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USAGE OF INFORMATION TECHNOLOGIES IN CONTAINER SHIPPING INDUSTRY

AND IMPACTS ON BUSINESS: AN ERP SOLUTION

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SOLUTION

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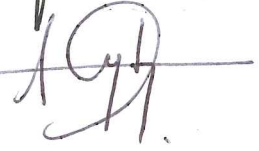SHIPPING INDUSTRY AND IMPACTS ON BUSINESS: AN ERP
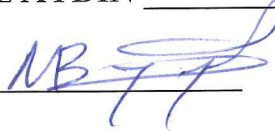
SOLUTION

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USAGE OF INFORMATION TECHNOLOGIES IN CONTAINER SHIPPING INDUSTRY AND IMPACTS ON BUSINESS: AN ERP SOLUTION

Abstract

In the last two decades, information technology has grown rapidly by affecting other industries on the way. Shipping industry has no difference. New advancements as both software and hardware take maritime industry into different level. The major concern of this study is to explain container shipping industry and information technology relationships specific to ERP solution software based SaaS. Its purpose of usage and benefits will be explained with the related screens and examples. Key performance indicators defined with the expectation from the software solution. Each indicator explained whether if they create advantage for the businesses from the subject ERP solution or not. IT transformation process for container shipping industry has been examined and all actors in the field will be mentioned accordingly. Except the subject ERP software other applications and systems partaking in the industry also be indicated.

All findings from the interviewing and conversations with the employees and managers of the container shipping companies have added to relevant subjects throughout the study. Also, a questionnaire conducted with the 50 participants from different professions from the industry in order to understand their opinion about the impacts of IT in marine transportation. Questions and results from the survey added into analysis section of the study with their explanation. In the light of this information, GAP analysis is created and all results/recommends added on the last section of the study.

KONTEYNER TAŞIMACILIĞINDA BİLGİ TEKNOLOJİLERİNİN KULLANIMI VE ETKİLERİ: BİR İŞLETME KAYNAK KULLANIMI (ERP) ÇÖZÜMÜ

Özet

Bilgi teknolojileri diğer endüstrileri de etkileyerek son yirmi yılda hızla gelişti. Denizcilik endüstrisi de diğerlerinden farklı değildir. Hem yazılım hem de donanımdaki gelişmeler deniz taşımacılığını farklı bir seviyeye getirmektedir. Bu çalışmanın temel amacı konteyner taşımacılığı ile bilgi sistemlerinin ilişkisini Hizmet olarak Servis (SaaS) tabanlı bir Kurumsal Kaynak Planlaması yazılımı özelinde açıklamaktır. Yazılımın kullanım amacı ve faydaları ilgili ekranlar ve özellikleriyle birlikte açıklanacaktır. Temel performans göstergeleri ve göstergeler için yazılımdan çözüm beklentilerinin neler olduğu belirtilecektir. Her bir göstergenin ilgili yazılımdan faydalanarak firmalara avantaj oluşturup oluşturmayacağı açıklanacaktır. Konteyner taşımacılığı için bilgi teknolojileri dönüşüm süreci ve alandaki tüm aktörlerden bahsedilecektir. Endüstride yer alan ilgili işletme kaynak kullanımı yazılımı dışında kalan uygulama ve sistemlerden de söz edilecektir.

Konteyner taşımacılığı firmasında yer alan tüm çalışanlar ve yöneticilerle yapılan konuşma ve görüşmelerden elde edilen bulgular çalışma boyunca ilgili bölümlerde yer alacaktır. Ayrıca, deniz taşımacılığı sektöründe yer alan 50 kişi ile yapılan ve bilgi teknolojilerinin konteyner taşımacılığı üzerindeki etkisi hakkında ilgililerin fikrini ölçmeye yönelik anket de çalışma içerisinde mevcuttur. Anketin tüm soruları ve sonuçları analiz bölümünde açıklamalarıyla birlikte yer almaktadır. Tüm bu bilgiler ışığında Fark Analizi yapılmıştır ve son bölümde sonuçlar ve önerilerle birlikte yer verilecektir.

Keyword: container shipping, IT solutions for container shipping, KPI in maritime industry, EDI, XML, maritime technologies.

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List of Abbreviations

IT: Information Technologies

ERP: Enterprise Resource Planning

EDI: Electronic Data Interchange

XML: Extensive Markup Language

FCL: Full Container Load

LCL: Less than a Container Load

TEU: Twenty-equivalent Unit

MTGD: Maritime Trade General Directorate

NVOCC: Non-vessel Operating Common Carrier

VSA: Vessel Shared Agreement

RFID: Radio Frequency Identification

WWW: World Wide Web

SaaS: Software as a Service

PaaS: Platform as a Service

IaaS: Infrastructure as a Service

RTLS: Real Time Location System

GIS: Geographical Information System

IORs: Interorganizational Relationships

IMO: International Maritime Organization

API: Application Programming Interface

VANs: Value Added Networks

BI: Business Intelligence

BL or BOL: Bill of Lading

KPI: Key Performance Indicator

UNCTAD: United Nations Conference on Trade and Development

LPI: Logistics Performance Index

ETA: Estimated Time Arrival

VGM: Verified Gross Mass

OOG: Out of Gauge

SOLAS: Safety of Life at Sea

GPS: Global Positioning System

AIS: Automatic Identification System

ECDIS: Electronic Chart Display and Information System

ISO: International Organization for Standardization

PTI: Pre-trip Inspection

CRM: Customer Relationship Management

1. INTRODUCTION

Today's trade world needs to use all logistics activities in different levels of business processes. In this study, we will try to explain specifically marine transportation principles and its relation between information systems to make the business sufficient. It will be an empirical study which takes all data and samples from the real business practices. So, it aims that to explain shipping environment and usage of information system in this industry and describe what would be the impacts on business. It has conducted to understand usage of information systems in shipping industry and how they will affect business performance.

Scope will form around line companies whom has operation in maritime industry and software companies whom has provide IT solution for their business needs and agents whom has close relations between final customer and line companies itself.

It will be explained how a shipping line company is using IT tools to provide inter-organizational communication. Also, management needs information gathering and processing techniques to make decision to get most effective results. How electronic data interchange -also known as EDI- has changed data transformation between company and third parties (like custom offices, agents, ports, other lines etc.) will investigate.

Study will start with general information about shipping industry and container lines. It will continue with the explanation of relationships between information technologies and sea transport. Information systems that are currently using in sector will be listed. Then move forward what are the performance criteria in the marine transportation. The effect of information systems on the decision-making processes will mentioned. Some

analysis will be conducted to understand and analyze the issue from the perspective user-basis, customer-basis, agents and 3rd parties and management and decision makers'.

1.1.Structure of the study

Study will start with the explanation the scope of the maritime industry and continue with the relationship of actors in the sector. It will be clarified what are the key performance indicators in maritime practice. Components of the business, business objectives, system's features and elements which related software have will be determined and explained in detail. After that indicators which have effects on business will be measured to locate the content in the scope. Advantages and disadvantages (if there is any) will be listed accordingly. Then at the end of the study findings will give a chance in order to make deductions what are the shortcomings in the industry. As a result, recommendations will take place so it will be understood what would be the benefits of using information systems in a shipping company and how they can be used to improve overall efficiency in maritime industry. Each department's and actors' approach for the created software will be considered. This study will also explain the importance of the different opinions matters for the software in order to achieve purpose of the company.

In this study, main focus will be IT usage and effectiveness instead of IT adoption due to reason of the subject company has already implement their system. Users are already pass through the concept of adoption and we focus whether the result of the software solutions and switching system with the web-based cloud solutions will create efficiency. It is not a feasibility study to understand IT adoption whether can happen

or not in the company. Mostly focused on after that ERP solution implemented what kind of results has occurred.

1.2. Research Questions

Shipping industry has enormous potential to work in terms of different aspect. This study will focus on IT systems usage in container shipping industry and its effects on business performance. A sample ERP (Enterprise Resource Planning) solution which is created from scratch and implemented will explained in detail. This solution is based on cloud computing SaaS (Software as a Service) that also demonstrate in further explanation. Study will seek for an answer if IT systems are using effectively in container shipping industry and which indicators we should point out for describing this relationship. Also, we will reveal what would be the advantages to create an integrated ERP solution into a small-medium sized container shipping line company which is based on Turkey but works with 4 different countries closely. Throughout the creation of this study, there was a chance to analyze the job requirements closely and to see what would be the missing points of IT- Container shipping relations. In order to concentrate of maritime transportation IT solutions results from the user point of view a questionnaire has conducted and see if people from industry agrees with the main idea of the study as higher IT usage will have positive impacts on a container shipping line.

This research will be conduct in order to enlighten how SaaS can be use in small and medium scale shipping industry to gain advantage for the operations. So, it can be understood the benefit of using the subject application can help the enterprises to become one step ahead of their competitors. Advantages will explore and present. Businesses need to analyze risk, evaluate existing/potential rivals and take necessary

actions considering these factors. It will be question whether SaaS has the power to change many aspects of industries in this manner. Therefore, this research has written based on a small and medium sized shipping line company so case study will become main concern in this study. Explain daily usage and problematic area and reveal the potential beneficial point has taken as a goal. Users of this mentioned ERP-SaaS solution and the decision maker authority will give their opinion on this matter how they think this system contribute into their job.

