"A STUDY ON THE IMPACT OF ELECTRONIC DATA INTERCHANGE IN THE SHIPPING INDUSTRY"

PROJECT REPORT

Submitted to the School of Maritime Management,

Indian Maritime University, in partial fulfilment of the requirements for the award of degree of "Master of Business Administration" in International Transportation and Logistics Management

BY

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DECLARATION

I, NOAH LEUCAS NEDIAKALA (REGISTRATION NO: 1905305024) hereby declare that the Project Report titled “To study on the impact of Electronic Data Interchange Operation in the shipping industry” is the bona fide work submitted to the School of Maritime Management, Indian Maritime University, Kochi Campus, under the supervision of Dr. Sreejith U, Assistant Professor, School of Maritime Management, Indian Maritime University, Kochi Campus. For partial fulfilment of the requirement of award of the degree Master of Business administration in International Transportation and Logistics Management is a report of the original work done by me and this work has not been submitted before in part or full to this or any other university or institution for the award of any degree, diploma or any other courses.

DATE: 29/06/2021 NAME: NOAH LEUCAS

PLACE: KOCHI

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EXECUTIVE SUMMARY

The purpose of this research is to look into the use of Electronic Data Interchange (EDI) in the shipping industry and logistics sector which includes freight forwarding business, logistics sector, the movement of cargoes through sea which is typically called as sea freight, usage in customs operations, port operations and so on and so forth. The usage of EDI in various operations of shipping business has been studied through the users of the respective applications. The impact on the usage of EDI depends on the users who are involved in the process of exports and imports and also who are interested to transport the products from one point to another point. The usage of EDI has increased multifold in the current scenario since every trader would like to get things done at the quickest possible time and also by spending fewer amounts of money and with greater ease of getting things done across the systems. The applications of EDI are made available through internet and this aspect facilitates the international traders to use EDI applications more predominantly. The EDI and Electronic Commerce are always used in conjunction by the traders who expect the processing of transactions in a transparent manner. The logistical aspects can be processed at a faster pace than before through the usage of EDI which literally leads to faster access to data and information. The global usage of EDI has made the international traders to go for e-filing of documents such as bill of lading, bills of exchange, letter of credit, cargo manifests and other e-documents with fewer hassles.

The most significant perceived benefits brought by EDI implementation are found to be faster information response and access, improvement of efficiency and streamlining of logistics processes. Since EDI being both quick and efficient, the shipping industry is expected to benefit greatly from its adoption, particularly in the areas of bills of lading. Unfortunately, numerous technical and legal obstacles have slowed the introduction of EDI, with the chief impediment being the law's insistence on paper-based documentation. Recently however, several significant steps have been taken to promote the use of EDI and it is revealed that more Research & Development efforts focusing on the provision of real-time information are warmly anticipated by the industry.

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INTRODUCTION

1.1 INTRODUCTION

The most crucial component of any international trade is the speed with which information can be accessed, particularly in the transportation of cargoes from one location to another. Because millions of dollars are involved in the transportation of high-value cargoes, the requirement for EDI implementation would become even more important. The use of the EDI application in the shipping industry will undoubtedly increase as a result of web-based document transactions. The EDI applications would also speed up the processing of payment gateways such as letters of credit, allowing for quicker money transfers from buyer to seller.

In comparison to EDI-based applications, EDI applications are generally created to decrease the complexity of manual labour, which may be less exact. The usage of EDI and internet connectivity will result in an increase in the transformation of data from one user to another. The shipping business, which is often regarded as a genuinely global industry, needs more accuracy and efficiency in document and payment processing. The EDI applications will also eliminate redundancy in the users' job.

The shipping paperwork were historically created using paper documentation and transmitted manually to the destination in the manual system. The document format used at one location should match the format used in the destination location, or the contents of the documents will not be decoded by the receiver in the destination location, resulting in confusion and duplication of information. EDI, on the other hand, employs standardised forms for shipping documents that are common in both origin and destination locations.

Companies participating in the transportation of commodities and papers will be given an electronic link, which will reduce duplication of effort. This will also provide access to the parties engaged in the deal for future transactions. EDI can be used to communicate standardised shipping documents within a company, such as between divisions, or between a company and its external suppliers, vendors, stakeholders, and clients.

The data and information that is transmitted from one firm to another in a safe way utilising EDI security software is handled with the highest care, and the time and money spent on this process is well spent.

From the time the vendor initiates the procedure until the customer makes the payment, EDI transmission comprises numerous phases of operation. The seller will begin the process of drafting the purchase order, and then the EDI transaction will begin. The seller's computer will next convert the purchase order into an EDI structured format, which will include the seller's

and buyer's names as well as an identification number. The buyer will get the EDI format in the form of an EDI envelope. The buyer will confirm the EDI message's validity and acknowledge receipt of the data.

The EDI message will then be translated into the buyer's internal computer system. The buyer's computer will approve the purchase order via the EDI system, and the seller will ship the items to the buyer's location, where they will be received and a receiving advice will be sent. After that, the seller will provide the buyer a money remittance advises, and the money will be sent to the seller by electronic funds transfer.

1.2 MEANING AND DEFINITION

Electronic Data Interchange (EDI) “is the electronic interchange of business information using a standardized format; a process which allows one company to send information to another company electronically rather than with paper. Business entities conducting business electronically are called trading partners. EDI is the electronic transmission of organized information by concurred message principles starting with one PC framework then onto the next without human mediation. It is a framework for trading business archives with outer substances. Numerous business records can be traded utilizing EDI, however the two most basic are buy requests and solicitations. At any rate, EDI replaces the mail planning and taking care of related with customary business correspondence. Many business documents can be exchanged using EDI, but the two most common are purchase orders and invoices. At a minimum, EDI replaces the mail preparation and handling associated with traditional business communication. EDI implies the electronic trade of business reports, for example, orders, delivery slips and invoices. These documents are exchanged among business partners in structured data form and without manual intervention. There are set standards for this which apply internationally.

It is normally utilized for online business purposes, for example, sending requests to distribution centres, following shipments, and making invoices. it is essential to have a simple method to exchange request data to the areas where the products are put away. EDI makes this

conceivable. Some normal EDI organizations incorporate X12 (U.S.), TRADACOMS (U.K.), and EDIFACT (Global).

The objective of EDI is the simple and secure trade of information between organizations, free of arrangements or product the board frameworks. Besides, organizations ought to have the option to further process this information without having to physically record it once more. EDI is basically utilized by huge organizations to have a uniform handling framework, empowering productivity, cost speed, accuracy and efficiency are the major benefits of EDI. The system is expensive to implement and usually requires help from a consultant that specializes in the field. Utilizing EDI frameworks limits the expense to print, record, store, post and recover paper records. The goal is to get rid of paper and have everyone working with the same invoice so that information is processed and read easily**.**

How EDI works?

Computer-to-computer: EDI replaces postal mail, fax, and email. While email is also an electronic approach, the documents exchanged via email must still be handled by people rather than computers. Having people involved slows down the processing of the documents and also introduces the potential for a host of errors. Instead, EDI documents flow straight through to the appropriate application on the receiver's computer (e.g., the Order Management System) and processing can begin immediately. A typical manual process involves lots of paper and people, the EDI process does not.

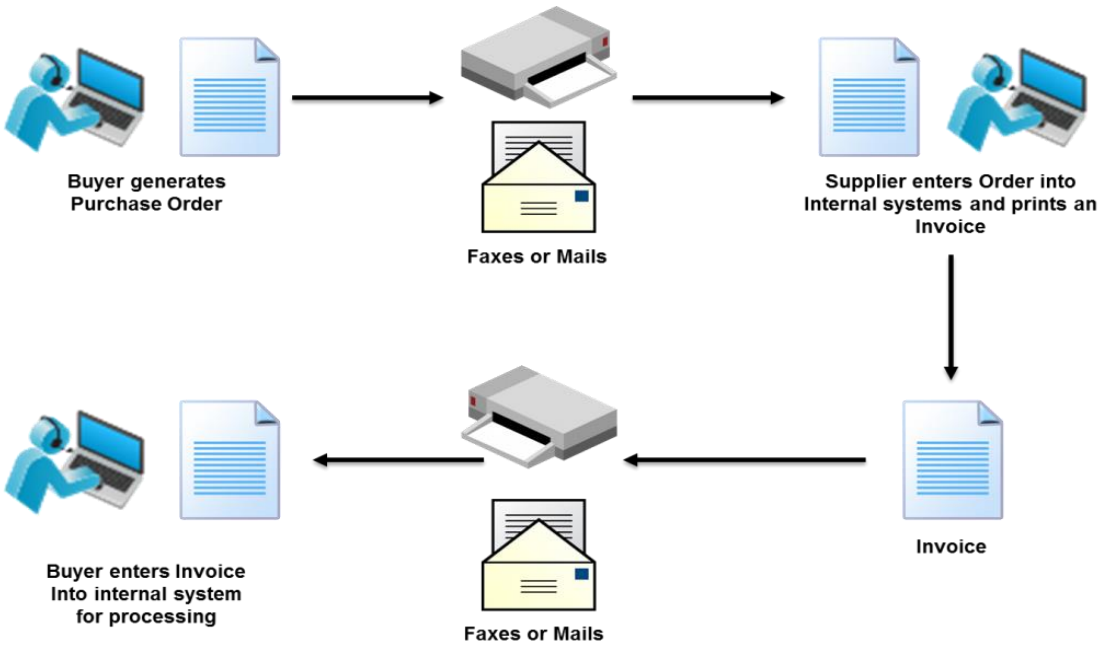

Fig 1.1

The EDI process looks like this — no paper, no people involved:

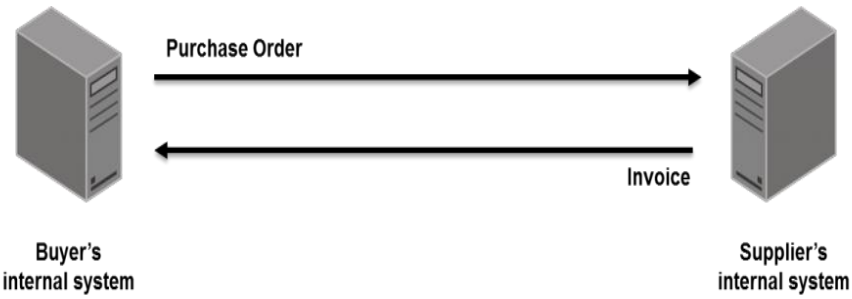

Fig 1.2

Business documents: These are any of the documents that are typically exchanged between businesses. The most common documents exchanged via EDI are purchase orders, invoices, and advance ship notices. But there are many, many others such as the bill of lading, customs documents, inventory documents, shipping status documents, and payment documents.

Standard format: Because EDI documents must be processed by computers rather than humans, a standard format must be used so that the computer will be able to read and understand the documents. A standard format describes what each piece of information is and in what format (e.g., integer, decimal, mm/dd/yy). Without a standard format, each company would send documents using its company-specific format and, much as an English-speaking person probably doesn't understand Japanese, the receiver's computer system doesn't understand the company-specific format of the sender's format.

There are several EDI standards in use today, including ANSI, EDIFACT, TRADACOMS, and ebXML. And, for each standard, there are many different versions, e.g., ANSI 5010 or EDIFACT version D12, Release A. When two businesses decide to exchange EDI documents, they must agree on the specific EDI standard and version.

Businesses typically use an EDI translator – either as in-house software or via an EDI service provider – to translate the EDI format so the data can be used by their internal applications and thus enable straight-through processing of documents.

Business partners: The exchange of EDI documents is typically between two different companies, referred to as business partners or trading partners. For example, Company A may buy goods from Company B. Company A sends orders to Company B. Company A and Company B are business partners.

1.3 PROBLEM IDENTIFICATION

The study focuses on the impact of Electronic Data Interchange Operation in the shipping industry and the impact it has had on this sector. Electronic Data Interchange refers to computer-computer exchange of business documents in a standard format. EDI describes both the capability and practice of communicating information between two organization electronically instead of traditional form.

1.4 RESEARCH OBJECTIVES:

1.41 GENERAL OBJECTIVES:

To study on the impact of Electronic Data Interchange Operation in the shipping industry.

1.42 SPECIFIC OBJECTIVES:

- To identify the areas of applicability of EDI operations
- To analyse the impact of EDI operations
- To understand the challenges faced by EDI operations

1.5 SCOPE OF THE STUDY

This study will investigate the current impact of EDI selection in shipping, its use in customs offices, and the types of shipping documents and EDI messages. The impact of EDI on the transportation industry is substantial. The apparent usefulness of EDI software is widespread throughout the industry, particularly for online EDI systems. Vendors are increasingly utilising PCs to facilitate global exchanges, and many observers believe that irrefutable electronic commerce is nearing reality. At the moment, the corporate network relies on electronic data

interchange (EDI). The most notable reported benefits brought about by EDI execution are faster data reaction and access, as well as improved proficiency.

Because EDI is both quick and proficient, the distribution industry is expected to profit greatly from its reception, particularly in the areas of bills of replenishment. As a result, the current study is complete in order to understand the impact of EDI on the delivery sector. Typically, information from one PC is not structured in a way that allows it to be directly input into another PC. The information may need to be reorganised before it is transferred to another PC, or a few pieces of information may not be required by any stretch of the imagination. With EDI, all information is converted into a standard format before being transmitted through the system. The PC that receives the information would then be able to extract the necessary data.