1.2. Research Method

This study takes its data from the real practices on the field. Before the industry based information gathering by experience is shared a literature review will take place. After that created software examine with the purpose of comparing. We will give the business components along with the KPIs from current situation and explain with the possible advantages which will get from the subject solution.

Questionnaire analysis and results will share with the graphics at the end of the study. This study is conducted with the personal experience in the field so, shaped as empirical and observational research. Data has retrieved from the below resources:

Questionnaires and interviews (in person)

-with top managers

-department managers

-department supervisors

-operation staff

-3rd party service providers

After all insight has gathered from the interviews and questionnaire a gap analysis has created. Analysis consist of 4 main elements as: Subject/Feature, Current State, Needs

and Action. Subject or Feature is a description of what is rest, what is the subject really about. Current state indicates the issue's current state, what is company doing right now about the subject. After that we added the needs as what it is needed to be improved or changed the current situation. Lastly, actions are described as what to do for closing the gap between the current state and needs. Then each subject/feature matched with a resource from literature which is related to it.
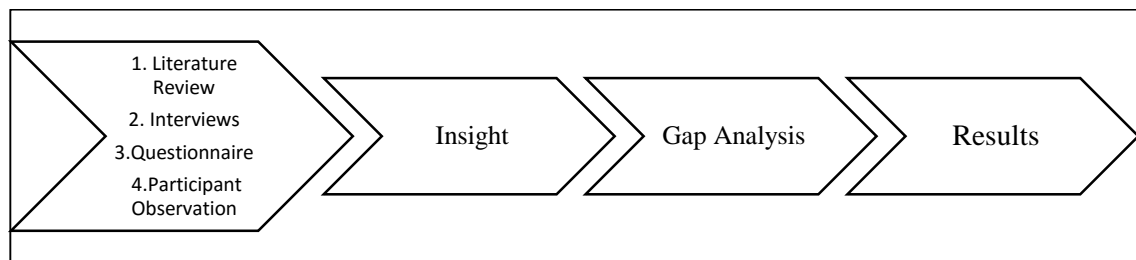
Figure 1: Research Methode

1.3.Literature Review

To understand concept better first literature review takes place. Firstly, scanning has started with the logistics and maritime transportation as from general to the specific. Literature review consist from the subjects as follows: Maritime industry historical progress, containerization, shipping industry in the global aspect and Turkey specifically. Parties involved in the shipping industry. Then, information systems and IT transformation process for shipping industries. The main IT tools and developments which has been embraced by the shipping industry. Place and importance of EDI (Electronic Data Interchange) and XML (Extensive Markup Language) in the maritime. Performance management and key performance indicator for a container shipping line. What are the overall components to be taken into consideration while

evaluating IT usage and requirements. Below tables show that three categories as the grouped by the subject:

1. Logistics and maritime related studies: Both Turkish and English resources have reviewed on the subject of logistics and then container transportation.

2. IT and shipping industry related studies: IT adoption, other empirical studies in the field, internet services and other applications of IT has studied.

3. Shipping industry performance indicators related studies: Based on Greek and Asian ports we tried to understand basics of performance factors in shipping.

Table 1: Logistics and maritime industry related studies

Name of the Study	Authors	Year
Lojistik Maliyetler ve Lojistik Performans Ölçütleri	Bayraktutan, Prof. Yusuf	2015
Türkiye denizyolu konteyner taşımacılığının analizi, sorunların belirlenmesi ve öneriler	Kıpçak, Kemal Süleyman	2014
	Ülgen, Prof. Hayri	
Maritime transportation research: topics and methodologies	Talley, Wayne K.	2013
Maritime transport chain choice by carriers, ports and shippers	Talley, Wayne K.	2013
	Ng, Manwo	
Dünya Konteyner Pazarında Türkiye'nin Yeri	Ateş, Alpaslan	2010
	Karadeniz, Şengül	
	Esmer, Soner	

Table 2: IT and shipping industry related studies

Name of the Study	Authors	Year
Adoption of Information Technology in Supply Chain Management	Ülengin, Füsun	
	Uray, Nimet	2016
An empirical study of the role of information technology in effective knowledge transfer in the shipping industry	Fei, Jiangang	2016
Adoption of Internet Services in Liner Shipping : An Empirical Study of Shippers in Taiwan	Lu, Chin Shan	
	Lai, Kee Hung	
	Cheng, T C E	2016
The role of inter-organizational information systems in maritime transport chains	Elbert, Ralf	
	Pontow, Holger	
	Benlian, Alexander	2016
Information communication technology innovation in a non-high technology sector : achieving competitive advantage in the shipping industry	Poulis, Efthimios	
	Poulis, Konstantinos	
	Dooley, Lawrence	2013
Bilişim Teknolojileri Kullanımının İşletme Performansına Etkileri: Lojistik Sektöründe bir Uygulama	Tekin, Mahmut	
	Zerenler, Muammer	
	Bilge, Atıl	2011
Maritime logistics and applications of information technologies	Kim, Kap Hwan	
	Hong, Bong Hee	2010

Table 3: Shipping industry performance indicators related studies

Name of the Study	Authors	Year
Analysis of transport performance indicators	Išoraite, Margarita	2016
Management control systems and performance: evidence from the Greek shipping industry	Triantafylli, Androniki A	
	Ballas, Apostolos A	2016
A Hierarchical structure of key performance indicators for operation management and continuous improvement in production systems	Kang, Ningxuan	
	Zhao, Cong	
	Li, Jingshan	
	Horst, John A	2016
The performance effect of innovation in shipping companies	Jenssen, Jan Inge Rand, Trond	2016
Diagnosing the Marine Transportation System: Measuring Performance and Targeting Improvement	The Committee on the Marine Transportation System	2013
Key Performance Indicators (KPIs) and Shipping Companies Performance Evaluation: The Case of Greek Tanker Shipping Companies	Konsta, K.	
	Plomaritou, E.	2012

2. SHIPPING INDUSTRY

2.1. Overview

Among all industries logistics has one of the most important factor which has an huge impact on business. After the concept of globalization logistics is not only an operation for transportation but also other services which is add value to the product in terms of physical place to keep it, custom procedures, packaging materials requirements, and many other services. (Aydın & Öğüt n.d.) Logistics will take place even before the good ever produced like it was only an idea level for a product. Even though logistics has many different aspects this study will focus on transportation part of the it. Transportation types is divided into five major groups: Air, road, railway, sea and pipeline transportation. Among all model of them sea transportation has the lowest cost with the variety of good that can be carried. (Erdal & Çancı, 2003) Container can be used to transport many different type of cargo including, transport, gas or liquid form of commodities. Many different materials finished or not can be containerized in order to carry between destinations. A container line acts according to a specific route which indicates its calls. Also some liner can use a in between the way of ports or hub. (And & Dogan 2007) Maritime as transportation type is one of best way to decrease cost since it carries the products in bulk. After the modular transportation took place in the industry it becomes more crucial to provide door to door service into world combining with the globalization concept. Globalization also affect the counties' policies about the trade and improved the usage of shipping services all around the world. (Kothari 2008)

According to below table from TUIK despite that there are some inconsistency in the change of numbers in export and import a developing country like Turkey still have

big potential in foreign trade on the both perspectives. Which means it creates more business opportunities for sea trade day by day. It also has effect on balance of foreign trade which will take role in a country's overall economic status.

Table 4: Foreign Trade by years, 2010-2015 (TUIK, 2016)

Yıllara göre dış ticaret, 2010-2015						
Foreign trade by years, 2010-2015						
						(Değer: Bin ABD $ / Value: Thousand US $)
	İhracat Exports		İthalat Imports		Dış ticaret dengesi Balance of foreign trade	Dış ticaret hacmi Volume of foreign trade	İhracatın ithalatı karşılama oranı Proportion of imports covered by exports
Yıllar Years	Değer Value	Değişim Change (%)	Değer Value	Değişim Change (%)	Değer Value	Değer Value	(%)
2010	113 883 219	11,5	185 544 332	31,7	- 71 661 113	299 427 551	61,4
2011	134 906 869	18,5	240 841 676	29,8	- 105 934 807	375 748 545	56,0
2012	152 461 737	13,0	236 545 141	-1,8	- 84 083 404	389 006 877	64,5
2013	151 802 637	-0,4	251 661 250	6,4	- 99 858 613	403 463 887	60,3
2014	157 610 158	3,8	242 177 117	-3,8	- 84 566 959	399 787 275	65,1
2015	143 838 871	-8,7	207 234 359	-14,4	- 63 395 487	351 073 230	69,4
TÜİK, Dış Ticaret İstatistikleri, Eylül 2016						
TurkStat, Foreign Trade Statistics, September 2016						

Shipping is one of the oldest and common used transportation system in the world. Shipping industry have specific types in terms of cargo, vessel, water. Researches show that in the last two decades container transportation is taking almost %70 of total cargo handling in the sea trade. (Angeloudis et al. 2016) From yesterday to today container shipping has become the driving force of the trade. The carrying capacity increased by a factor of 6, from 3.17m TEUs (4772 ships) in 1990 to 18.9m TEUs (8337 ships) in 2014. Total growth in the maritime industry related market is mostly depend on the container transportation giants Top 20 big container shipping lines has %40-%75 of total fleet in the world. (Tran & Haasis 2015). According to below

statistics from the Foreign Trade Statistics Yearbook 2013 Turkey has no difference than other countries in terms of usage sea trade in its economy. Both exports and imports figures depends on mostly cost effectiveness of this transportation type. However maritime mostly used with intermodal transportation which described as integrating various modes and services of transportation to improve the efficiency of the whole distribution process. Intermodal transportation is often used in containerization due to some advantages. (Crainic et al. 2007) Intermodal transportation also has positive effect on improvement of the maritime industry worldwide. By creating alternative routes and connecting necessary ports and railways to each other more and more cargo slip into water ways. However, there are still some risks in maritime industry which might unite with the slowness factor so it creates a disadvantage to overcome in the industry.

Both import and export figures from 1999 till 2013 tell us that sea transportation is the most often used system among all and it has been increasing in each year due to economics of scale push businesses to use a way that can reduce cost while achieve other expectations from a transportation operator such as security, moderately fast and easy to manage. It is not only in Turkey but also in EU and Asian developing countries have the same perspective on the matter of containerization and improving of sea transportation.

Table 5: Rate of transport systems in exports, 1999-2013 (TUIK, 2013)

Transport Systems, 1999-2013　　　　　　　　　**Taşıma Sistemleri, 1999-2013**

1.21 İhracat içinde taşıma sistemlerinin oranı, 1999 - 2013
Rate of transport systems in exports, 1999 - 2013
A. Miktar - Quantity　　　　　　B. Değer - Value

| | Taşıma sistemi - Transport system | | | | | | | |
| | Deniz yolu Sea | | Kara yolu Road | | Hava yolu Air | | Diğer [1] Other [1] | |
Yıllar Years	A	B	A	B	A	B	A	B
1999	84,1	45,3	15,2	46,3	0,2	8,2	0,5	0,3
2000	84,4	47,1	14,8	43,3	0,2	8,4	0,6	1,2
2001	83,6	49,5	15,3	42,0	0,3	7,2	0,8	1,3
2002	82,7	47,2	16,2	45,5	0,2	6,5	0,9	0,8
2003	80,5	49,2	18,2	43,0	0,2	6,8	1,1	1,0
2004	77,5	49,5	20,8	42,9	0,2	6,2	1,4	1,4
2005	73,7	48,2	24,4	43,0	0,3	5,4	1,6	3,4
2006	76,1	49,9	21,5	41,1	0,2	5,7	2,2	3,3
2007	75,5	48,6	21,0	41,5	1,7	6,5	1,9	3,4
2008	75,6	50,3	20,8	38,6	1,7	7,9	1,9	3,2
2009	71,6	46,2	25,2	41,5	1,9	9,6	1,4	2,8
2010	73,9	50,7	24,3	40,3	0,7	6,7	1,0	2,2
2011	73,6	54,5	24,2	37,3	1,0	6,4	1,2	1,8
2012	75,7	51,1	22,5	33,1	1,0	14,3	0,8	1,5
2013	74,2	54,6	24,2	35,4	1,0	8,5	0,5	1,5

(1) Demiryolu, posta, boru hattı ile yapılan taşımalar ve elektrik enerjisi, kendinden hareketli vasıtalar.　　　(1) Electrical energy, moving vehicles by itself and transportation by railway, post, pipeline.

Table 6: Rate of transport systems in imports, 1999-2013 (TUIK, 2013)

Taşıma Sistemleri, 1999-2013　　　　　　　　　**Transport Systems, 1999-2013**

1.23 İthalat içinde taşıma sistemlerinin oranı, 1999 - 2013
Rate of transport systems in imports, 1999 - 2013
A. Miktar - Quantity　　　　　　B. Değer - Value

| | Taşıma sistemi - Transport system | | | | | | | |
| | Deniz yolu Sea | | Kara yolu Road | | Hava yolu Air | | Diğer [1] Other [1] | |
Yıllar Years	A	B	A	B	A	B	A	B
1999	90,9	47,2	5,9	39,0	0,1	10,8	3,1	3,0
2000	90,7	50,6	5,9	33,6	0,1	10,8	3,3	5,0
2001	90,4	48,7	6,5	32,6	0,0	12,6	3,0	6,0
2002	89,3	55,0	6,6	27,6	0,2	12,3	3,9	5,1
2003	91,1	57,3	6,7	25,7	0,1	12,2	2,1	4,8
2004	92,3	50,7	5,0	24,6	0,1	12,6	2,6	12,1
2005	92,5	48,4	4,9	24,5	0,1	11,2	2,4	15,9
2006	93,4	49,0	4,8	23,4	0,1	9,8	1,8	17,8
2007	92,7	51,0	5,1	22,7	0,2	9,9	2,0	16,4
2008	93,2	52,4	4,6	20,4	0,1	8,4	2,1	18,8
2009	93,6	52,5	4,5	23,8	0,1	8,2	1,9	15,5
2010	92,7	53,2	5,0	22,9	0,1	8,2	2,2	15,8
2011	93,1	55,4	4,4	18,5	0,1	8,9	2,5	17,2
2012	93,4	54,5	3,9	16,7	0,1	10,1	2,6	18,7
2013	93,4	55,6	4,0	15,9	0,1	13,0	2,5	15,5

(1) Demiryolu, posta, boru hattı ile yapılan taşımalar ve elektrik enerjisi, kendinden hareketli vasıtalar.　　　(1) Electrical energy, moving vehicles by itself and transportation by railway, post, pipeline.

2.1.History of Containerization

In order to understand scope better, history of containerization should be examined. The idea of container was developed at 1937 by the Malcolm P. McLean who was a truck driver. He decided to improve this idea while waiting long hours to unload his truck trailer. In order to have a better time and cost efficiency he started to work his idea on containerization. During next two decades, he worked in this business however since trucking create huge cost McLean has decided to switch into shipping the trailers. Although, the idea of shipping trailers was nothing new. In the year of 1929, there were some other companies who already railroad boxcars on vessels to transport goods. The difference was it was not a systematic transport system as it is in containerization. The transportation of goods in containers and the container shipping industry have rather recent histories. The first container ships were old tanker ships whose decks were converted into trailer platform to host the just-built containers. In a matter of months, a container ship departed from New Jersey to Houston with 58 containers on deck. This event marked the beginning of the containerization era and the future of general cargo transportation. Containerization as a cargo handling concept was soon born, proving efficient in reducing labor costs, handling time and damage during loading from trucks to container ships and vice versa. Soon after Sea-Land company developed the fully cellular container ship designed to maximize load capacity and ensure safety. (Petering et al. 2009) After all those improvements which leads by the Sea-Land company in the early 1960s containerization process both vessels and ports has dramatically increased and other companies started to adapt their ships according to container usage.

After the intermodal transportation has emerged and widely used even the small change in technology has effect in all types of transportation including sea, rail, land

and air way. However, with the huge technological advancement has not only affect the shipping industry but also providing the local improvement even the worldwide change. Meanwhile shipping industry get better also create value for social improvement in people's lives. (Tomlinson 2009)

After container have used widely all around the world a standardization problem has emerged especially after World War II in USA. There were many different container types according to their usage purpose and in many different sizes. Differentiation between containers has decreased the efficiency and value of the sea transportation. First standardized container has appeared in USA by the name of lift van and used after 1911 then spread around the globally. The advantages of the standardized units were proven in manufacturing and logistics industries after they discovered the potential of shipments in standardized containers. Economies of scale created a need for logistics providers for better transportation conditions, lower costs and help with the competition.

2.2. Container Shipping Industry

Container shipping has emerged after 1970's and created new components related to subject. As told before majority of the trade has been done on water. Furthermore, 85% of the sea trade is done with the containers. World economy has been changing with the effect of technological advancements and container shipping industry effected from many aspects accordingly. Main element on the shipping is vessel so container vessels started to take place even more than past. Also, their size got bigger and bigger since the needs get more than ever. Mostly some Asian ports and Rotterdam are convenient to serve the giant Ultra Post Panamax vessels.

Container shipping can be divided into 3 different subcategories:

FCL (Full Container Load) in this type of shipments owner might have a deal with shipping agency or forwarder. To work with line directly company must have big volumes of cargo regularly. So, FCL as is evident from its name express to load a container fully.

LCL (Less than Container Load) means that goods which will transport is not fill a container up. When container arrived its destination all property owners will get their products accordingly. LCL loads can occur in port or depot depends on the instructions.

Other Transportation and Services: Such as special equipment and combined transport We can also combine them as below 4 categories:

FCL/LCL: Two or more exporters load their goods into one containers, we will have only one importer.

LCL/FCL: One exporter will load a container for two or more importers.

FCL/FCL: All cargo inside the container belongs to one shipper and one consignee only.

LCL/LCL: Consolidated cargo will have one shipper and one consignee.