1.6 RESEARCH METHODOLOGY

The type of research is descriptive in nature and this study mainly focuses on the impact of electronic data interchange in the shipping industry. This report mainly contains facts based on the secondary data collected from websites, reports, newspapers and internet resources and articles.

1.7 RESEARCH HYPOTHESIS

H1: There is a significant difference in the mean values of the EDI factors of shipping business
H2: There is a significant difference in the mean values of cost and time factors of EDI

1.8 LIMITATIONS OF THE STUDY

- Due to covid the study was limited to collection of secondary data only.

- Exact and proper values were not available and therefore conduct of quantitative data was not possible.
- More time and money are required to make the study helpful to the general audience.
- This study is limited to the information from online journals and study reports.

1.9 DISERTATION STRUCTURE

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CHAPTER 2

LITERATURE REVIEW

2.1 REVIEW OF LITERATURE

A literature review examines books, academic papers, and any other materials related to a certain subject, field of research, or theory, and gives a description, summary, and critical assessment of these works in connection to the research problem under consideration. The aim of literature review is to show that "the writer has studied existing work in the field with insight" A decent writing audit presents an unmistakable case and setting for the venture that makes up the remainder of the theory. The study done here is the impact of Electronic Data Interchange in the shipping industry where the importance and usage of EDI in various organizations is being surveyed here. A few contextual analyses have been conducted to look at explicit components of EDI usage in associations. The following is a summary of a few of these surveys conducted.

Noor Apandi Osnin (2017) specifies in the study made with regard to EDI in Transportation elicits that the communication between people who are involved in the transportation of cargoes from one point to another point requires the data to be transferred at the quickest possible time and also without any human intervention. EDI covers transferring of data, information security, vendor participation, trader's information, distribution of data, sales data and much more. Through EDI applications, the traders and clients can exchange the information at a faster pace than the olden days. EDI will provide access to the new markets by utilizing the trading opportunities that are prevailing in that region. The major problem with regard to international trade would be the availability of proper distribution network, proper customs operations, and few others which will amount as the hurdles and these barriers can be conveniently overcome by the usage of EDI applications. The usage of EDI applications do not require years of training and with little bit of familiarization of computer jargons, one easily pick up the knowledge about EDI. The EDI application in transportation sector is considered to be the biggest advantage for the people who are involved in the trading process.

For this investigation, data from 128 businesses was obtained. The findings of this study show that the EDI level fundamentally affects overall success of the EDI framework as perceived by customers, but does not predict overall success as perceived by suppliers. In addition, it was revealed that the EDI dimension of utilisation predicts the criticality of 4 out of 13 EDI

execution variables as a result of this investigation. They are as follows: pilot project execution, cross-utilitarian EDI group usage, security and evaluation control, and end-client EDI preparation. It has been finished up by the creators to think about that the consequences of this examination, propose the need to achieve further examinations in the territory, and to decide different elements that may influence the connection between the dimensions of EDI execution and framework achievement. **Angeles et al (2001),** have dissected the elements that are basic for American organizations in fruitful EDI usage in the US, and globally, have been examined.

Here, data from 56 businesses has been analysed. The factors that affect EDI implementation at the domestic level (in the United States) are contrasted to those that affect international EDI. Furthermore, the relative relevance of each implementation element in terms of EDI performance on a national and worldwide scale has been reported. The following key components associated with effective EDI execution in the United States have been identified: EDI principles, relationships with exchanging partners, top management support and responsibility, accessibility of significant value included systems (VANs), and security and review controls. For the success of EDI at the international level, availability of mature communication infrastructure, accessibility to international VANs, adequate security measures for international data transmission and kind disposition" of laws overseeing international trade, has been found to be critical.

Heck and Ribbers et al (1999) have analysed the factors responsible for the adoption/implementation of EDI system and its impact on small businesses in Netherland. This examination has been bolstered by 137 little firms, which included 83 non-EDI-adopt, 54 EDI-adopter organizations. The consequences of this investigation demonstrated that the predominant factor that clarifies the reception of EDI by independent companies is 'outside weight'. The underlying reason is that small businesses are forced to do this by their dominant suppliers or customers. An additional result of this study shows that for the EDI-adopters from the investigated group, there was no noteworthy connection between the level of EDI integration and the actual benefits adopters received from utilising EDI.

Leslie K.et al (1995) have examined in their study the process of adoption and integration of EDI by US automobile industry suppliers. Their study has been based on data from 103 responding companies, where 81 firms had already introduced EDI and 22 companies had not. Their investigation demonstrates that the components influencing EDI appropriation are not quite the same as those influencing EDI coordination and victory. According to their findings, it seems that managerial pro activeness is the most significant factor for EDI integration and success. So as to execute EDI effectively in the inventory network, it is vital for EDI advertisers to invigorate the administrative professional animation of low haggling force providers by helpfully helping them in the process of learning how to identify and explore EDI benefits.

Gerrit K. Janssens (1988) conducted an inter organisational study on personal interview with the responding company employees. In this paper he looked at various aspects of EDI in the business world, and more specifically how EDI has changed from its original concept. He concludes that the utilization of EDI is still increasing and that the concept of supply chains is a driver to give it use an additional boost. In a logistics business, lots of supply chains cross each other and have their links, the utilization of EDI seems to grow towards a common service. While in the past the utilization of EDI has been slowed down to high software investments, in the future, internet-based EDI will have a dominant position over dedicated software implementations. Efforts by authorities or community organisations allowing a relatively low-cost access to the utilization of EDI will certainly benefit its future positive evolution. The integration of IT and effective electronic communication is a number one-priority. Incompatibility, security, different company size, internationals and cultural differences are expected to slow down the growth process, the final conclusion is that there exists a positive future for EDI."

Technology and the freight industry don't always go hand in hand. The reasons behind this are complicated, but technology-trusting freight brokers like Freight Pros are making progress. We've invested heavily in our customer's Transportation Management System, as well as software such as Salesforce and Bloom fire for many of internal processes and documents. Electronic Data Interchange, commonly known as EDI, is another way in which the freight industry is pushing into the 21st century. Electronic Data Interchange is the computer-to-computer exchange of information in a standard electronic format. EDI is hardly freight

industry specific, and you can find its use in the finance industry, as well as many others. But that's not our topic today. Today, we're going to talk about using Electronic Data Interchange in the Freight Industry. The most common use of EDI in shipping is the scheduling of pickups. At Freight Pros, we schedule a lot of pickups. Hundreds a day. That means phones ringing off the hook, emails blowing up, and interminable hold times. And the same thing happens on the side of the carrier dispatchers! It's a process that requires excellent skills in multi-tasking. By using Electronic Data Interchange when scheduling pickups we can save time and limit mistakes. **(Logan Theissen, 2016)**

Josep Oriol (2014) indicates in the study made with regard to the Electronic Data Interchange in Port Management that the speed of the dispatching of goods will depend on the efficient way of managing and handling of documentation procedure. In order to facilitate the speedy way of managing of documentation procedure, EDI plays the major role. EDI' structured messages are sent from one computer to another computer of different architectural background. It is the beauty of EDI application that the messages are sent and understood in the smooth manner without any human intervention. If documents such as bill of lading or bay plan or manifests are to be sent to the recipient then the EDI will be really handy since without any human intervention, the documents can be handled efficiently. From the ports point of view, the most important documents to be transmitted through EDI would be cargo manifest and customs declarations. The next category of documentation which are handled by EDI would be the inter communication sent and received from and by the freight forwarders, non-vessel operating common carriers, agents appointed by principal and charterers.

Shannon W. Anderson (2002) the study was conducted on sales service department of OFM Logistics, this was focused on the major 500 independent dealers of the firm on his study "Electronic Information exchange (EDI) is a data innovation that institutionalizes the trade of data between executing parties. Utilizing information from a noteworthy U.S office furniture producer that received EDI fundamentally to improve the proficiency of bookkeeping exchanges, he assesses whether EDI diminishes request preparing time (the time from deals request receipt to deals request planning) and whether this improvement is more prominent for increasingly complex requests. Our proportion of unpredictability reflects both the blend of

various items the seller arranges just as highlights and alternatives the vendor chooses for every item in the request. In his discoveries that EDI is related with quicker request preparing, free of unpredictability, and that EDI mitigates the greater part of the negative impacts of intricacy on handling time. He finds that sellers figure out how to submit mistake free requests to the maker, and that past mistakes give input that enables sellers to submit more exact requests from his study he concluded that only mixed evidence that order complexity impedes learning.

Judith E Payne (1950) he conducted and interview on DoD logistics policy maker managers and workers with the representatives of other federal agencies involved with EDI and also with the vendor which provides relevant services. He also analysed the quantitative data's which required for his study to understand performance of existing DoD EDI efforts. He finds that "Electronic Data Interchange (EDI) has been pushed as a standout amongst the most significant utilizations of PC innovation, what's more, one that holds the best potential for improving the country's efficiency for with EDI will come "electronic trade," an innovation that will permit both private and open segment business to move from a paper-based world to one dependent on electronic exchanges. Each EDI exchange is organized so that it very well may be perceived and handled by a company's PC without human intervention-that is to say, without the need for a person to interpret the transaction for the computer. Even more important, EDI enables businesses as well as DoD to use many new techniques in pursuit of more effective resource management"

Hariesh Manaadiar (2010) specifies in the study undertaken with regard to EDI messages transmitted between traders who are doing business in two different countries will be based on EDI messages. In the olden days, the cargo manifests were sent through the master of the vessel and also through the post. The EDI messages can be deciphered instantaneously by both the parties avoiding unnecessary confusions between parties, port authorities, customs officials, that is, the information regarding the cargo manifest, loading and discharging list, stowage planning, bills of entry and other relevant data. The EDI software will automatically convert

the data and documents into EDI messages assisting the parties to understand the requirements of each other. The examples of EDI messages are ENTREC, DOCAMA, RETANN, etc.

Erick Pettersson (2001), the area of study on his thesis was focused on four major sectors such as sea freight industry, air freight industry data communication and trade vision products and services. The study analysed that the air payload industry has a rigid background of standardisation and employment of electronic information exchange. Subsequently it has been normal for trade vision, an e-coordination organization, to create electronic message administrations for the business and its included gatherings using EDI. Recent solicitations for comparable administrations in the ocean payload industry too have developed as another business open door for Trade vision. This report maps the flow circumstance in ocean cargo, makes an operational correlation to airfreight and explores how this new business zone ought to be drawn nearer. The result demonstrated that the market still is at an underlying stage, why open doors for major pieces of the pie enables the explanations behind trade vision to get in to this zone. At first, electronic associations with transportation lines ought to be made through INTTRA, a gathering of delivery lines participated in their EDI-work. Later, other transportation lines ought to be added to the framework. System functionality should include: booking function, sending shipping instruction to shipping lines and presenting status information on shipped cargo.

In this paper, we survey and analyse the actual conditions of EDI system for B2B business of transport companies in Korea. As the result of our analyses, it comes an old-fashioned EDI system at harbour and logistics industry, and the VAN based systems are still widely used in Korea. In conclusion, the next generation EDI, XML/EDI, is very effective to solve these kinds of problems. So, we suggest and implement a scheme of XML/EDI as a substitute for the traditional one. We design and implement the XML/EDI system on B2B of shipping request to show the effectiveness and strength of XML/EDI over the traditional EDI. At first, we analyse the standard items of shipping request EDI, and define the document by the DTD of shipping request. And we implement the document creation module in order to generate the document without user's knowledge of XML, and also implement XML storage module to store the generated XML document. **(Soung Won Kim, Ran Jung and MyoungSoo Kim, 2005)**

Abdel-Latif, Hatem (2000) narrates in the study made on the EDI application to facilitate global freight transportation is that the EDI procedures are facilitating the traders and the customers who are involved in the international trading process of exporting and importing of cargoes of bulk nature and containerized cargoes. The cost-benefit analysis made by the author revealed the EDI usage has had a direct impact in the reduction of money spent in the handling of documents which are handled internationally. The EDI applications saved a lot of money in the waiting time of documents reach to the destination and thereby the data and information were efficiently shared between parties with less human intervention and chaos. The paperless operation could truly be achieved through EDI operation by sending the EDI messages about the port documents and customs documents well in advance to the relevant authorities and this has made a lot of time and money savings on both the parties. The major hurdle that hinders the international transaction would be the procedures followed in the respective countries and ports and EDI has simplified that process.

Amir Parsa (2003) his study on Analysis of EDI success implementation factors and their interrelationship with the level of EDI implementation within Swedish companies was improvised from “Index for Elektroniska Affärer" composed by Anna Johansson. She conducted two categories of companies for the study. The first category, which amounts to 600 companies, is related to large Swedish companies and the second category, which amounts to 300 companies, is related to small/ medium ones. It is of importance to mention that the categorisation of companies in relation to their size is based on several factors such as the sales volume, number of personnel, and etc. Amir decided to narrow our research down to this category, as the EDI application prevails in large companies. One of our main reasons underlying the delimitation of study is due to limited time and resources. Instead of contacting all 600 EDI responsible persons, which is a very time-consuming, so they focus on a small proportion of 50 companies in order to run the analysis, and get a fairly precise result. Selection of companies has been done randomly, attempting to include firms from different Swedish industries. “This theory concerns the electronic information trade (EDI) which is being utilized for exchanging data between associations in the production network. The advantages and hindrances of utilizing EDI are featured all through the presentation organize of our

examination work. Despite the clear focal points of the EDI framework, it has been accentuated by numerous inquiries about and experts that the usage of the EDI framework can result in both positive and negative impacts for the organizations. A legitimate usage of the EDI framework may dispense with or possibly limit its hindrances and improve the viability of the EDI framework"

Roland Hellberg, Ragnvald Sannes (1991) specifies in their study of using EDI by freight forwarders that the EDI significantly improves the transaction of data especially for customs clearance and port authorities, The time taken and the cost related to the transmitting of data from the freight forwarders in Norway to the freight forwarders in the destination port has considerably reduced. This clearly shows that there is a huge amount of advantage exists in the usage of EDI applications. The EDI usage will also increase the customer base in the international trade and also it will have a smooth flow of materials and information across the borders.