2.3. Container Transportation in Turkey

After globalization is emerged international trade has increased as parallel to it. Trade has created logistics requirements and transportation operations demands. Sea trade has significant importance due to Door-to-door delivery gets important in today's business world. Since world trade potential grow this type of transportation get bigger as parallel to it. Variety of services related logistics and marine trade is increased. Additionally, along with the professionalism port and terminal understanding is

changed especially with the help of IT system spread all over the Turkey. Systems has become integrated with each other thus created new dimensions in the shipping industry. Similar as rest of the world Turkey's international trade mostly depend on sea transportation as 90% rather than other transportation types. Container handling become prevalent in the world after 1960's however it takes two more decades for Turkey to catch up with the trends. Container transportation become popular after 1980's and get more intense after 1990's after private sector takes more initiative. (Çetinkaya; 2010) Fast industrialization and higher life expectancy has created more demand on maritime within the last two decades in Turkey. Also since land road volume is busy sea transportation become more crucial for the businesses. Also, Turkey's geographical conditions allows shipping to grow fast and even force to it. One of the most important reasons to choose sea transportation is the reduce cost since it is one of the most reliable and cheap transportation type in the world. General approaches that affect sea trade is to increase efficiency and productivity therefore ships are getting bigger and faster throughout time.

In the sea transportation, there are 3 main lines as: Transatlantic (between Europe-America), Transpacific (between Asia-America) and Europe-Asia line (between the Far East and Europe) and among the three of them Transpacific is the busiest one. The reason behind this intensity caused from mostly America and Far East markets cargoes. (Ateş et al. 2010) Turkish ports are barely 24. in ranking on the world with the 4.5 million TEU handling as 14% decrease in 2009. In the previous year ranked as 12. in the most container handling countries with 5.3 million TEU. (Review of Maritime Transport, 2009: 111) In the Europe scale only Ambarlı port (combine of the Marport, Kumport and Mardaş ports) has reached the necessary figures which includes

top 20 ports in worldwide ranked as 12. in 2010. Top ports mostly consist from China ports.

Despite the geographical advantages and 4500 sea mile seaside Turkey is not in good place in shipping industry when you compare both Europe and world in general. There are growing cargo potential in Turkey's port. Also, Turkey has opportunity to take share from transit cargoes from the neighboring countries from Mediterranean and Black Sea regions. In order to catch the potential Turkish ship fleet must be enhanced. Also, ports and infrastructure must improve accordingly. Lastly Turkey needs to take more cut from transit cargoes in the region.

According to the MTGD (Maritime Trade General Directorate) statistics which published January 2017, total cargo handling in Turkey reached 430.201.162 (all included local cargo and transit) In the previous year total cargo handling was 416.036.695 in 2015 which indicates small increase as 3,4%. In 2016 from this amount of total 8.761.974 TEU was container transportation in total (both transit and local cargo), transit 872.772 TEU and total export and import 7.150.890 TEU. So, container transportation needs serious support to grow. As region based cargo handling; bigger share is taken by Marmara region with 57% and followed by Mediterranean 21%, Aegen 19% and 3% Black Sea regions.

2.4. Maritime Transportation Actors

Sea transportation inholds many factors and types in terms of vessel type, carried goods, commercial behaviors. Nature of maritime business create many different parties throughout the process. In this business area below actors play a part in different levels.

2.4.1. Carriers

2.4.1.1. Tramp Transportation

Tramp businesses can be described that there will be no fixed and published schedule has created for the shipping company so cargoes can be collected in certain ports and locations then they call their route accordingly. Tramp businesses can work all types of market nowadays, including liquid and gas or bulk cargoes. After consideration the location of their ships they can part of the local markets also. They also known to transport their tools in order to use in operation in case they could not find it in the next place they will anchor to load and discharge activities. (Schiels, 1994)

2.4.1.2. Liner Transportation Businesses

In the liner business, the ships operate a regular advertised service between ports, carrying cargo at fixed prices for each commodity, though discounts may be offered to regular customers. So, a liner company offers organized regular services in certain lines.

In this study, we will focus on liner business instead of other type of seaborne transportation types. Liners are known with their fixed schedule to call certain routes and ports in every destination accordingly. They mostly have list prices for commodities and those are offered to customers. However, in some cases they can give special prices for their loyal customers. Also, they might keep tender prices if there is regular cargo continuously. (Stopford 2003) The samples which are given throughout this study was taken a liner transportation company's operations and software solutions.

2.4.1.3. Tanker Businesses

Tanker business can count as a part of the differentiation by the commodity because of the characteristics of this type of transportation comes from mostly bulk cargoes they carry. Such as oil products, liquid chemicals, alcohol products. So, tank ships, tankships or a tanker vessel is designated to carry liquids or gases in bulk. Major types of them transport oil and chemical products.

2.4.2. Ports

A port is the he area of vessels are berthed, stayed, repaired, and built. Facilities fulfill vessels' all needs   and sometimes they have space for storage and warehouses. They are protected are for disasters and dangers by manmade or naturally. Ports can be categorized as many different types such as, container ports, dry bulk cargo ports, liquid cargo ports, military ports, yacht ports, fishing ports and mixed ports as multipurpose. There are largest ports around the world in terms of different elements. In the past Rotterdam port is the most cargo handling port, Singapore port dealing with the largest capacity vessels, recently Shanghai take leadership for most busy ports registered.

2.4.3. Containers

Container is a box which manufactured by international standards and used for purpose of carrying various objects. All standards related to the subject are created by International Organization for Standardization. Containers are mainly divided as 20' and 40'. Its measurement described as TEU which stands for twenty-food equivalent unit, so each 20' container correspond to 1 TEU. Main reason why the containers become so popular is some advantages that create for its users. Firstly, they are very

suitable to combine with other transport modes. You can take a container from a vessel, drag into a port and load a truck and send anywhere via land route or railway whatsoever. They are easy to use especially for any goods that might damage if it is wide open outside. Easy to handle, change place, move up and down with special equipment without harming the product inside. If interior arrangement can be handled wisely it can be load many goods into one container and save space on the process. Also, it is easy to align them inside the vessel and create loading/discharging/shifting operations.

2.4.4. Vessels

Vessels can be also count as one of the involved elements in shipping industry. There are many different types of vessels in terms of their usage purpose. However, container vessel belongs to the category of Dry Cargo Vessel. In the same group, there are also reefer vessel which can be combined with the container vessel since reefer is a type of container to transport frozen or fresh type of commodity inside the box. Another one can be Ro-ro vessels which is used to carry wheeled cargo such as cars, trailers, etc. Additionally, there are some other categories such as tankers, ferries and passenger vessels, bulk vessels, fishing vessels, or vessels for special kind of purposes like yachts.

2.4.5. Shipping Agencies

One of the most often used actor will be shipping agencies in this study. Since container lines has relations with the agencies due to custom affairs environment of the maritime transportation cannot be think without them. Mainly a shipping agency is a firm that has responsibility handing cargoes and related documentation work on

behalf of the charterers (ship owners in some cases) Agency would protect principal's interests and try to take care of its business smoothly and quickly.

2.4.6. Service providers

2.4.6.1. Brokers

A broker act in maritime industry like any other industries. He/She will bring buyer and seller together in order to create a transaction so he/she can get commission out of it. Since a broker will be mostly independent from both parties we can also count them as 3rd party for an operation. However, brokers can be represented one of the actors whom take place in the deal but not both sides at the same time.

2.4.6.2. Freight Forwarders

Forwarders are also agents who find customers for liner and vice versa. A forwarder company acts on behalf of other companies and receives and ships goods. They organize any step of a transportation operation for customers. It might start with the beginning such as from doorstep of the factory and ends on the customer's place. Any forwarder does not actually transport any goods however they create all process in order to actualize the conditions. They also known as non-vessel operating common carrier (NVOCC) and mostly work with the manufacturer or producer.

2.4.6.3. VSA Holders

Vessel Shared Agreement described as a consortium comes together for operates a specific number of vessels in a created route. VSAs does not always have equal number of vessel in a partnership. Available places will be shared between partners for each partner accordingly. An alliance and VSA is not same in terms of terms and conditions are dedicated to certain route whereas an alliance is more global.

2.4.8. Regularity authority

For trade relations, most important authority is the custom office. Both export and import procedures are strictly determined and examined by the customs of each country. All customs are connected to Ministry of Customs and Trade. In addition, for food export Ministry of Food, Agriculture and Livestock arranging rules for the traders. Also, Turkish Competition Authority takes important place for trade.

3. INFORMATION SYSTEMS

3.1. Introduction

Operations are nowadays unthinkable without effective and efficient IT use and appropriate optimization (management science and operations research) methods. Besides enabling efficient data interchange between supply chain partners, related information systems need to support terminal operators, shipping companies and even port authorities. Increasing containerization and competition among seaport container terminals have become quite remarkable in worldwide international trade (Voss 2007) The company it is mentioned in this study, is a shipping line which offers transportation services to its customers. It is a small and medium sized company that has 15 employees internally and 8 different agencies from 5 different countries. They intend to contribute the business by using information technology. In order to that it should be clarified to understand the running of the company. A shipping line has or lease ships and containers to provide service to customers. Mainly purpose is to take the products from the shipper and deliver to the consignee. There might many different kinds of agreement between the company and the customer. In our case, it has agents working on behalf of the company to get customers and sell them our services. So, no direct communication between customers and the liner company. It provides communication through its agent managers and marketing teams. However, if have tender customers or special customers who is using big volume from the service then there might get contact personally. Mostly finding customers is occurring through market researches and commercial expos. Also, the company can get involved with bid in order to get business. Job is providing container transportation to the customers. So, it needs to be trusted and trustworthy in general terms. Transit time that it offers

which means the needed time period we say our customer to deliver the products must be short and should happen as expected. Promised time should be kept as said. If there are any event foreseen that ships might be late to deliver a product then trying to cooperate with another company which has offer the same service in order to meet the requirements. Currently there are cooperation windows with many companies in the market. Other main thing in industry after the transit time is the price. Thus, a firm need to know what are the market prices for a destination and what would be the possible costs should be considered while determining the price. Possible costs can be regarded as following: leasing payment for a container, rent for a vessel, cleaning costs, bunker, commissions, other local expenses and costs. So those factors can affect the price therefore would have affected on customers. Businesses need to analyze risk, evaluate existing and potential rivals and take action considering these factors. It will be question whether SaaS has the power to change many aspects of industries in this manner. Explain daily usage and problematic area and reveal the potential beneficial point has taken as a goal. Users of this mentioned SaaS solution and the decision maker authority will give their opinion on this matter how they think this system contribute into their job. The Internet seems to be an extra distribution channel to most firms. In fact, the Internet and Web technologies can support the entire supply chain's operations. Internet-based supply chain operations are fast and inexpensive. Moreover, customers can instantly check the status of their orders by simply clicking their computer mouse. Corporate executives and managers can conduct real-time access to firm's inventory level, and so do their suppliers and distributors. (Chou et al. 2004)

3.1. IT Transformation Process for Shipping Industry

Since maritime industry and containerization has improved rapidly it has emerged various kinds of software and systems as parallel to those improvements. These issues include the optimization of the design and operation of container terminals, inland and maritime transportation systems, and real time locating systems, applications of RFID technologies, and other advanced information technologies to support efficient operation of the transportation systems.(Kim & Hong 2010) IT transformation needed in the industry with the main reason of cost. It is expected that RFID and other technologies would create an environment that leads to efficiency by numbering, tracking and creating real time information about containers in a terminal. It will help to boost communication within people or organization both internal and external actors. Because of the necessity of many documents and container itself will flow one way and/or one party to another all processes required fast and effective transformation. Day by day capacity and operations has been raising so it is crucial to find and implement the solutions without human errors get in the way or even with no mistakes all processes can be faster and reachable. It is also related with the fact that networks and internet and their quality is getting better. In the maritime it will be collected main IT transformation milestones in shipping industry as below:

3.1.2. Networks

All over the world shipping instructions and whole operations has been carried out by the network connections. Despite that industry does not have the public eye on it there is still massive connections required in order to tracking vessels, follow up operations and documentation functions afterwards and all traffic in maritime industry included. Thanks to network connection we have better understanding that how maritime traffic

is working now especially when we need to compare it with the past operations and relations. Both container transportation and other types of shipping choices can gain efficiency and even better safety with the network connections. Network can be a factor to choose certain a port in the route or a vessel to be chosen. There are four major approaches in the industry related with the network usage in maritime: (Ducruet & Notteboom 2012)

Geographic coverage of carrier networks, network connectivity, network efficiency and complex networks. In the container transportation, there are some features in networks which other types of transportation do not have: First, opposite of the other types of transportation lines container liners have a going around and oblique way to visit each ports. Secondly networks are irregular to their oblique features. Thirdly, all connection lines has separated from main line to the branch lines. (Hu & Zhu 2009) Intensity of a port provide major correlation between the network and industry. There are some main ports in the world that create much busier traffic than others as a result they needed to create a quite effective network line to manage all vessels and functions without making concessions from quality standards. Therefore, when a port gets more hit than other it is likely to make investment for network infrastructure than any other ports accordingly. Busy ports create massive requests to respond however equally they are more likely to have better infrastructure throughout this process. Better network connections might also attract business into those regions who can provide for liners. Also types of the operation can affect the network quality based on what would be their route and destination, their fast and even their commodity for some cases. Ship types and size will have impacts on the maritime networks. Additionally, can added that other main transportation types such as air and railway networks also have the same big positive impacts so that they would improve efficiency, effectiveness and

safety for mainly. For example, like other critical infrastructures, the air transportation network has enormous impact on local, national, and international economies. The worldwide air transportation network is responsible for the mobility of millions of people every day. (Mossa et al. 2005) Similarly sea transportation is responsible from each goods to arrive their destination with the satisfaction of the shipper and consignee and for that a strong communication network must be created. Effective multimodal networks and well structure distribution centers are among those aspects making port performance more efficient. (Voss 2007)

3.1.3. Internet services

Nowadays, the Internet and the World Wide Web are widely accepted since they broaden the scope of connectivity among individuals and businesses. Web based solutions has certain advantages for a firm such as cooperating with other businesses, gaining advantages by eliminate some costs, improve relationships with customer and trying to get competitive advantages.(Chou et al. 2004) Since the World Wide Web has significantly become important all over the world shipping industry has started to utilize this service for its efficieny. In liner shipping, the use of Internet services can reduce the cost of transactions between shippers and shipping lines. Instead of spending time on interorganizational communication with the shipping line by telephone and fax, the shipper can manage the simpler aspects of the transaction through the shipping line's website.(Lu et al. 2016) Mostly both large and small shipping lines prefer to use web-based operation systems in order to track down both internal and external related works. To create better understanding how internet services can give a shipping line effectiveness a sample firm from industry will be explain and analyzed as below:

Internet has dramatically grown over last years. It is predicted that it is even get more widely used than today in the future. We try to understand business to business usage of the internet instead of individually used. Internet helps to create better communication between stakeholders and helps to cut down some of the logistics expenses within the company. (Lancioni et al. 2000) So mentioned shipping lines has developed a system that is called as business management platform (shortly BMP among users). BMP has different modules according to different functional areas in the company. Such as; booking and commercial, documentation, equipment and logistics, vessel operation, finance and accounting and other administrative and definitional modules to be used. Application has opening page that allows you to give user name and password in order to enter the system and track all data. All users have different roles from different regions, countries and companies. So, they get information whatever they were allowed. This internet services have provided as cloud database and also all operation backup online. We called SaaS (software as a service) and explained briefly below:

Cloud computing elements which can be listed as follows: Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS) is helping the businesses to have better resources in order to provide a better service to their customers. (Giessmann & Stanoevska-Slabeva 2013) Cloud computing is a internet based system so it is mostly considered as a supporting system. Cloud computing and its components adoption into business can be determined as which job actions are supported by the cloud, which applications a firm can use for their business activities in general and what are benefits that can be added into job itself. (Salleh et al. 2012)

3.1.4. RFID systems

RFID stands for Radio-Frequency Identification. In this process, a product or a container can tracked with the help of RFID tags. In each system, there is a receiver and responder which takes related data and keep it in the memory of the device. Each tags are unique also the information is created is unique to the that specific tag and this is how the system works in general. (Richard et al. 2011) It seems that FRID systems mostly deal with the storage and warehouse and used for these purposes. However, warehouses occupy a serious place in supply chain management thus logistics and shipping industry. Containers can be storage in some cases and needs to be tracked down to manage operations effectively without extra cost for both customer and liner itself. Also in many different industries which are especially contain manufacturing processes can be beneficial to track down all pieces before production and afterwards as a semi-manufactured or manufacture goods. On the other hand, it can be tricky to keep a container safe and clear as location for ports and terminals authorizations without proper technologies to make it easier in a complicated cycle of the shipping operations. RFID systems can increase efficiency in terms of handling equipment with knowledge, sustainable even harsh weather and environment conditions, save time and provide clear knowledge about inventory. Historically, the ports market was an early adopter of RFID and today represents a proven, growing field for this technology. However, what started as a market focused on the use of passive RFID for security purposes has since evolved to a predominantly active RFID market for long range asset tracking and process automation, including: (Dempsey M. 2011) To track down all assets easily, processes are more automated and followed, helps to improve safety and security issues for both labor force and inventory.

3.1.5. Real time locating/tracking systems

Shipping companies consider most of the ship turnaround time as a critical factor when selecting a calling port for reducing costs. Container terminal operator tries to improve the port quality of service requested by a shipping line to maximize the productivity of container terminals. Therefore, this thesis proposes RFID (radio frequency identification)-based RTLS (real time location system) for enhancing the performance of terminal operation system. Some of the advanced ports installed with latest IT technologies have better competitiveness to the lagged ports. There are some researches adopting RFID and the wireless network technologies for their faster speed, more secured, and support automated work procedure in the logistics infrastructure. (Park et al. 2006) A container tracking system comprises a dispatcher workstation with a graphical user interface and a database. These are used to track the whereabouts of shipping containers in a storage and transfer yard. For container tracking there is a method to plug a device into container to see all positions of a containers, device will report the data into receiver through radio frequency. It will continue to transmission till the container has stopped and then they separate from each other. Then the database is updated according to the last move of the container and interface arranged to see the container's place later. (Gonzalez et al. 2002) GIS (geographic information system) has another important development for such systems can be used in maritime effectively. With the power of digitalization GIS' has been increasingly often used to create some simultaneous like real world pictures for users. GIS is helpful to increase maritime safety. Many vessels in the open sea has dangerous goods onboard and even a small accident might be fatal for environment and creatures which live in the sea. To

avoid such a disaster it is good to use GIS and maritime navigation systems to eliminate human errors to reduce the number of accidents. (Goralski & Gold 1997)

3.1.6. Data transfer technologies

Data transfer technologies are widely using to transfer documents or data between business partners. It is belongs to concept of inter-organizational relationships and provide an approach to arrange a framework for enhancing communication between partners.One of the most commonly used data exchange type is the EDI (Electronic Data Interchange) to share knowledge between parties involved with an operation. (Elgarah et al. 2005) Also EDI has been reviewed in Information Systems chapter widely however it must be mentioned in here too since shipping industry exploit this format in data exchange everyday all over the globe. In shipping liners EDI has been used for sending/receiving documents and reports from their agencies, business partners, ports and other third parties who get involved in overall business.