(Tae-Woo Lee, Nam-Kyu Park, John F. Joint &WoongGyu Kim, 2000) There have been many efforts to develop a logistics information system in the Korean logistics industry. In spite of these efforts, there are many points which need improvement in the Logistics Information System, of which function is the electronic data communication without added value. This paper aims to describe some of the main problems and the successful factors which are being found in the evolution of the present EDI systems for clearing import/export container cargoes, with special reference to Singapore, Korea, and Japan. Following this, leaving legal issues aside, to suggest workable guidelines for designing a new efficient EDI system for container cargo logistics. As a result of the review, the following successful factors are drawn:

(a) the planning, requirement analysis and design of EDI are critical, as it provides a framework for its implementation;

(b) as the data of customs clearance are an integral part of a logistics EDI system, the inclusion of customs in the system design is essential;

(c) the sharing system of cargo data as the framework of the logistics EDI is efficient for data interchange;

(d) the EDI software for the user has been developed and provided by an EDI network operating company; and

(e) to facilitate communication between trading partners and the transport sector, it is necessary to adopt a global message standard, such as EDIFACT.

Hurewitz, Barry J et al (2003), legal disputes associated with EDI may present potential challenges to business organizations. Their study has been based on data from 10 responding companies that the survey was based on questioner with responded by the legal officials. On his study business partners together need to clearly make an agreement on all terms and conditions related to EDI use. The terms and conditions of EDI use depends on the partners involved and the furthermore business. This may incorporate span of the agreement, assignment of who pays for system charges, what's more, the commitments of sender and beneficiary, on the off chance that the archive is caught by an unapproved outsider or just a piece of the archive is transmitted.

2.2 LITERATURE GAP

So, from all these comparisons and critics from different authors we can see that EDI is a business invention that allows companies and their partners to exchange business information electronically, without the need for human involvement, between their computers. EDI was created for its inherent economies, such as increased efficacy, less errors, and lower costs. However, the major benefits grew in other, obviously larger zones, particularly in reduced stockholding requirements and marketing gains via improved administration and a larger client base. Competitive edge advantage resulted from the better cost base and the utilisation of fresh, up-to-date information.

EDI has grown at a breakneck pace, and it is currently used as a standard in a variety of industries and countries. EDI is currently a critical issue at the organisational, industrial, and national levels. It will become increasingly important as it integrates with ongoing advancements in the whole field of media communications innovation, on which future economic growth and the creation of additional employment possibilities are dependent. Both the government and the private sector must work together to coordinate and promote such a key commercial device on a national level.

The main aim of this study is to understand the reason behind the adoption of EDI, the impact of EDI in the shipping business, the conceptual understanding of EDI and its effectiveness and the working of EDI in the shipping industry.

CHAPTER 3

CONCEPT ANALYSIS AND INTERPRETATION

3.1 WHAT IS EDI?

Electronic Data Interchange (EDI) “is the electronic interchange of business information using a standardized format; a process which allows one company to send information to another company electronically rather than with paper. Business entities conducting business electronically are called trading partners. EDI is the electronic transmission of organized information by concurred message principles starting with one PC framework then onto the next without human mediation. It is a framework for trading business archives with outer substances. Numerous business records can be traded utilizing EDI, however the two most basic are buy requests and solicitations. At any rate, EDI replaces the mail planning and taking care of related with customary business correspondence. Many business documents can be exchanged using EDI, but the two most common are purchase orders and invoices. At a minimum, EDI replaces the mail preparation and handling associated with traditional business communication. EDI implies the electronic trade of business reports, for example, orders, delivery slips and invoices. These documents are exchanged among business partners in structured data form and without manual intervention.

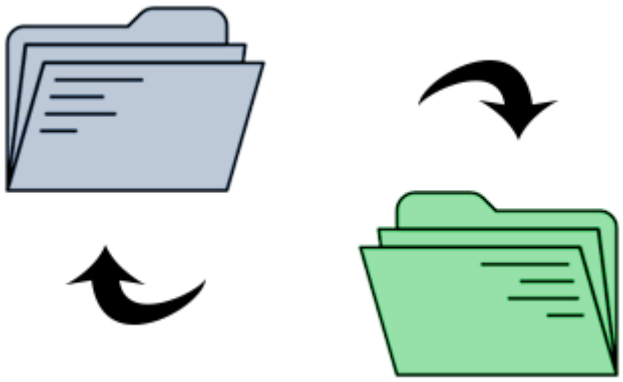

Fig 3.1

So basically, EDI comprises of many types of “messages” which when transmitted between two parties is designed to substitute other forms of data transfer. In the olden days, a hard copy of the manifest used to be handed over to the captain of the ship and also a hard copy of the same used to be couriered or posted to the relevant discharge ports. As technology improved, there was the process by which the manifest was sent to the relevant discharge ports by email. The manifests thus received by the discharge port agents were manually captured into their respective computer systems. With the advent of EDI, the above can now be avoided and precious time can be saved. When sent as an EDI message, the data can be instantly downloaded into the recipient’s system thereby avoiding manual capture which in turn will

avoid any typographical errors and also saves a lot of time. This EDI messaging is also used to send the data to Customs (Manifest, Bill of Entry), Port (Container Stowage planning, Cargo Dues, Load/Discharge list, Container moves), Principals (Load/Discharge list, Container moves, Bookings). Usually there are software that will help to convert data into an EDI format and this is then sent by email to the recipient same as a normal machine. At the other end, there are systems that can automatically receive these messages and transfer them back into data in their system. There are many different types of EDI messages and among them or mainly used by shipping lines/agents are as below:

1. ENTREC: Accounting entries message

2. DOCAMA :Advice of an amendment of a documentary credit message

3. CONAPW: Advice on pending works message

4. RETANN :Announcement for returns message

5. APERAK: Application error and acknowledgement message

6. IFTMAN :Arrival notice message

7. AUTHOR; Authorization message

8. BALANC :Balance message

9. BOPCUS :Balance of payment customer transaction report message

10. BOPINF: Balance of payment information from customer message

11. BOPBNK: Bank transactions and portfolio transactions report message

12. BANSTA :Banking status message

13. BAPLIE :Bayplan/stowage plan occupied and empty locations message

14. BERMAN :Berth management message

15. IFTMBC :Booking confirmation message

16. BMISRM :Bulk marine inspection summary report message

17. BUSCRD :Business credit report message

18. IFTICL :Cargo insurance claims message

19. HANMOV :Cargo/goods handling and movement message

20. CHACCO :Chart of accounts message

21. CLASET :Classification information set message

22. COACSU :Commercial account summary message

23. COMDIS :Commercial dispute message

24. IFTMCA :Consignment advice message

25. COPARN :Container announcement message

These are some of the examples of the various EDI messages used in the shipping industry. The simple definition of EDI is a standard electronic format that replaces paper-based documents such as purchase orders or invoices. By automating paper-based transactions, organizations can save time and eliminate costly errors caused by manual processing.

In EDI transactions, information moves directly from a computer application in one organization to a computer application in another. EDI standards define the location and order of information in a document format. With this automated capability, data can be shared rapidly instead of over the hours, days or weeks required when using paper documents or other methods.

Today, industries use EDI integration to share a range of document types — from purchase orders to invoices to requests for quotations to loan applications and more. In most instances, these organizations are trading partners that exchange goods and services frequently as part of their supply chains and business-to-business (B2B) networks.

All EDI transactions get defined by EDI message standards. It is vital to have proper governance processes for data quality. When information is missing or in the wrong place, the EDI document might not be processed correctly.

Standards are the basis of EDI conversations. Several organizations define the EDI message standards, including ODETTE, TRADACOMS, GS1, Peppol and the Accredited Standard Committee X12 (ASC X12).

In general, there are two basic types of EDI transmission:

- **Point-to-point or direct connections:** Two computers or systems connect with no intermediary over the internet, generally with secure protocols.
- **Value-added network (VAN):** A third-party network manages data transmission, generally with a mail boxing paradigm.

EDI internet transmission protocols include Secure File Transfer Protocol (SFTP), Applicability Statement 2 or AS2, an HTTPS-based protocol, Simple Object Access Protocol (SOAP) and others.

EDI data elements include items such as sender ID and receiver ID. Data segments combine two or more related elements to give them greater meaning. For example, FNAME and LNAME can combine to form CUSTOMERNAME. Envelope's structure different types of data and carry the sender and receiver address information. EDI document flow or message flow describes the movement of EDI messages to various inbound and outbound addresses and departments to execute a business process or transaction.

Metalanguages such as Extensible Markup Language (XML) or JavaScript Object Notation (JSON) complement rather than replace EDI. Companies must be ready to handle an ever-increasing number of document formats and transmission options. One global manufacturer routinely exchanges about 55 different document types with nearly 2,000 partners.

An EDI system's essential components basically are:

Equipment (PCs), media transmission system, correspondence programming, and interpretation programming are the main components of an EDI system.

- Hardware equipment:
  Hardware is a specialised term for a wide range of PCs as well as the associated physical hardware. They are essential components in the development of EDI exchanges, since they provide the physical interface that enables and promotes the electronic transfer of data between at least two trading partners. Any combination of centralised server and close-to-home PCs can be used to build an EDI system.

- **Telecommunication Networks**

  Media transmission offices are made up of phone lines or other correspondence channels that provide a medium for data to be electronically communicated between the sender and the recipient. The connection can also be completed via satellite. If a media transmission line cannot be connected to the receiving PC, the data can be kept in touch with a floppy circle or an attractive tape. The floppy diskette or attractive tape could then be physically transported to the accepting PC.

  If a telecommunication line cannot be established between the sending and receiving computers, the information can be written to a floppy disc or a magnetic tape. The floppy disk or magnetic tape can then be physically transported to be used the receiving computer.

- Interchange Software and Translation Software:

  Message exchange programming allows messages to be sent and received between computers. They should have interchanges programming and interpretation programming for sending messages from one PC to the next. Interpretation programming allows messages to be encoded and decoded into a format that the two PCs can understand. The transmitting PC's programming "interprets" the message into the proper organisation or sequence of information components as specified by the message standard. At the receiving PC, the product translates the standard message into an arrangement that can be understood by the receiving PC and printed or shown in plain language.

3.2 BENEFITS OF EDI:

EDI transactions are essential to B2B processes and continue to be the preferred means to exchange documents and transactions between businesses both small and large. There are five key business benefits that EDI technology delivers through automation and B2B integration:

- EDI technology saves time and money through automation of a process previously manually executed with paper documents.

- EDI solutions improve efficiency and productivity because more business documents are shared and processed in less time with greater accuracy.
- EDI data transfer reduces errors through rigid standardization, which helps to ensure information and data are correctly formatted before they enter business processes or applications.
- EDI integration improves traceability and reporting because electronic documents can be integrated with a range of IT systems to support data collection, visibility and analysis.
- EDI automation supports positive customer experiences by enabling efficient transaction execution and prompt, reliable product and service delivery.

For large organizations, EDI enables standards to be instituted across trading partners to achieve benefits consistently. For smaller organizations, adherence to EDI offers greater integration with larger firms that have big budgets and strong influence.

3.3 TYPES OF EDI:

- **Direct EDI/Point-to-Point:**

  Direct EDI, sometimes called point-to-point EDI, establishes a single connection between two business partners. In this approach, you can connect with each business partner individually. It offers control for the business partners and is most commonly used between larger customers and suppliers with a lot of daily transactions. In the direct connection approach, you and your business partner connect directly via the Internet using the same communication method or protocol. This approach can become very complex and resource intensive if different business partners are using different communication protocols, which is the norm in most trading communities. Your system must be able to support all of these different, required protocols.

  This approach is most commonly used by large corporations that have business partners with whom they exchange a high volume of EDI documents, frequently.

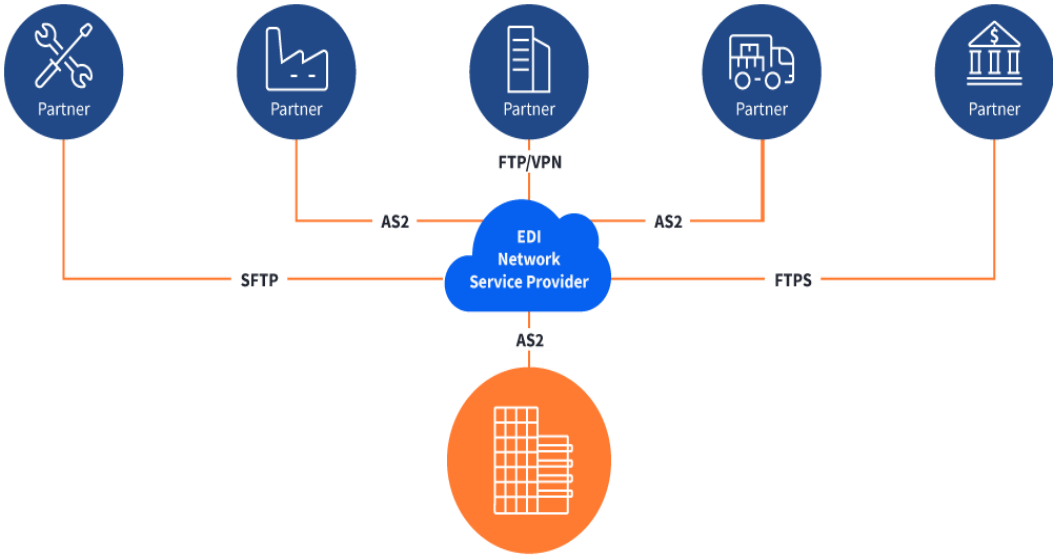

Fig 3.2

- **Proprietary EDI:**

  In proprietary EDI data exchange with partners takes place via direct communication channels. Different kinds of encryption and distinguishing proof conventions can be utilized in this direct correspondence, for example, AS2, OFTP2, FTPS, SFTP, and so on. On the off chance that there are a few accomplices, the bound together administration of restrictive correspondence channels is fairly exorbitant thusly exclusive EDI is rarely used in multi-party connections. Another important issue is that on account of communication established within a private sphere, conversion has to be solved in the same sphere, which also represents considerable availability requirements and costs.