3.1.7. Stowage Stability Software

Container lines uses stowage, stability programs for their own, operated or chartered vessels in order to organize cargo onboard. Main points of using stowage, stability programs are to maximize container lift and ship utilization at same time. On this section, will give details about stowage, stability and allocation programs and also point out advantages of using these programs.

First of all, from safety point of view, it is an obligation to perform strength and stability calculations of container ships during loading / unloading operations. These calculations were made by hand in the past, however with much of difficulties, mistakes and loss of time. Using calculations made by hand also complicates to claim

any case to vessel (captain) / company (vessel operator) in any conflict on loading / unloading operations. This problem occurs when two different people are making calculations by hand with same data but came up with different outcomes. If also different nationalities in shipping business added as a factor, small communication problems on calculation outcomes by between two operators, can cause major loss on cargo, vessel or worst on human life. In order to prevent these kind of losses, International Maritime Organization (IMO) obliged ship owners to accommodate a computer and related software application able to carry out strength and stability calculations for all ships having length above 65 m.

Using program on shipping business have major benefits from container line aspect. Primarily, application allows vessel operators to plan more vessel with less time. From company side, it is beneficial to hire less planners for vessels, it is also beneficial for workers to perform same task by less time. Programs are also can be a very reliable guide before companies offer any cargo transportation to their customers or change their company strategy, i.e. making a port call addition on their service etc. Especially on chartered vessels, vessel operators (captain) can accept less cargo than vessel actual capacity in order to be sure of vessel is secured. Using programs can prevent and outcomes of the program can be used as a proof in any conflict with Captain. In shortage, program helps companies to know their operated vessels true capacities and allows them to simulate different scenarios.

In shipping business, regulations keep changing day by day by maritime authorities and container lines are forced to follow these regulations and make same on their company policies in order not to have any penalty etc. When a container line starts to work with a stability software developer, they also have advantage to track these regulation changes beforehand as they already have after sale support.

On common practice, of international container transportation, 3 parties can be considered as essentials for operations. First party is vessel operators from container line, second party is vessel agents which are responsible to follow instructions given by vessel operator and the third party is vessel officer (captain). Major responsibility of the captain is to secure vessel other than maximization container lift, therefore vessel operators have major effect on ship utilization, loading more cargo onboard. At first, operators prepare a plan by using a stability program. Task of the operator is to load maximum cargo with less amount of container movements in order to minimize cost. Captain checks prepared plan from safety point of view, agent is responsible to follow operation plan at port if captain does not have any objection. As clearly seems on above, it is essential to use program for time management and prevent human mistakes considering huge amount of container operations at ports.

In this section, will give details about container stowage and stability programmes. Stowage and stability applications are being used by container terminals, marine agencies and container lines. They have mostly have 4 sections for users. First one is represented for arranging a stowage plan for the units will be loaded. User can check tonnage, type of the units and any special remark such as containers stowed with dangerous goods or refrigerated containers. Programme warns user simultaneously if vessel is loaded over its capacity or if special units such as refrigerated, dangerous goods containers are not stowed properly.
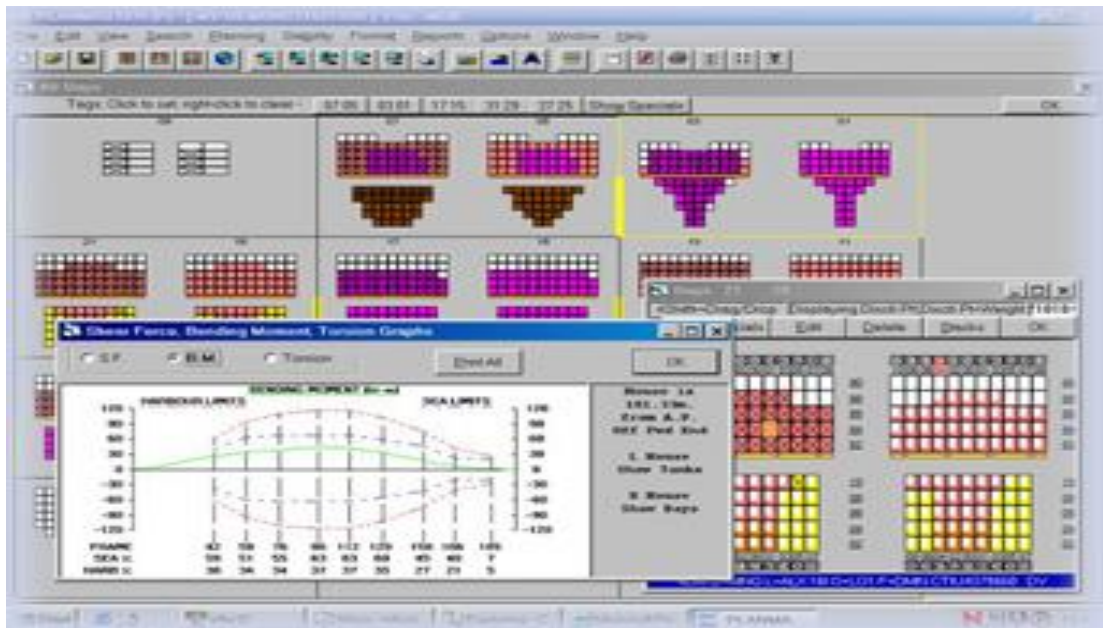
Figure 2: First section

After plan is arranged by user, second section of the program is used for file translation. Translated file is needed for stability calculations on 3rd section.

On 3rd section of the program, user can check vessel stability, bending moments, shear, torsion and trimming of the vessel. This section is important for vessel safety. User can also, make adjustment on oil, ballast tanks of the vessel for a safe sailing with planned cargo onboard. Both vessel operator and captain uses 3rd section in order to check safety of the vessel.
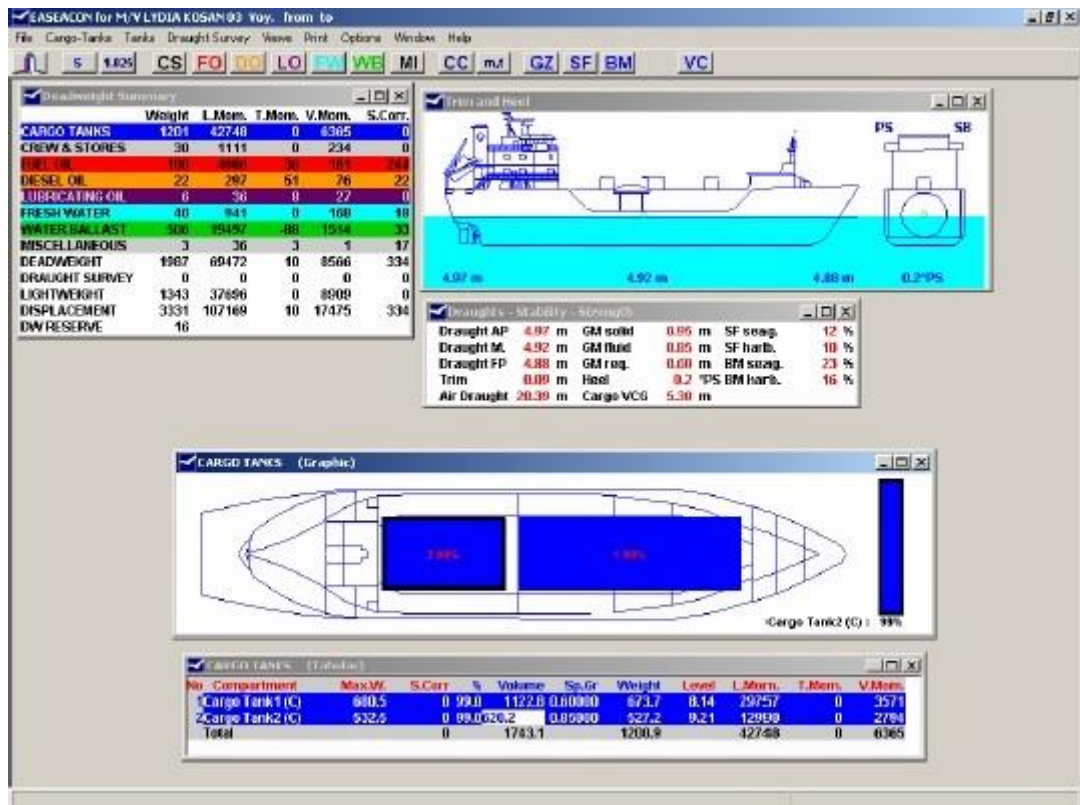
Figure 3: Third section

4th section is used to create vessel profiles for newly joined vessels to the fleet. User can also make adjustment on current fleet vessel plans if any modification is performed on them.

2.3.7. Other supportive systems: Other services that can helps any company not only shipping companies can be listed as productivity software such as spreadsheets and worksheet tools. Most small businesses prefer to track their business with those tools and applications. Spreadsheets such as most known Ms Excel which are consist of cells, rows and column. Spreadsheets makes calculations easier to understand and helps to create a visional display which support it with graphics, pictures, tables etc. Templates makes function fast and allow the users to create reports in a proper shape. Most spreadsheets can work with databases and helps to extract data, format raw data

and explain it. Especially in data exchange spreadsheets and word processing packages takes place. Word processors also helps companies in terms of security, cost and cooperation. From the security aspect most of the word processors has the option of setting password protection for the documents. It might lock the documents for anyone to change or encrypted for only authorized people to see them. Also, it helps people to share documents and enable team work. Users can keep documents in a shared server so people will revise their work and reports. It is an effective way since it enables simultaneously work on a document online. For cost perspective, there are many word processor program which is free and reliable for the businesses. MS Word is mostly used in this category as word processor but it has a cost to use. OpenOffice, Zoho writer or Google Docs is offering free services if the company budget does not allow to buy any expensive software. Mail exchange software is crucial for communication and knowledge transfer. File translators also widely used in shipping industry to create vessel plans and exchange them between parties involved.

3.2. Electronic Data Interchange (EDI) in Maritime Transportation

Since the technology and innovations in the industry get better all companies try to get more of it in order to benefit from those improvements. Fundamentally changing data between business/trading partners is a simple protocol. However, clarify rules in exchange in other words standardized the sending/receiving data to create circumstances for all parties one of the tricky part. Any firm can design their structure according to their partner. However, it might not be same for all parties included in operation. When a shipping line company considered it can be easy to organize their data exchange protocol with one agency or business partner but there are many actors in this photograph so, how they can get standardized? EDI – electronic data

interchange- is the one answer for this struggle. EDI can be described as exchange of data between applications among organizations. It can be thought that EDI take the place of interchanging paper and documents on the maritime industry.

EDI is applied in a growing number of sectors; retail/distribution; automotive, aerospace; defense; all transport modes; tourism; banking/finance; Government; Customs, and its principles are often taught and discussed in academic institutions. This contributes to drawing work- able and useful guidelines for designing a new efficient EDI system for container cargo logistics. There is now a great deal of activity all over the world in trade facilitation services. Some value-added networks are designed to improve one particular aspect, or another, of the trade facilitation processes. (Lee et al. 2000)

3.2.1. Advantages of EDI

There are many features and benefits that can count which come along with the EDI. EDI is the electronic computer-to-computer exchange of business information in a structured format between business trading partners or between various units within an organization. Accordingly, EDI is a high-speed method of electronic communication that facilitates the exchange and processing of high volumes of business data from one computer to another. EDI is being used by many companies to order and pay for goods from suppliers, to arrange transportation from carriers, to receive orders from customers, to invoice customers, and to collect payments from customers. The application of EDI involves the conversion of written documents into structured, machine readable format. (Arunachalam 1995) If one is to succeed in establishing a new and generally applicable EDI system for container cargo logistics,

there are three general prerequisites to success. Through the model, one must understand more clearly:

- what the EDI is: what are its capabilities and limitations;

- the transport sectors, maritime and inland, that the EDI system is to be used in: its processes and the information that it uses; and

- the broader context for the use of EDI: international standards, the law, the trading and transport process that create EDI messages and the benefits such as a system can provide.

All three of these prerequisites to success will be aided by modelling tools that make one see the individual concepts behind container logistics and the group concepts that, together, make EDI what it is. (Lee et al. 2000)
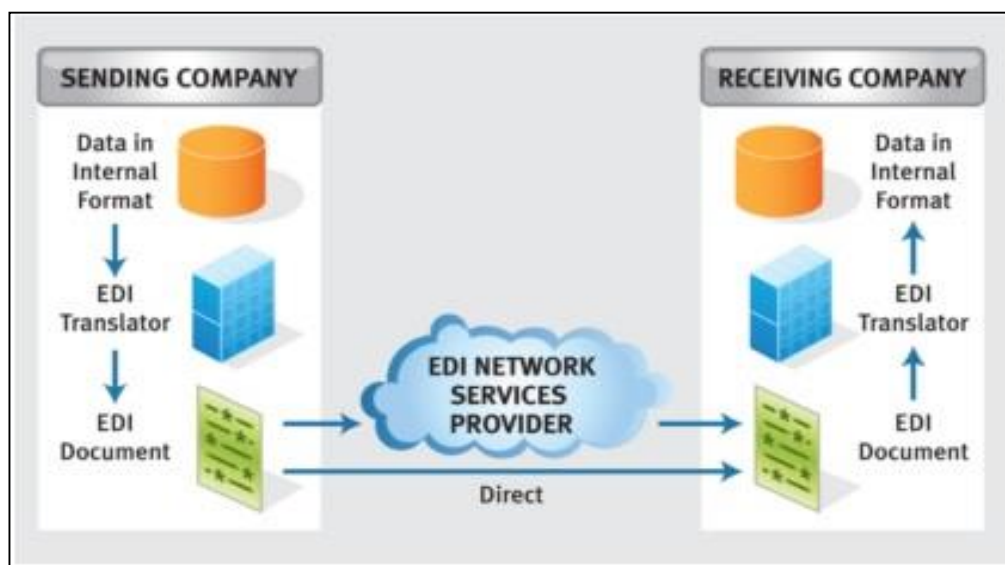

Figure 4: EDI Process Overview (Cohen, 2014)

Main advantage of using EDI is shorten the time of not only the delivery of the documents from A to B but also is shorten overall operation time. So, it helps to provide necessary resources to what is main by eliminating waste of time and energy.

It will increase efficiency as reallocating those resources and putting into another bottleneck which needed by the firm. Instead of writing letters, fill in some forms, creating notes and many other paperwork over and over again and most importantly all those works would have done by people EDI creates an environment that reduce of need human power. Moreover, not only reducing the human power in paperwork but also helps to decrease human mistake/error which is highly possible to occur during operation.

EDI is broadly used among the maritime actors such as liner, customer (both shipper/consignee which means exporters/importers), carrier companies, banks, agencies and custom. It shows that on the trade (industry, manufacturing, finance, banking, insurance), on the transportation (land, air, railway, storage and warehousing services), also in public sector (custom office) is transferred their data with this way. For small and medium size enterprises, there are many advantages which come with the usage of EDI especially after internet get more accessible without less problem. Also, it has advantage like not to create much expense.

(Shiwa et al. 1999) In brief EDI provides a company below potential advantages:

- Fast and correct data flow

- Increasing productivity and profitability

- Reducing costs

- Improving business relations among the partners

- Helps to build customer satisfaction

- Create competitive advantage

- More effective work environment

- Helps to gain data security

Table 7: Sample EDI file content from a shipping line company

```
[                                                                    UNA:+.?
'UNB+UNOB:2+MARMAS+ADM+161206:1541+009776'UNH+009776+IFTMIN:D:
06B:UN:SMDG20+IE1649+1'BGM+340+0+9'TSR+28'FTX+AAS+++FREIGHT
PREPAID
FCL/FCL'CNT+7:14821.000:KGM'CNT+8:2278:PCE'CNT+16:1:NMP'DOC+70
5+++0+0'GDS+9:00:ZZZ'LOC+57+TRGEM:::GEMLIK'LOC+91+TRGEM:::GEML
IK'TOD+5++FILO
'RFF+BM:BLNO/2016/0001'DTM+95:20161205:102'RFF+BN:B161205917'T
DT+20+IE1649+++ADM+++TCZF2:103::SAMPLE                          VESSEL
NAME'DTM+132:201612050000:203'DTM+133:201612050000:203'LOC+9+T
RGEM:::GEMLIK'LOC+12+ILASH:::ASHDOD   PORT'NAD+CZ+SHIPPER1::ZZZ+
SHIPPER  COMPANY  NAME  'NAD+CN+::ZZZ+CONSGINEE  COMPANY  NAME  -
ISRAEL'NAD+N1+::ZZZ+CONSIGNEE        COMPANY        NAME        -
ISRAEL'TCC+101021:::BASIC                                        OCEAN
FREIGHT'CPI+1+PP'PRI+CAL:1.00:::::21'MOA+64:1.00'TCC+103003:::B
UNKER                                              ADJUSTMENT
FACTOR'CPI+1+PP'PRI+CAL:1.00:::::21'MOA+64:222.00'TCC+104198:::
WAR                                                        RISK
SURCHARGE'CPI+1+PP'PRI+CAL:1.00:::::21'MOA+64:18.00'TCC+104809:
::CONGESTION
SURCHARGE'CPI+1+PP'PRI+CAL:1.00:::::21'MOA+64:68.00'TCC+104167:
::DISCHARGE            TERMINAL            HANDLING
CHARGE'CPI+1+CC'PRI+CAL:1.00:::::21'MOA+64:360.00'TCC+104808:::
ISPS                                                        CODE
SURCHARGE'CPI+1+CC'PRI+CAL:1.00:::::21'MOA+64:12.00'TCC+104808:
::ISPS                                                      CODE
SURCHARGE'CPI+1+PP'PRI+CAL:1.00:::::21'MOA+64:6.00'TCC+600926::
:CLEANING
SURCHARGE'CPI+1+CC'PRI+CAL:1.00:::::21'MOA+64:7.00'GID+1+2278:B
X:::BOXES'TMD+3'MEA+WT+AAB+KGM:14821.000'SGP+TGHU7986068'EQD+C
N+TGHU7986068+45GP+2++5'MEA+WT+T+KGM:4000'SEL+642050+CA'UNT ]
```

Above sample is taken from an EDI file which is sent by a shipping agent to line, port authorities, custom office and customers. All necessary information to create a bill of lading such as shipper and consignee name, their address and commercial title, loading and discharging port for cargo, container details, description of goods, container details and their content and all related data related with the subject cargo.   Bill of lading

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described as transport bill which has all kind of information contained for carried cargo and B/L is the main document for all shipping operations. Within 1 month a shipping line company can create hundreds, even thousands of bill of lading according to market condition.