- **EDI via AS2:**

  AS2 is an Internet communications protocol that enables data to be transmitted securely over the Internet. EDI via AS2 delivers the functionality of EDI with the ubiquity of Internet access. AS2 is one of the most popular methods for transporting data, especially EDI data, securely and reliably over the Internet. It essentially involves two computers – a client and a server – connecting in a point-to-point manner via the web. AS2 creates an “envelope” for the EDI data, allowing it to be sent securely – using digital certificates and encryption – over the Internet.

- **Mail EDI (X.400, SMTP)**

  Naturally, EDI messages can likewise be conveyed through messages. Here, as well, we can recognize two sorts of correspondence. The more widespread, but also more problematic correspondence method uses Internet mailboxes and the SMTP standard recommendation. Although Internet mail is a cheaper solution, in today's world of spam and counter-spam filters its use is problematic in automated business relations. EDI is on a very basic level a business and regulatory framework in this manner it was coherent that EDI message transmission should occur on a business correspondence framework that utilizes the X.400 standard. This is the sort of EDI that the previously mentioned VANs for the most part use in their interior systems, putting EDI messages in a X.400 correspondence envelope as per the X.435 standard. In most cases, the associations between VANs additionally occur on a X.400 system.

- **Web EDI:**

  Web EDI is simply conducting EDI through an Internet browser. It replicates paper-based documents as a web form. The form will contain fields where users can enter information. Once all the relevant information is added, it is automatically converted into an EDI message and sent via secure Internet protocols such as File Transfer Protocol Secure (FTPS), Hyper Text Transport Protocol Secure (HTTPS) or AS2.

  The ease of rolling out a Web EDI solution facilitates the participation of all your business partners. This can be especially beneficial when working with partners in countries where IT and EDI skills are limited. Companies are not required to install any EDI software or manage a complex EDI environment.

  In its simplest form, Web EDI enables small- and medium-sized businesses to create, receive, turn around and manage electronic documents using a browser. Simple pre-populated forms enable businesses to communicate and comply with their business partners' requirements using built-in business rules. Business partners anywhere in the world can connect without dedicating IT resources to their EDI implementation.

  Web EDI is traditionally based around the 'hub and spoke' model, in which the major business partner acts as the hub and the smaller partners as the spokes. In this model:

  - The hub organization implements EDI and develops a web forms option for use by its small- and medium-size business partners.

- These web forms may be hosted on the hub's site or that of an EDI network service provider.
- Business partners connect to the web forms via web browser to exchange documents as forms that are converted to EDI documents behind the scenes for subsequent processing by the hub.

- **EDI providers**

  When EDI is set up through a specialist organization, correspondence channels are given by the last mentioned. A portion of these specialist organizations are known as VANs (Value Added Network), and they perform EDI transmission inside their own private system, commonly through X.400 post boxes. Another fragment is referred to just as EDI suppliers - they give message transmission by means of an open system and for the most part additionally offer change and different administrations, for example, receipt chronicling. These specialist organizations are nearer to the redistributing administration of EDI.

- **Mobile EDI:**

  There have been questions about whether a user would want to use a mobile device for completing a purchase order or invoice while out of the office. However, focusing on supply chain efficiencies, it is easier to see the benefits of a sales person being able to see the status of a delivery to a supplier while on the road or a business manager being able to review supplier performance while in a re-negotiation meeting.

  The result is that these types of Mobile EDI applications are beginning to appear. The limitations of the mobile devices themselves have hampered development. The quality and size of the screen for most devices has been relatively poor. However, the advent of the iPad and other tablet computers is altering what can be achieved with mobile computing devices.

  It is not an overstatement to say that these devices are changing the way users interact with their organizations and some companies are starting to launch applications to help 'mobilize' their supply chains. It has now become accepted that there are corporate

'apps' and it is only a matter of time before you can download a supply chain or EDI-related app from a private or corporate app store.

Recently, the Retail sector has seen the adoption of Direct Exchange (DEX) to help the flow of products and information through the supply chain. Using DEX, delivery personnel can scan the barcode of an item into a mobile device to create an electronic invoice. This data is transmitted to the receiver via an in-store docking station. The receiver opens the invoice in the receiving system and scans the delivered goods to verify quantities. After the data is reconciled, the digital invoice is closed and a finalized copy is transmitted back to the supplier system via his mobile device. One US retailer has been able to reduce the duration of each store delivery by 15 to 45 minutes using DEX.

- **EDI via FTP/VPN, SFTP, FTPS**

  FTP over VPN, SFTP and FTPS are commonly-used communication protocols for the exchange of EDI documents via the Internet. Any of these can be used to connect to business partners directly (Direct EDI) or via an EDI Network Services Provider.

- **EDI Via VAN/EDI Network:**

  The vast majority of EDI still occurs via EDI VAN also known as Value Added Network. Despite the emergence of some basic, low-cost approaches, such as Web EDI or EDI via AS2, the EDI VAN model continues to be the preferred option due to the value- added service that EDI VAN providers can deliver. Often companies look to implement a hybrid strategy in which different types of EDI are implemented as appropriate to the business, but the EDI VAN remains the core to these installations.

  What is an EDI VAN?

  Companies just starting off with their first EDI connections, may choose to set up direct EDI or point-to-point connections to other EDI enabled businesses, which quickly turns into "integration spaghetti". Although this scenario provides great flexibility, the problem is that the cost scale is the size of the trading community which becomes very expensive and very complex, very quickly. To simplify the complexity of managing multiple EDI direct connections, a company can use a single connection to an EDI VAN, which provides partner connections. The EDI VAN is simply a secure network where EDI documents can be exchanged between a network of business partners. An

organization will be provided with a mailbox by the EDI VAN provider. Documents are sent and received from there and the organization checks the mailbox periodically to retrieve its documents. Most EDI VAN providers offer an alerting service that informs the sender when messages have been sent successfully and also notifies the recipient that a new message is waiting.

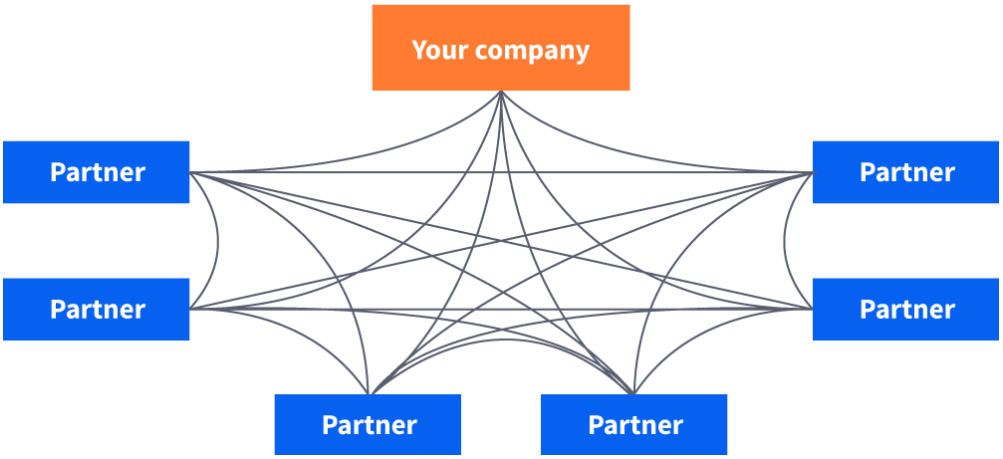

Fig 3.3

Benefits of an EDI VAN:

In addition to the many EDI benefits your company can realize by moving away from manual paper-based document exchange, companies who enlist the services of an EDI VAN provider can take advantage of additional value-added services, such as:

Secure communication channel. Electronic data transfers can be made securely using encryption

Full mailbox service. Messages are automatically routed to the correct mailbox. Business partners connect to the EDI VAN to retrieve their messages

Inspection and authentication of all EDI messages. The EDI VAN will verify the identity of the business partner and validity of the message

Expanded network connections. By connecting with a network of companies, a business can quickly onboard and begin trading with new EDI-enabled partners.

Support for a variety of protocols. Since a VAN sends data with a variety of protocols, it creates a fast communication channel allowing each party to use the data format most suited for their organization, which is critical for setting up a scalable business model

Full audit trail. All EDI messages are tracked and recorded

Message notification. Business partners are notified when message enters their mailbox

Ancillary services. EDI VAN providers offer an extensive range of EDI VAN services including data backup and recovery, document mapping and compliance

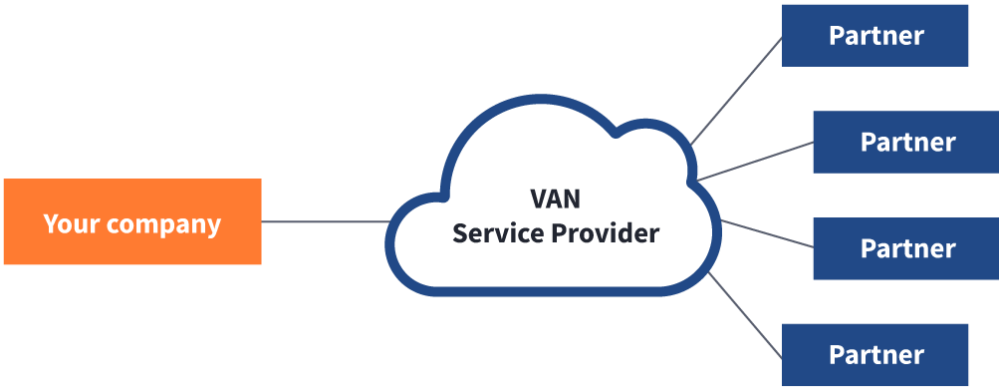

Fig 3.4

3.4 EDI Standards

Since the introduction of EDI in the 1960s, various associations have worked to institutionalise B2B information. Due to diverse company requirements, ventures have advanced informing designs for their own utilisation, resulting in more than twelve well-known EDI principles being applied today. Well-known configurations, for example, X12, EDIFACT, TRADACOMS, and ebXML, are used over ventures to encourage commercial correspondence, while specialist kinds and EDI groups indicate exchanges in exceptional industry circumstances.

The different types of EDI standards are:

- **EANCOM**

  EANCOM is an EDI standard used to incorporate data sent electronically with the physical progression of products. It's a subset of the UN/EDIFACT EDI standard and contains just the messages utilized in business applications and kills numerous discretionary messages found in EDIFACT. It is created in 1987 and taken over GS1 in 2015 and refreshed again by GS1 in 2016. It is made for retail and buyer products and furthermore embraced in human services and developments. EANCOM joins GS1 models of physical ID of exchange things, coordination’s units and the Global Location Numbers (GLNs) distinguishing the exchanging accomplices into the electronic messages.

- **UN/EDIFACT**

  Which is created in 1987, represents Electronic Data Interchange for Administration, Commerce and Transport. It's the acknowledged EDI standard for global exchange. EDIFACT spread language structure guidelines to structure information, intuitive trade convention (I-EDI), standard messages (report exchange sets) for multi-nation and industry trade, information component catalogues Rules for electronic exchange of organized information between PC frameworks. An EDIFACT transmission comprises of at least one Interchanges. Each Interchange comprises of at least one Messages, which contain information fragments identifying with the business exchange. At each dimension, a progression of encompassing information sets tracks the trade structure. EDIFACT is utilized to deal with inventory network exchanges between worldwide exchanging accomplices. Trades incorporate everything from buy requests and solicitations to shipment following furthermore, different coordination exchanges.

- **EDIG@S**

  EDIG@S, or EDIGAS, is a set of EDI message transactions designed specifically for B2B document exchange between gas companies. Originally created by four gas companies as an independent transaction standard, EDIGAS now has 14 member companies that govern its use, all multinational gas and energy firms. Today, EDIGAS uses a subset of standard EDIFACT transactions and also supports XML transactions. It is created in 1983 for gas and energy industry which is refined in 1996 and updated to use UN/EDIFACT standard transactions.

- **HIPAA**

  The Health Insurance Portability and Accountability ACT (HIPAA), passed in 1996 in the U.S., requires millions of healthcare entities who electronically transmit data to use EDI in a standard HIPAA format. HIPAA EDI is a set of data transmission specifications strictly governing how to electronically transmit sensitive data from one computer to another. It defines the different types of covered transactions and stipulates the exact format for each transaction record. Its intent is to reduce the hundreds of healthcare data formats previously in use to just one, universally implemented healthcare data standard. consistency significantly expands the convenience and

availability of wellbeing related data and slices managerial expenses related with dealing with a formerly awkward procedure.

- **HL7**

  Health Level Seven, or HL7, is a lot of global norms for exchanging clinical and managerial information between programming applications utilized by human services suppliers. These models centre around the application layer, which is "layer 7" in the International Organization for Standards (ISO) model of institutionalization. Medical clinics and other social insurance suppliers commonly have an assortment of different PC frameworks utilized for everything from charging records to patient following. HL7 helps all of these frameworks convey, or interface, when they get, or need to get, new data. HL7 determines an assortment of adaptable norms, rules and techniques that social insurance frameworks can use to speak with one another, share data and process information in a uniform, steady manner. This data trade has helped make therapeutic consideration less geologically disconnected and variableHL7.Health Level Seven, or HL7, is a set of international standards for transferring clinical and administrative data between software applications used by healthcare providers. These standards focus on the application layer, which is "layer 7" in the International Organization for Standards (ISO) model of standardization. Hospitals and other healthcare providers typically have a variety of disparate computer systems used for everything from billing records to patient tracking. HL7 helps all of these systems communicate, or interface, when they receive, or need to receive, new information. HL7 specifies a variety of flexible standards, guidelines and methodologies that healthcare systems can use to communicate with each other, share information and process data in a uniform, consistent way. This information exchange has helped make medical care less geographically isolated and variable.

- **IATA CARGO-IMP**

  IATA Cargo-IMP represents International Air Transport Association Load Interchange Message Procedures. It's an EDI standard dependent on EDIFACT made to computerize and institutionalize information trade among aircrafts and different gatherings. IATA's Payload IMP is the heritage standard for trading basic freight tasks data. In any case, IATA quit supporting Cargo-IMP after the 34th release in 2014. The

reason for this was to completely concentrate on expanding Cargo Extensible Mark-up Language (Cargo-XML), another cutting edge informing group. Payload XML encourages freight business forms, satisfies custom prerequisites for Advanced Cargo Information (ACI) recording, and conforms to security guidelines like e-CSD. This new configuration at last helps the air payload industry to move towards improving its procedures by digitalization over the whole inventory network. In any case, Cargo-IMP is still generally utilized for electronic informing in the business notwithstanding the absence of upgrade from IATA. The relocation from the heritage freight IMP configuration to Cargo-XML is progressing. It is made in 1983 and refined in 1996 what's more, refreshed to utilize UN/EDIFACT standard exchanges for carriers and flying. IATA Cargo-IMP assigns systems for mechanizing the trading of room assignment, air waybill, flight show, bookkeeping, status, error, ban, traditions, CASS charging, risky merchandise, designations and surface transportation. IATA Payload XML In 2012, IATA made the IATA Cargo XML standard to supplant the IATA Payload IMP standard.2014, IATA discharged its 34th release to IATA Cargo-IMP and reported that was the last update to the convention, with every single further update moving to IATA Cargo XML. The dispatch of IATA Cargo XML was intended to end the flight business' dependence on an EDIFACT-based framework and rather update to a progressively present-day web-first standard.

- **IATA CARGO XML**

  IATA cargo XML, named the New Distribution Capability, is a piece of IATAs more extensive. Rearranging the Business activity, started in 2004 to expand proficiency all through avionics. It incorporates advancements, for example, electronic tickets, bar-coded tickets what's more, new self-administration things alternatives, among others. The IATA Cargo XML standard empowers similar decisions to be offered to high road head out customers as to the individuals who book straightforwardly through carrier sites. IATA PADIS The IATA Passenger and Airport Data Interchange Standards (IATA PADIS) is a subset of EDI messages intended for use with both EDIFACT and XML sentence structures. IATA made it explicitly as an institutionalized method for sharing traveller data between carriers, airplane terminals, governments and others in the flight business. It's significantly more explicit than the more extensive IATA Cargo-IMP and Cargo XML norms.

- **IATA PADIS**

  IATA Passenger and Airport Data Interchange Standards (IATA PADIS) is a subset of EDI messages intended for use with both EDIFACT and XML grammar. IATA made it explicitly as an institutionalized method for sharing traveller data between aircrafts, air terminals, governments and others in the aeronautics business. It's considerably more explicit than the more extensive IATA Cargo-IMP and Cargo XML norms. IATA PADIS covers all standard traveller cooperation, for example, flight registration refreshes, ticket reprints, stuff exchanges, schedule valuing demands and ticketing control demands, among others.

- **NCPDP SCRIPT**

  It is a standard created and kept up by the National Council for Prescription Drug Programs (NCPDP). The standard characterizes reports for electronic transmission of medicinal solutions in the United States. The SCRIPT standard gives standard EDI report configurations to data trades between medicine prescribers, drug stores, mediators and payers. It is made for human services, pharmaceuticals, long term care, medical coverage what's more, government. NCPDP initially established in 1976 and the association moved toward becoming ANSI-certify in 1996. In 2010, a noteworthy arrival of NCPDP Script increased administrative acknowledgment and the content standard is restored and refreshed routinely by the NCPDP.

- **ROSETTANET**

  Rosetta Net is a GS1 standard for electronically exchanging data among enterprises for example, the high innovation industry and the shopper gadgets, semiconductor, broadcast communications, and coordination enterprises. Rosetta Net is an open standard used to shape a typical e-business language, adjusting forms between store network accomplices on a worldwide premise. It depends on the XML standard. Rosetta Net covers an expansive scope of coordination and budgetary exchanges, counting buy orders, shipment sees, invoices, return requests, statements and more.

- **SAP IDoc**

  SAP IDocs (middle of the road reports) are institutionalized archives, or information holders, that are utilized to speak with both SAP and non-SAP frameworks and trade

data. They look like EDI records and are normally used to electronically exchange data, for example, buy orders, solicitations, shipping takes note and that's only the tip of the iceberg. IDocs depend on two EDI guidelines, X12 and EDIFACT. For a situation of any contention in information measure, it receives the arrangement one with more prominent length “â€” there is no official mapping of IDocs to EDIFACT or X12. IDocs are utilized for an assortment of associations, fundamentally in the territories of monetary coordination and deals exchanges.

- **SEF**

  The Standard Exchange Format (SEF) is an open-standard document design that characterizes the arrangement and usage rule for exclusive and standard EDI records. SEF is utilized extensively by numerous enterprises for their exclusive EDI informing needs also as in coordination and supply chains all the more by and large. SEF can be utilized for an EDI exchange, as it is utilized to make exclusive, custom EDI messages by undertakings and ventures. It likewise underpins numerous X12 and UN/EDIFACT standard messages, for example, coordination, transportation and money related messages, including buy requests, invoices and more.

- **TRADACOMS**

  TRADACOMS is an early EDI standard created for retail. Today, it's fundamentally utilized in the UK retail area, regardless of being basically supplanted worldwide by EDIFACT. It was initially one of the antecedents to the UN/EDIFACT standard and has since been expostulated for the EDIFACT EANCOM subsets. Regardless of this TRADACOMS is still utilized for most of UK-explicit retail situations. It is initially made in 1982 as an execution of the UN/GTDI grammar, an early form of EDIFACT and improvement viably stopped in 1995 however, for EDIFACT.

- **X12**

  The Accredited Standards Panel X12 (ASC X12) is a gauge’s association outlined by the American National Gauges Institute (ANSI) in 1979. X12 envelops a lot of gauges and comparing messages that characterize explicit business archives utilized in a wide assortment of enterprises today. RSSBus is an individual from ASC X12. X12 is a standout amongst the most prevalent EDI informing guidelines and is utilized about all

around crosswise over enterprises for different use cases. It's additionally the reason for other EDI gauges, which utilize its configuration to make industry-explicit subsets. A portion of the enterprises utilizing X12 most conspicuously incorporates fund. Coordination and inventory network the executives, fabricating, retailing, transportation and so on.

3.5 HOW EDI WORKS:

There are three steps in the process of sending EDI documents: prepare the documents, translate them into an EDI format and transmit them to a partner.

One common process automated with EDI is the exchange of purchase orders (POs) and invoices. To give you a good example of how EDI works, we'll illustrate the EDI process for POs and invoices.

3.51 Document Preparation

Following the example of a PO and invoice, this is where a buyer prepares an order in a purchasing system.

- The buyer collects and organizes the data so it will work with EDI
- For example, instead of printing a PO, the system creates an electronic file with the necessary information to build an EDI document

So how would you properly prepare documents? There are several approaches, including:

- Exporting computer-based data from spreadsheets or databases
- Reformatted electronic reports into data files
- Enhancing apps to create output files ready for EDI standard translation
- Purchasing EDI software that can turn documents from your systems into EDI files
- Human data entry

Ideally, you would want your system to eliminate as much human data entry as possible to save time and improve accuracy.

3.52 EDI Document Translation

The next step is to feed your document through EDI translation software to convert your internal data format into the EDI standard format using the appropriate segments and data elements. Alternatively, you can send your data to an EDI service provider, who handles translation to and from the EDI format on your behalf.

In our example, the PO is translated into an EDI 850 purchase order document.

3.53 Connect & Transmit EDI Documents

Once the PO is translated to the EDI 850 purchase order format, it's ready for transmission to the supplier. There are several ways to connect to a partner via EDI. The most common of include:

- Direct, point-to-point EDI connection via a secure Internet protocol, such as AS2
- Connect to an EDI network provider, also referred to as a Value-Added Network (VAN) provider
- A combination of both Direct EDI and VAN, depending on the partners involved and the transaction volume

In the case of an EDI network provider, or value-added network (VAN), the buyer uses their preferred communications protocol, ensuring reliable, secure EDI transmission. Then, the network provider connects to the supplier using the supplier's preferred communications protocol, ensuring the supplier receives the order. VANs can reduce setup and maintenance in some cases but tend to be more expensive than point-to-point integration for many use cases, as they charge a fee for each transaction or even line item.

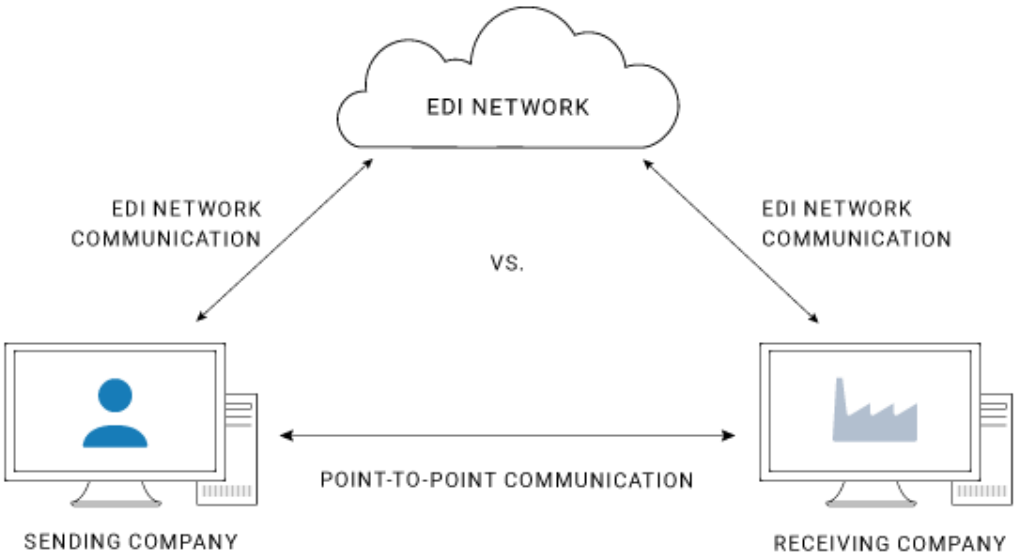

Fig 3.5

Data security and control are maintained throughout the transmission process using passwords, user identification and encryption. Both the buyer and vendor EDI applications automatically edit and check documents for accuracy.

3.6 TRANSMISSION OF EDI:

EDI transmission involves several stages. Consider a business transaction between a purchaser and vender

- Buyer initiates the EDI transaction.
- Buyer's computer system translates the buy request into the required EDI Format which is called a transaction set.
- Buyer must give the framework data on seller's name and recognizable proof number.
- Buyer transmit the EDI envelope to seller.
- Seller receives information and verifies the transaction sets.
- Seller sends functional acknowledgement that information was received.
- Seller translates order into its own internal system.
- Seller sends out product.

- Buyer receives goods and sends receiving advice.
- Seller sends remittance advice to seller.
- Buyer pay seller via electronic fund transfer.

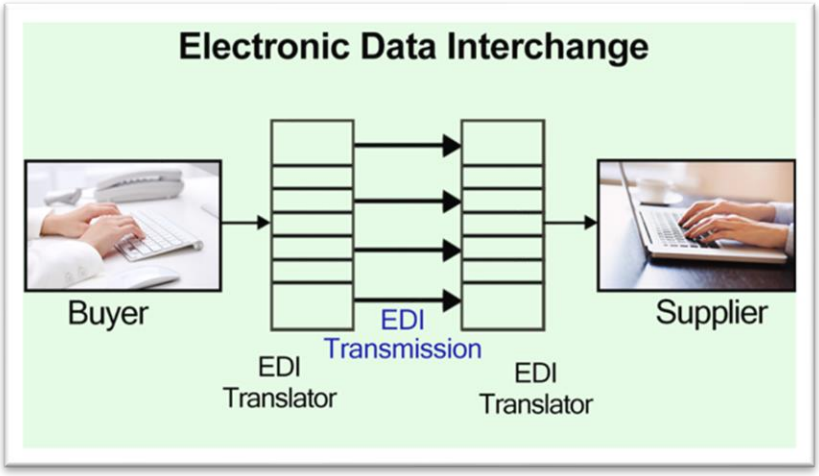

Fig 3.6

3.7 HOW DOES EDI FOR LOGISTICS WORK?

Logistics organizations rely on EDI data to simply get things done. Whether that is onboarding a new trading partner, communicating with a customer, or receiving an EDI load tender, the bottom line is logistics companies have needed a consistent and efficient EDI strategy for decades and will continue to for years to come.

Connecting and integrating EDI transport data across a multi-enterprise supply chain is of the utmost importance. Modernized technology can extend data flows to integrate into core applications to expand a company's online presence through seamless eCommerce and marketplace integration.

Scaling quickly is what every logistics company across the globe wants to be able to do. Modernized EDI systems give organizations the control that they require to conduct business with customers and trading partners. Those critical data exchanges between businesses must be standardized, automated, integrated sufficiently, and simplified. Without those four key ingredients, logistics companies are going to struggle.

Along with the supply chain, EDI has often been referred to as the lifeblood of the logistics industry. From all of the EDI communication standards to the various EDI messages, the critical data communication standard that is EDI has been fundamental throughout the logistics industry for a long time.

As much as any other industry, if not more, logistics companies must be able to scale – and scale quickly. Companies need to handle the sending and receiving of electronic documents, such as X12, EDIFACT, Tradacoms, ODETTE, EANCOM, HIPAA, VDA, and much more. Throughout the logistics industry, becoming EDI capable means not just being able to accommodate and leverage all of these communication standards, but to do so efficiently and fast.

EDI's primary goal is designed to make the workflow of a logistics company smooth and easier through the standardization, automation, integration, and simplification of those critical data exchanges. But that's why it takes the right solution to make these things possible, and the right solution begins with modernizing your EDI.

Every industry, from transportation and logistics to manufacturing or retail has its own recurring EDI transactions that they will need to not just familiarize themselves with, but learn to master and know the ins and outs of. Each EDI document transaction contains a certain amount of important data, and without it, the EDI document is practically useless.

EDI formatting must be adhered to base on strict formatting rules that define how and where each part of data on the document is found and utilized. Each EDI document is assigned one of several transaction numbers from the EDI public format. This allows logistics companies to streamline EDI transport transactions and improve EDI order processing using efficient EDI integration and the seamless automation of B2B workflows between both internal and external systems, applications, and cloud ecosystems.

Some of the most common EDI transport transactions for logistics companies include:

EDI 106: Motor carrier rate proposal

EDI 107: Request for Motor Carrier Rate Proposal

EDI 108: Response to A Motor Carrier Rate Proposal

EDI 109: Vessel Content Details

EDI 110: Air Freight Detail and Invoice

EDI 120: Vehicle Shipping Order

EDI 121: Vehicle Service

3.8 EDI IN SHIPPING:

In the olden days, a hard copy of the manifest used to be handed over to the captain of the ship and also a hard copy of the same used to be couriered or posted to the relevant discharge ports. As technology improved, there was the process by which the manifest was sent to the relevant discharge ports by email. The manifests thus received by the discharge port agents were manually captured into their respective computer systems. With the advent of EDI, the above can now be avoided and precious time can be saved. When sent as an EDI message, the data can be instantly downloaded into the recipient's system thereby avoiding manual capture which in turn will avoid any typographical errors and also saves a lot of time. This EDI messaging is also used to send the data to port (container stowage planning, cargo dues, load/discharge list, container moves), customs (manifest, bill of entry), principals (load/discharge list, container moves, bookings).

The below information exchanges required in a single voyage in the liner trade illustrates the importance of EDI in sea transport. It offers cost and time benefit through the reduction in paper documentation by supporting seamless flow of data between all parties in international trade cycle. It eliminates multiple keying in of data and significantly reduces the volume of paper to be handled. This results in immediate savings in administrative and personnel costs.

EDI messages expediting the process of loading and discharging are as follows:
At the terminal, EDI messages between the shipping line and port authority or Terminal operator:

- Berth management – BERMAN
- Call information – CALINF
- Bay plan – BAPLIE
- Dangerous goods notification – IFTDGN
- Stowage instructions – MOVINS
- Loading order – COPRAR
- Loading report – COARRI
- Vessel departure – VESDEP
- Status report – IFTSTA
- Release order – COREOR
- Gate out report – CODECO

Between shipping lines and customs or port community system:

- Customs conveyance report – CUSREP
- Customs response – CUSRES
- Customs cargo report – CUSCAR

Between shipping lines and consortia members:

- Booking firm – IFTMBF
- Booking confirmation – IFTMBC
- Dangerous goods notification – IFTDGN

Between shipping line and exporter:

- Sailing schedule – IFTSAI
- Booking provisional – IFTMBP
- Booking firm – IFTMBF
- Booking confirmation – IFTMBC
- Instruction – IFTMIN
- Contract status – IFTMCS
- Status request – IFTSTQ
- Status report – IFTSTA

Between shipping line and importer:

- Arrival notice – IFTMAN
- Status request – IFTSTQ
- Status report – IFTSTA

Between shipping line and depot:

- Stock report – COEDOR
- Gate in report – CODECO
- Damage estimate – DESTIM
- Repair approval – DESTIM
- Release order – COREOR
- Gate out report – CODECO

Between shipping line and container freight station or port terminal:

- Gate in report – CODECO
- Stuffing or stripping order – COSTOR
- Stuffing or stripping report – COSTCO
- Release order – COREOR
- Gate out report – CODECO

Between shipping line and inland transport provider:

- Transport work order – IFTMBF
- Gate out report – CODECO

Between shipping line and the ship:

- Tack status report – TANSTA
- Dangerous goods notification – IFTDGN
- Bay plan – BAPLLIE

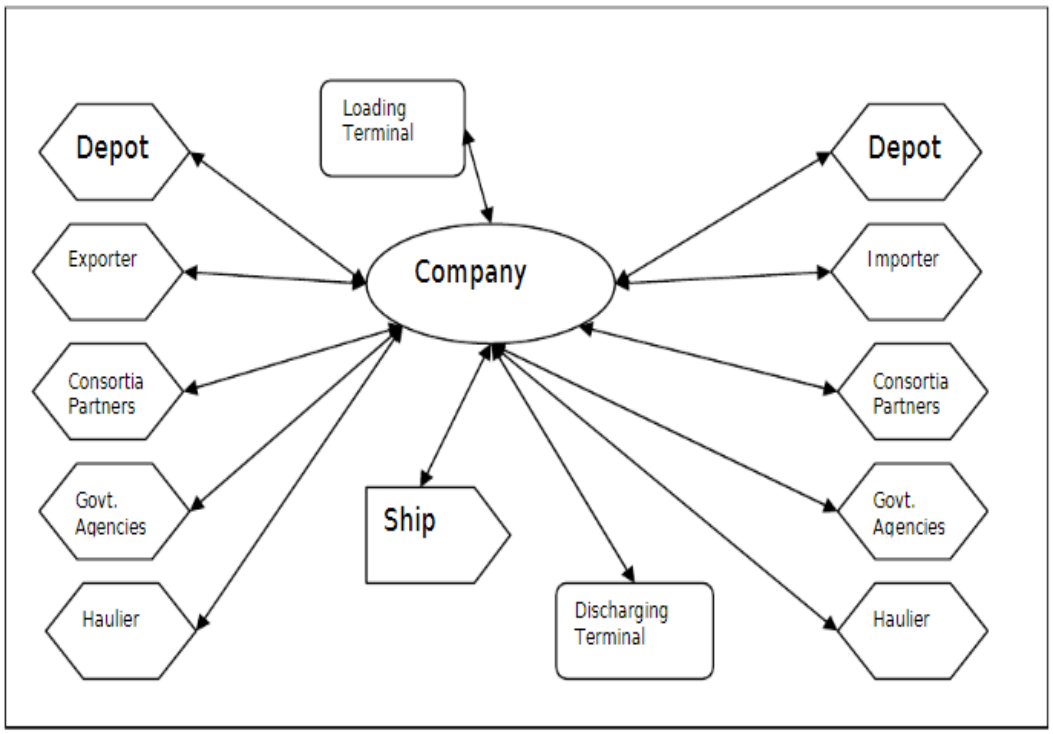

Fig 3.7: shows the amount of information exchange required in a liner operation.

Electronic Data Exchange (EDI) is a valuable tool for optimizing import and export operations at ports. The information flows produced around cargo movement at ports and the engagement of different public and private stakeholders is driving the use of technology for the secure exchange of sea shipping paperwork. EDI permits the efficient management of information, and the more logistic chain players implementing this communication system, the greater the benefits.

By using EDI technology, you can:

- Automate the generation, sending, reception and recording of exchanged documents
- Cut response times
- Enhance management accuracy
- Optimize processes to reduce costs
- Improve customer service

EDI benefits for the shipping industry:

Applied to maritime transport, the benefits of EDI include that it:

- Cut's freight waiting times (ship, terminals, customs)
- Reduces ship stopover times
- Powers freight storage-area performance (terminals, depots, etc.)
- Streamlines and boosts administrative procedure security
- Reduces errors by generating information automatically
- Enhances control of information and therefore freight
- Brings added visibility, tracking and traceability
- Integrates the entire intermodal operation: sea-port-land in a single communication flow
- Makes it possible to adapt the structure of sent messages to new sector laws, technical requirements, etc.

Maritime transport stakeholders and messages:

Different agents engage in maritime transport, each with a specific function: shippers (importers/exporters), shipping lines, consignees, terminals, inland carriers, Port Authority and Customs, and more.

Different messages and documents specific to the shipping industry are exchanged over the course of an operation. The use of standards like EDIFACT, X12, SML, etc., lets all the parties involved exchange transactions through secure message transmission designed for automatic integration in management systems.

These are structured messages, each with a specific objective. For example:

- Booking and boarding instructions. Through message exchanges between the freight forwarder/customs agent and consignee. Allows forwarders and shippers to seek a space booking from shipping lines for the content to board and to receive the pertinent answers.

A booking flow based on an exchange of EDIFACT messages would be:

- The freight forwarder or customs agent asks the consignee or shipping line to book space using an IFTMBF (International Forwarding and Transport Message Firm Booking) message with its booking function.
- The consignee confirms the booking with the forwarder/customs agent using an IFTMBC (International Forwarding and Transport Message Booking Confirmation) message.
- The forwarder sends the booking instructions with an IFTMIN (International Forwarding and Transport Message - Instructions) message to the consignee.
- After boarding the freight, the consignee issues a draft bill of lading to the forwarder using an IFTMCS (International Forwarding and Transport Message Contract Status)

What other operations in the logistics chain can benefit from the usage of EDI?

- Ship stopover management: The exchange of messages between shipping line and port authority and other competent bodies (Harbourmaster's Office, etc.) makes it possible to seek a stopover and mooring permit and send the paperwork needed to make a port

of call and receive the permits concerned. This involves the use of BERMAN (Berth Management) messages.

- Sending freight handling lists: Via messages between consignee and cargo terminal. Enables consignees to send freight handling lists from ship to terminal with the corresponding acknowledgements of receipt. This is done using COPRAR (Container discharge/loading order) messages.

When the terminal has finished the loading or unloading operation a message is sent to the consignee with the details of the work performed. This is done using COARRI (Container discharge/loading report) messages.

- Cargo manifests: This is a requirement to control the issue of export or trans-shipment goods by sea. This document details the list of goods that comprise the cargo and sets out their commercial data.

The consignee must submit this declaration to the Port Authority. This is done using IFCSUM (International forwarding and consolidation summary) and CUSCAR (Customs Cargo) messages. The response from the Customs Office is transmitted via a CUSRES (*Customs Response*) message.

- Customs declaration: This is a form submitted to the Customs Office. The forwarder or customs agent must submit the Single Administrative Document (SAD). This is done using a CUSDEC (Customs Declaration) message.
- The Customs Office issues and sends the release form if the declared goods do not have to undergo a documentary or physical check. This is done using a **CUSRES**
- Clearance notifications: Customs also notifies the Port Authority of cleared customs declarations and the contents to which they refer. This is done using a **CUSRES**

In short, the logistics ecosystem and the maritime transport one in particular requires an exhaustive control of information transmitted in various directions and to different stakeholders for their actions to deliver on the purpose of ensuring the cargo reaches its destination in time and at no added cost. EDI solutions simplify this information exchange, powering the integration of information systems across all the companies engaging in the logistics chain, optimizing operation and management process times.

3.9 ROLE OF EDI AND INFORMATION AND COMMUNICATION TECHNOLOGY AT INDIAN PORTS:

Need of EDI and Information Technology in a Port

Ports are interfaces in a complex chain of logistical stations where not only containers and general cargo but also numerous kinds of bulk goods, like coal and ores, are loaded and unloaded at maritime and river terminals, stored and transferred to power stations, agricultural and industrial centres using conveyors, road and rail transport. Therefore, Ports deal with a wide range of activities like movement of ships, passengers, cargo/container through different modes of transport, the loading and unloading of ship and interaction/clearance from different statutory bodies and port users. In addition, allocation and management of physical resources like berths,

Anchorage, channels, tugs, warehouses, storage space, human resources, etc. are also to be considered. Therefore, management of a port involves efficient deployment and utilization of all resources, backed-up by timely and accurate information, which can only be successfully achieved by efficient deployment of state-of-art EDI and Information Technology. In view of innovations in Information and Communication Technology, the maritime industry is undergoing rapid technological changes. High degree of automation in operations is aimed at the ports world over to meet the increase in demand of efficiency of port operations. Hence, application of Information Technology is one of the key issues in the modernization of ports.

Computerization at Indian Ports – Present Status

In India, at present, there are 12 major ports, six on the west and six on the east coast each and about 69 operational non-major ports/private ports contributing to the maritime trade. These ports are spread along the country's long coastline of around 7517 km on the western and eastern shelves of the mainland and also along the islands.

Understanding the key importance of technology, the Indian Ports Association, has already taken a series of initiatives to transform Indian ports. It has leveraged ERP to connect all the major ports to decrease the turnaround time, and bring about ease of doing business.

Another major initiative taken by the Indian Ports Association is the Port Community System (PCS), which aims to be the centralized hub for the electronic flow of trade related information for all ports and ports related entities. Explains Sudhir Kanvinde, Executive Director-IT, Indian Ports Association, "As a part of Electronic Commerce/Electronic Data Interchange(EC/EDI)

for Trade, Port Community System (PCS) project was envisaged, which intended the electronic flow of trade related information/document and function as the centralized hub for all the ports of India and other stake holders (like Shipping lines/Agents, Surveyors, Stevedores, Banks, Container Freight Stations, Customs House agents, Importers, Exporters, Railways/CONCOR, Government regulatory agencies, etc. for exchanging electronic messages in a secure manner. During the Covid -19 situation, the eBL solution, which works on Block chain (Ethereum) Technology, was integrated with PCS 1x in record time. "

Presently, Indian Ports are now rapidly moving towards application of state-of-art technology and internet technology to implement integrated Port Operation System and to move towards paperless regime so as to reduce dwell time and as also cost to users. The major areas include, where such automation is aimed at by use of:

- Vessel Traffic Management System (VTMS)
- Information Technology in Operational and non-operational areas
- Surveillance System and Safety & Security System
- Electronic Commerce (EC)/Electronic Data Interchange (EDI)

Vessel Traffic Management System (VTMS)

VTMS has already been installed at Mumbai, Jawaharlal Nehru, Kolkata, Chennai, Cochin, New Mangalore and Mormugao Ports. Installation of the VTMS in the Gulf of Kutch providing coverage to Port of Kandla and other non-major Ports along the Gulf is under process.

Information Technology

Indian Ports have been implementing/implemented heterogeneous system using the latest technology covering the following modules/applications for efficient functioning of ports:

- Integrated Vessel Services and Control Management
- Integrated Cargo Management and Accounting System for all types of cargo (which includes import & export module, Rail/CONCOR Operation and billing)
- Integrated Container handling and Tracking system
- Resource Planning (Including Equipment, Labour etc)

Most of the Private Container Terminal Operators in Major Ports/Non-Major Ports have also implemented Terminal Operation Systems like NAVIS, CATOS, etc. Apart from the operational applications; some of the Indian Ports possess modern Hydrographic Survey units.

Other areas, which have been computerized by the Ports, are Pay Roll preparation and related accounting functions such as P.F. Accounts, Loan Accounts, Income Tax, Financial Accounting, Stores Inventory, Personnel Management, Estate Management, Hospital Management, and Materials Management System, etc.

Surveillance System and Safety & Security System

As a result of fallout of 9/11incident, a number of new technologies have been introduced to help the implementation of International Ship and Port Facility Security (ISPS) Code in various countries including India. All the Major Ports are ISPS compliant. In process of implementing ISPS, the need for bio-metric based access control management was felt and many ports are in the process of implementations.

Besides, the requirement of CCTV based surveillance system has also been felt and some ports are also reaping the benefits of the same. Now, all crafts tend to have AIS system, which install a satellite station on a ship. Similarly, the use of radio frequency identification (RFID) is gaining ground in logistics and transport planning and optical charter recognition (OCR) is being used quite cleverly in terminals to speed up the processing of containers in and out. It is also proposed to introduce container scanning system in a phased manner, in addition to the introduction of automatic surveillance system like CCTVs. Because of terrorist threat, the surveillance and security has become top most priority in Ports. Therefore, the need of very stringent and secured RFID/smart card and biometric verification at access points within ports/terminals for the seaport personnel, vehicles and container truck traffic management has arisen. Ports are geared to take up this challenge. The need of electric fencing with breach alarm is also thought of.

Electronic Commerce (EC)/Electronic Data Interchange (EDI)

The members of the Port Community depend on the flow of data from other members of the community to perform their functions effectively, since activity in one area will have an impact on the others. If data can be exchanged between them accurately and speedily, the efficiency and throughput will be improved. Electronic Data Interchange (EDI) has therefore become an essential element for maintaining the efficient operation not only of ports but also for the complete trade and transportation cycle. The EC/EDI implementation is vigorously pursued in the functioning of trade regulating and facilitating organizations like Customs, Ports, Airports, Airlines, Banks, DGFT, AEPC/Texprocil, CONCOR, Railways, etc. Implementation of EDI

varies from port to port and covers areas like Banks, exchange with Customs and few messages with few users.

Port Level Automation

Each port should undertake Enterprise Resource Planning (ERP) solutions which would cover all functional areas including port operation. The functional areas where ERP solutions are not available on the shelf, the solutions should be developed and integrated with ERP solutions. Ports like Cochin and Mormugao have already implemented ERP Solution along with Port Operation System and other modules that are not part of ERP Solution. New Mangalore is in the process of implementation similar ERP Solution followed by all the other Ports. Non-ERP solution like GIS linking with the Land/Estate Policy, Hospital Management, Bespoke System like Vigilance, Legal, File Tracking, Employee welfare, Right to Information (RTI) Act shall be implemented. Ports shall implement Land/Estate Management solution which is completely scalable for implementation of other Business Process like Financial and Management Accounting, etc. As most of the Major Ports have initiative for the Computerization of Land Management process, the need of the hour is the Implementation of a complete application for Real estate Management, Utilities, and Advertisements which is completely scalable for implementation of an integrated ERP application on a Decentralized basis and shall be linked with ministry e-governance initiatives. The provision for Self Service Scheme available in the system would be introduced as an employee welfare measure. Automated equipment (Cargo/Container handling, Weight Bridges) shall also be integrated with the centralized system to avoid manual intervention. Campus cabled LAN Network system shall be undertaken covering all the automation system and as a redundancy wireless LAN network shall also be considered. The IT Policy of the port should be such a way as to integrate all sophisticated systems in the port in a comprehensive manner such as VTMS, AIS, RFID, CCTV, Surveillance System and other security systems.

A comprehensive data base needs to be developed by the ports themselves which will lead decision making and provide artificial intelligence. Sufficient and suitable manpower shall be placed in each port for managing IT systems and these personnel shall be trained periodically to update their knowledge & knowhow.

Port Community Level Automation

Port Community System **(PCS)** is intended to integrate the electronic flow of information and function as the centralized hub for Indian Ports and other stakeholders like Shipping Lines/Agents, Surveyors, Stevedores, Banks, Container Freight Stations, Government regulatory agencies, Customs House agents, Importers, Exporters, CONCOR/Railways, etc. through common interface in secure manner using the latest technologies.

PCS will be accessible through a secure and personalized web browser. This central and common facility will definitely save time and money and improve the speed of the services. It will improve track and trace efficiency and shipment/service visibility by automatically posting the current status updates by the system of each member as and when any significant event occurs. The status will be available for all interested parties for viewing or downloading as required. Steps had already been initiated to implement Centralized Web based – Port Community System (PCS) at all Major Ports to reap the maximum benefits of EC/EDI and move towards a paperless regime. The module like Vessel, Container, Cargo, Transport, Finance, e-payment and MMD has been made LIVE. The testing of Port-Customs interface messages is in progress. Presently as on July 2010, Major Ports are exchanging around 5 lakhs messages every month.

Now, steps have already been taken to implement PCS at Non-Major Ports also. Ports like Mundra, Pipavav, Gangavaram, Dehaj have already shown interest to implement PCS and taken advance step to integrate with PCS.

Fig 3.8

3.10 INDIAN CUSTOMS EDI SYSTEM (ICES)

Indian Customs EDI System (ICES) initiated a new era in the country.

An era of:

- Paperless trade.
- Trade facilitation rather than control.

An era in which Indian trading community can exchange documents electronically with Customs and other Government Agencies. This had been made possible by the joint design, development and implementation of ICES by the officers of Central Board of Excise and Customs and National Informatics Centre.

The ICES envisage acceptance of customs documents electronically and exchange of information electronically in centralized/structured formats, integrating customs with other agencies such as Reserve Bank of India (RBI), Director General of Foreign Trade (DGFT) etc. and was developed to implement the various provisions of the Customs Act 1962, CTA and CETA. The system was designed to exchange/transact customs clearance electronically using EDI.

The main objectives set for Indian Customs EDI System by the Customs were:

- Respond more quickly to the needs of the trade
- Computerization of customs related functions including import/export, general manifest control, ex-bond clearance of warehoused goods, goods imported against export promotion schemes, monitoring of export promotion schemes.
- Reduce interaction of the trade with Government agencies
- Provide retrieval of information from other custom locations to have uniformity in assessment and valuation
- Provide management information system for policy making and its effective revenue and pendency monitoring and
- Provide quick and correct information on import/export statistics to Director General of Commercial Intelligence and Statistics

The guiding principles for the officials of Customs and National Informatics Centre while designing the ICES system were:

***Facilitation*:** While ensuring proper enforcement of Customs laws and regulations, Customs Administration should strive to improve facilitation of Customs clearance procedures.

Accountability: Customs Administration should be accountable for their actions through a transparent and easily accessible process of Administration and/or judicial review.

Consistency: Customs laws, regulations, administrative guidelines and procedures should be applied in a uniform manner.

***Transparency*:** Customs laws, regulations, administrative guidelines and procedures should be publicly available in a prompt and easily accessible manner.

***Simplification*:** Customs laws, regulations, administrative guidelines and procedures should be simplified to the extent possible so that Customs clearance can proceed without undue burden.

Main features of the system are:

- **Security**

  ICES provides for security at all levels of access to the system. At the Service Centre. Security features are implemented at module level. System keeps track of any transaction carried by a user.

- **Help**

  System includes powerful help features which can be invoked by the Assessing Officers from their respective screens to facilitate their assessment work.

- **Management and Control**

  ICES allows the Collector to find out the status of any document in the system. Controlling Officers can monitor the progress of the Customs Officers in processing the documents and provide help in expedite the process. Number of documents cleared at each stage can also be monitored.

Benefits

- Improved customs clearance and inspection procedures is generating faster, more certain and, ultimately, less costly trade transactions. Computerization of customs procedures resulted in time and cost savings due to the reduced need to prepare, handle, store and deliver customs documentation.
- Improvements in communications, access to information and the transparency of customs processes and appeals increased the level of certainty and fairness.
- A good compliance track record resulted in faster clearance and less intrusive verification techniques.
- Importers know the amount of duties and taxes owing as a result of the clear and consistent rules. More efficient clearance will produce time and cost savings and provide the certainty required to exploit modern business practices such as "just-in-time" inventory.
- Exporters benefited from having similar customs rules and procedures apply across the international market, thus increasing market access opportunities, while reducing costs and complexity.
- Customs Brokers have the opportunity to refocus their services from dealing with forms and complexity to using their expertise and knowledge to bring a new range of professional services to clients operating in an expanding and evolving trade market.
- Carriers benefit from faster service, lower costs and the ability to use their equipment to its utmost capacity rather than having it delayed at Customs.

Operations

Fully automated process with little or no intervention by either party providing a virtual on-line scenario. Declarations can be accepted round the clock automatically, resulting in maximum productivity. Quicker retrieval of cargo through reduction of clearance times

Reduction in manual administrative processes resulting in fewer errors and no duplication. Harmonized business relationships with other bodies such as Ports, DGFT, Airlines, Container Depots etc.

Time Saving

Notification of releases are speeded up as a result of the electronic releases being generated automatically. Communication errors reported and communicated electronically to client

Data Accuracy

Electronic messaging has the proven advantage of minimizing data capture, which in turn ensures less errors and quicker releases. The accuracy of data received can be incorporated into clients Track and Trace

Cost Effectiveness

Cost of processing the documents has come down drastically.

Security and Risk Management

Security is very vital when submitting information electronically. To compound this basic assumption, the risks of diminished value in the real world are nothing compared to the risks of loss in the virtual world.

Customs in particular face issues such as fraud and theft in their standard business practice and they realize the need for a secure system. Scheduled auditing practices within the system ensured that to ensure that security is being implemented effectively customs have made sure that the security requirements. The client can be sure that their message information will not be tampered with.

Cargo Handling

Electronic clearances provide quicker cargo releases, resulting in more efficient delivered.

Technical

Indian Customs EDI system is developed for better management of Custom Activities. The existing processes were analysed in depth for re-engineering and improvement. The main achievements of the system are simplified and harmonized procedures which has not only provided efficient and reliable environment to the customs but also to the business communities and other agencies involved in the trade. The business processes of the customs and the trading partners along with their boundaries and interfaces were analysed in depth and reengineered from the viewpoint of

- Higher efficiency
- Customer satisfaction
- Lower Cost
- Facilitation
- Lower inventory level
- Reduced turnaround time

The main objectives while re-engineering the procedures were:

- All the agencies of the government should present a single face to the user.
- Data once captured should be available for all the government agencies
- The Importer/Exporter or their agent should interact with only one agency
- Gradual transition from scrutiny of paper documents.
- System appraisal for selected imported goods.
- Minimized export appraisement
- Examination waiver - Green Channel
- Electronic credit of drawback
- Reduced documentation for export cargo

The Indian Customs EDI application is running on Sun Solaris Operating System (V.2.5/2.6) and the database is Oracle (V.7.1/7.3). Each Customs station have stand-alone servers for running the ICES application. The data at present is locally stored on these servers.

Benefits of ICES

- Accuracy, transparency, accountability and better supervision
- Reduced interface between officers and trade
- Standardized procedures across the country
- Speedier clearance of cargo
- Reduction in Transaction Costs

ICEGATE: Indian Customs and Central Excise Electronic Gateway:

ICEGATE stands for the Indian Customs and Central Excise Electronic Commerce/Electronic Data interchange (EC/EDI) Gateway. ICEGATE is a portal that provides e-filing services to the trade and cargo carriers and other clients of Customs & Central Excise Department (collectively called trading partner). ICEGATE is an infrastructure project that fulfils the department's EC/EDI and data communication requirements. Through this facility the department offers a host of services, including electronic filing of Bill of Entry (import goods declaration) and Shipping Bills (export goods declaration) and related electronic messages between Customs and the trading partners using communication facilities (E-mail, Web-upload & FTP) including the communication protocols commonly used on the internet. The airlines and shipping agents can file manifests on the internet filed using this facility. Besides, data is exchanged between Customs and the various regulatory and licensing agencies such as DGFT, RBI, Ministry of Steel and DGCIS. The National Import database (NIDB) and Export Commodity Database (ECDB) for Directorate of valuation are also being serviced through ICEGATE. All electronic documents/ messages being handled by the ICEGATE are processed at the Customs' end by the Indian Customs EDI System (ICES), which is running at 40 customs locations. Department has embarked upon Centralization of its infrastructure and in due course all customs locations will be shifted to centralized infrastructure hosted at Data Centre. 5 Custom locations at Dadri have already been moved to the data centre. The ICEGATE also provides for 24X7 helpdesk facility for its trading partners. To ensure secure filing, it is proposed to use digital signatures on Bill of Entry and other documents/ messages to be handled on the gateway. ICEGATE is working through a MPLS based Wide Area Network (under implementation), linking 582 department's buildings all over the country. In addition to e-filing, ICEGATE also provides host of other services like E-payment, on-line registration for

IPR, Document Tracking status at ICEGATE and ICES, online verification of DEPB/DES/EPCG licenses, IE code status, PAN based CHA data and links to various other important websites/information pertaining to customs business.

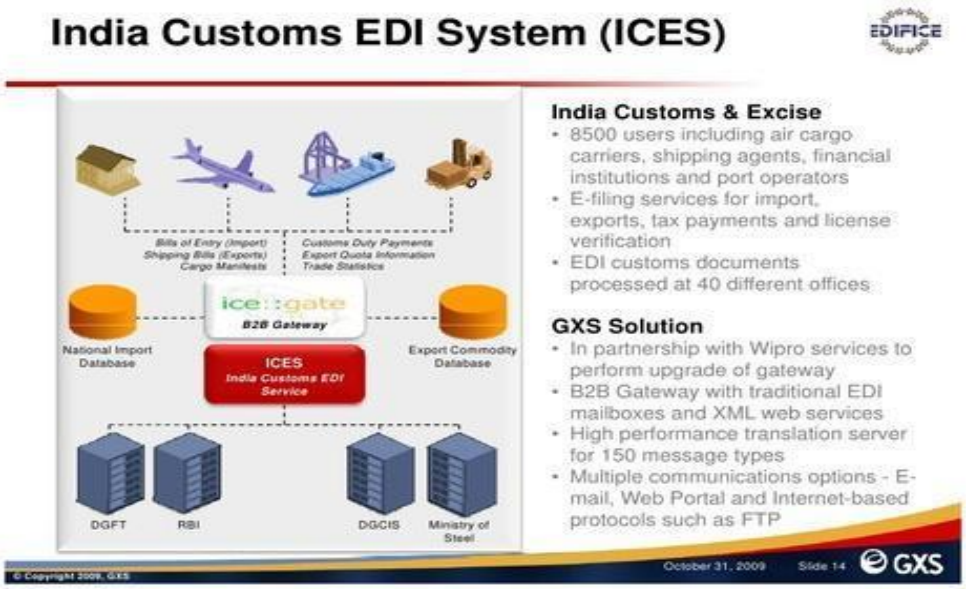

Fig 3.9

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

4.1 DATA ANALYSIS

A research study was conducted referring to a modal used in analysing the impact of EDI usage in the shipping line business. The conceptual modal is:

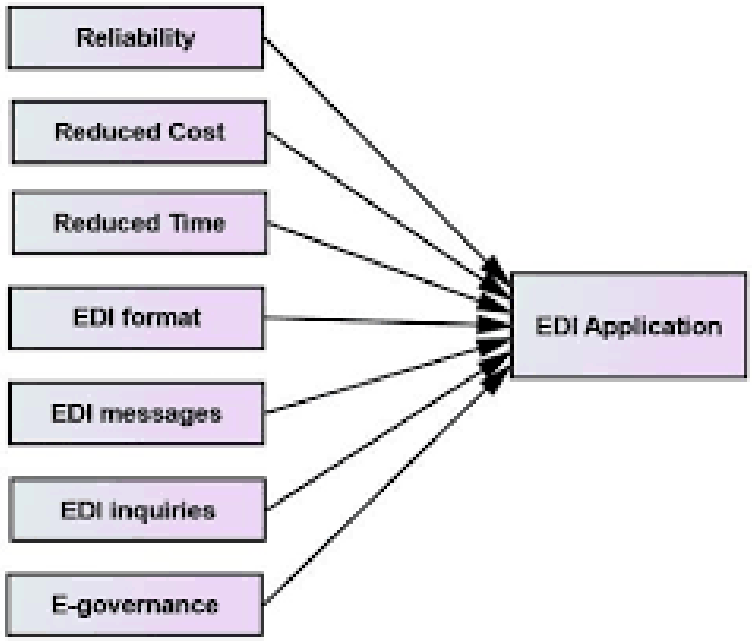

Fig 4.1: EDI Conceptual Model used in Shipping Business

The research study was organized by collecting data from the freight forwarders, non-vessel operating common carriers, port authorities, main line operators, port agents and customs officials. The researcher has used stratified random sampling method with the sample size of 80. The researcher has constructed a structured questionnaire to elicit information from the respondents by using likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

The scale reliability and internal consistency of the constructs of the questionnaire was verified by using Cronbach's alpha test measure for the factors such as reliability, reduced cost, reduced time, structured EDI format, EDI messages, EDI inquiries, E-governance and the corresponding values are 0.88, 0.82, 0.93, 0.91, 0.89, 0.91 and 0.92 respectively. The researcher has analysed the data by using one-way analysis of variance to test the hypotheses of the study. The F score and p-values of the one-way ANOVA are given in Table-1

Fig 4.2: One-way ANOVA of EDI factors

Factors of EDI	**F-value**	**p-value**
Data entry with regard to single terminal	2.23	0.007
Able to cater to the needs of multiple request	2.13	0.001
Ability to receive scheduled update on the status of operation	1.22	0.013
Minimizes the cost	1.23	0.021
Reliable operation 1.23 0.023	1.23	0.023
Transaction process can be monitored	1.21	0.031
Documents can be transmitted efficiently	1.32	0.013
Online payments can be made easier	1.32	0.012
Structured format of the EDI documents	1.37	0.014
Documents related to cargo shipments can be shared electronically	2.18	0.012
Turnaround time of shipments can be reduced	2.16	0.013
E-process and E-operations are made easier	3.14	0.006
Data and information are transmitted in the secured manner	1.35	0.018
Customs operations are made easier and more efficient	2.11	0.012
Regulatory authorities are connected well through EDI applications	1.14	0.003

From Table-1, it is clear that the p-values of one-way ANOVA for all EDI components are less than 0.05, implying that the alternative hypotheses may be accepted. It states that EDI factors such as data input with reference to a single terminal, ability to respond to the demands of numerous requests, and so on are specified. The ability to get scheduled updates on the operation's status, Reduces the expense, dependable functioning, The transaction procedure may be tracked. Documents can be effectively transferred. Online payments may be made more convenient. The EDI papers are formatted in a structured manner. Status inquiries can be automated. Saved time and money Human involvement is kept to a minimum. Enquiries are addressed more quickly. Documents pertaining to cargo shipments can be distributed online. Shipment turnaround times can be decreased. EDI messages can be used to update the current state. E-processes and e-operations are simplified. Data and information are sent in a secure manner. Customs processes are simplified and made more efficient. Regulatory authorities are well connected via EDI applications, which is crucial. According to the findings of the study, the use of EDI applications in the shipping industry will undoubtedly have an influence on the transmission of data and information from the source to the destination. The main advantage of utilising EDI software is that it reduces the cost and time of data transfer while also substantially facilitating international trade. Despite the fact that EDI is a three-decade-old idea, its implementation in cross-border trade is notable. Most merchants who want to do business on a worldwide scale want to utilise EDI via the internet to speed up the document transmission process.

CHAPTER 5

RECOMMENDATION AND CONCLUSION

5.1 CONCLUSION

The study was carried out to learn about the impact and use of EDI in shipping and the various forms of EDI messages, as well as to identify the reasons for EDI adoption and to comprehend the interaction between the buyer and the supplier utilizing EDI standards. The shipping business includes a variety of processes, beginning with cargo identification and ending with cargo delivery to the target site. Because cargoes are delivered to a destination by crossing national borders, the shipping industry is genuinely international in nature. EDI will come in useful when it comes to efficiently handling cargo and document data. Using EDI software, the structured EDI format will convert data from the seller's point to the buyer's point. It would be considerably easier for both sides to trade on a global scale with less human interaction. Shipping is therefore here improved as EDI provides quick and efficient information as it relies on barcode information to communicate. It is able to track inventory and eliminates the incidence of lost packages due to their isolation from the larger shipping order. EDI greatly improves accuracy of data as it is all automated. There is a reduction of re-keying errors, as there are none required. Therefore, fewer items will be lost, returned or required from back order. EDI simplifies the manufacturing process as it is able to provide one time data entry; reduced errors; on line data storage; faster management reporting and automatic reconciliation. Within various industries, EDI has been used to great advantages, and many benefits have been expounded in its regard. EDI´s benefits relate to environmental impact, improved time efficiency, improved accuracy and increased flexibility, enhanced partnership, labour costs, shipping, etc. EDI creates a system whereby documents and data can easily be transported from one source to another, and is able to overcome incompatibility issues. It handles data security, the volume of data to be communicated, and the e-payment option in a smooth manner. Data transmission speed, cost, and time are also important considerations where data and information are stored and retrieved at breakneck speed, making it considerably easier for every party in the chain to utilize the data effortlessly. It can be inferred that there is an significant impact on the use of EDI in the shipping industry.

5.2 FINDINGS:

- EDI has a major impact in the shipping line business as it is widely used and is now shaping to be an important factor in the whole logistics sector.
- Most of the companies are using EDI for invoicing followed by request for quote, purchase order, application/remittance, advance ship notice.
- With the help of EDI, human errors have declined substantially and is being more cost efficient.
- EDI has many advantages as it helps in the faster processing of transactions and speeds up business cycles.
- There is a lower cost incurred as EDI reduces transaction costs of paper, printing, storage, filing etc.
- A more accuracy rate is obtained where EDI reduces errors substantially and eliminates human errors as a whole.
- EDI can reduce the order-to-cash cycle time by more than 20%, improving business partner transactions and relationships. Due to the reduction of errors this save partners valuable time and frustrations, thus avoiding disputes.
- Environmental benefits are also attained with the help of EDI as it reduces CO2 emissions by replacing paper-based processes with electronic alternatives.
- The future of EDI is naturally evolving as technology keeps on updating for more efficiency.
- EDI can be supported with a whole new set of technologies such as ERP, TMS, AI etc which all improves the efficiency of a firm.

5.3 SUGGESTIONS:

- A Proper EDI connection is always suggested as it allows a faster response to inquiries, enhanced data security, and improved customer service and sales where an improper connection can lead to many errors and problems.
- Employ the necessary number of human resources and personnel to monitor the EDI data quality.
- Companies need to support both a core set of EDI transaction types and API capabilities or risk missing out on important opportunities to drive revenue, growth and competitive differentiation.
- EDI should be used as a purchasing tool to maximise profit through cost reduction, and it should be used frequently to purchase items from other firms. Testing of data quality management tools and other services for the smooth implementation of EDI system.
- Companies should adopt EDI and other technologies such as ERP, API and TMS (Transport Management System) effectively and precisely to attain a proper outcome.
- The organisation should be aware of the employees' level of comprehension of the EDI system.
- The EDI system should be user-friendly and well-maintained.
- The firm should be compatible with the trading partner in order to undertake adequate technological growth.
- Proper training should be given to labour so that they do the work properly and no more issues come up because at the base level all the material are managed by the labours on the instruction of the supervisor.
- A cost-benefit analysis should be performed following the deployment of an EDI system.
- Addition of AI technology is suggested along with EDI as AI would help in providing predictions, recommendations and advanced automation to improve human productivity.
- Addition of blockchain is also recommended along with EDI, as it would provide a new distributed ledger backbone, a tamper proof record of relevant events that deliver a shared state for all logistics and supply chain personnel.
- Adequate firewalls and other security measures need to be adopted, as the level of technology increases, the level of risk also increases. Therefore, all the data and information need to be stored safely and securely.

CHAPTER 6

BIBLIOGRAPHY & REFERENCES

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