If it can be considered below diagram can be seen that there are complex relations with the many responsibilities within a trade operations. All players send and receive all kinds of documents (commercial documents, invoices, certificates, carnets, transport documents, bill of lading, notes, receipts, insurance documents, policies, delivery orders, etc.) to each other. To make this easier there has to be improvements and innovations of the way of doing business. All technological advancements and protocols come with the necessity of the business. Even though they do not they turned out to be a way of assisting the progress of industry by people who seek the adequate path for businesses.
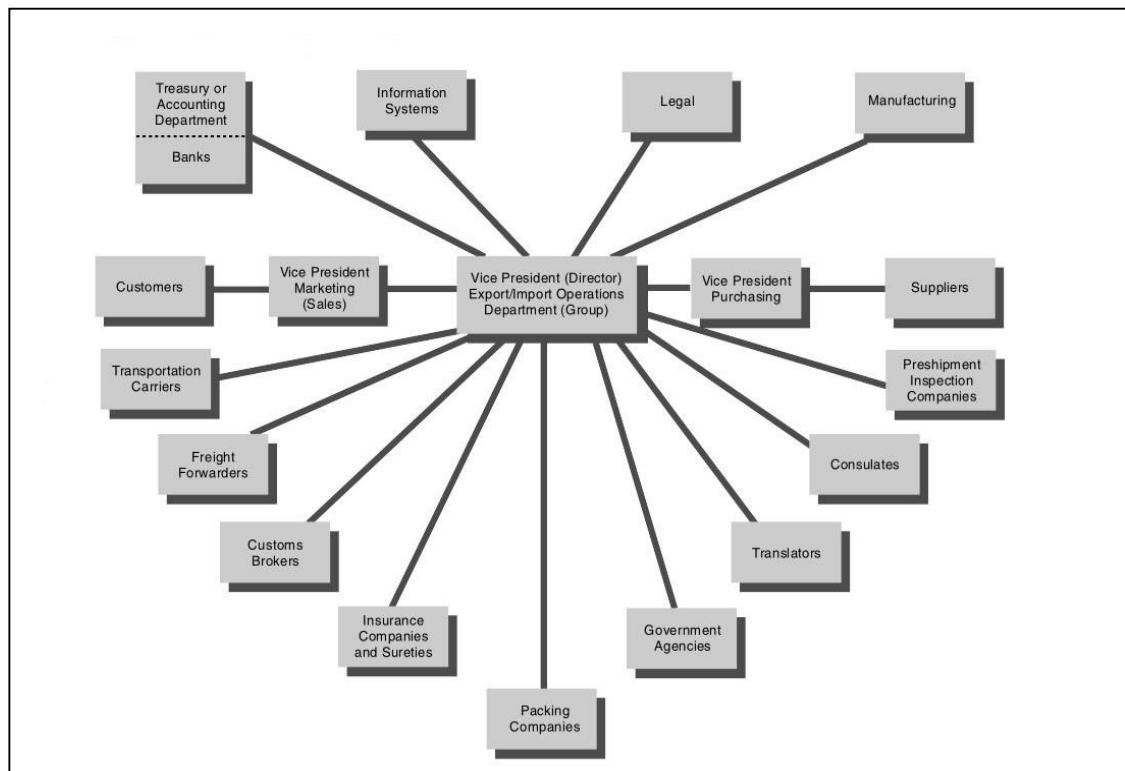
Figure 5: Interrelations between actors in a trade (Johnson, 2002)

3.2.2. EDI vs XML Comparison

Even though EDI is still widely used in maritime industry, there is new trend with the rise of internet. XML stands for Extensive Markup Language which has been started to occupy all industries over the last years. EDI based to XML changes affect the business in terms of financial and sales perspective and costs at the same time. (Nurmilaakso 2008) XML based systems has some leverages against the EDI based frameworks. There some points into taking consideration for it: (Bray et al. 2006)

XML is certainly needs to internet to be used.

XML can support different kind of functions

XML has compatibility with other alternatives

It is easier to write and create XML documents

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Any shipping line company which is using a web-based program/application can give all bill of lading, reports, analysis through the internet in order to its stakeholders can reach all data by following simple instructions and upload their system accordingly. It is more convenient than keeping the system internal based if you take necessary security measurements. The idea was that XML (eXtensible Markup Language) would be a logical alternative for companies who couldn't afford EDI (electronic data interchange) and the costly VANs (value-added networks) EDI required. (Kaplan, 2002)

Below sample code has written by with the purpose of tracking vessel and getting real time data with the help of API (Application Programming Interface) every 15 minutes. Furthermore they seems to manage to integrate this feature into existing software so it is getting easier to have convenient data. This only one example for using XML for maritime industry and its one aspect. It is possible to use what XML offers in many different subject for various purposes.

Table 8: Fleetmon vessel racking API (fleetmon.com, 2016)

```xml
▼<jakota apiversion="          -1.0">
  ▼<vessels count="1">
    ▼<vessel pk="50483">
       <name>ARKLOW RAIDER</name>
       <callsign>EIXS</callsign>
       <imonumber>9344540</imonumber>
       <mmsinumber>250001268</mmsinumber>
       <latitude>51.359275</latitude>
       <longitude>4.284787</longitude>
       <positionreceived>2012-03-20 16:54:12+00:00</positionreceived>
       <destination>DROGHEDA</destination>
       <etatime>2012-03-25 12:00:00+00:00</etatime>
       <navstatus>moored</navstatus>
       <speed>0.0</speed>
       <currentport>Antwerpen</currentport>
       <currentport_arrival>2012-03-20 04:30:03+00:00</currentport_arrival>
       <lastport>Terneuzen</lastport>
       <lastport_arrival>2012-03-20 01:20:01+00:00</lastport_arrival>
       <lastport_departure>2012-03-20 01:20:01+00:00</lastport_departure>
    ▼<image>
       http://img.fleetmon.com/thumbnails/399043.700x1000.jpg
    </image>
    ▼<map>
       http://fleetmon.com/getpic.position.V2.php?c=275.0&j=0&m=1&s=1.0&v=cai
    </map>
       <location>Antwerpen, BE</location>
    </vessel>
```

XML is the future language for data exchange, and support for XML has been extensive. Although XML has numerous benefits including self-describing data, improved readability, and standardization, there are always tradeoffs in the introduction of new technologies that replace existing systems. The tradeoff of XML versus other data exchange languages is improved readability and descriptiveness versus space efficiency. XML is rapidly replacing existing technologies as a medium for data exchange between systems. XML is a standardized, portable, human readable, flexible, and self- describing data format language. For many applications, it is a clear improvement over proprietary binary formats and non-standardized text files. XML is replacing these older technologies. However, like any new technology, XML has benefits and shortcomings with respect to the technologies that it is

replacing.(Lawrence 2004) Since implementing and adopting systems according to EDI is highly expensive and standards are complicated to meet exactly there are some opinions that consider to create EDI/XML framework in order to provide better service. The target of using XML/EDI based data interchange method for a small medium or large scale company is same, they try to communicate their business partners all around the world but with the less cost. (Lu et al. 2001)

3.3. Information Systems Usage in Maritime

Using technology for a small and business company may differ from various ways. Information management takes place especially for using operational data to analyze and understand. Information needed to be seeing the future of the business with reporting. Operational reports can give an idea about productivity, utilization, profit/loss and other related knowledge can turn into statistics for business. In order to manage reporting and understand the underlying reasons of costs will affect efficiency so information management technologies and applications needed to be for overall processes. Since competition is getting harsh and marketplace is even tougher using information management platforms and take advantage from it is mandatory. Because if companies wanted to be noticed in market and be successful in terms of services or products there must be some tools to take place in order to get advantage in today's business world.

In order to understand a small shipping line IT capacity, it will be given some certain knowledge about it as follows: It has been using for daily work by personal computers. There is one main server for using intranet services. One local application is running internally for documentation, reporting and finance solutions. There is also a web based business management platform for using operational needs, booking and

commercial. The program has been running on cloud. It has been a problematic to have two applications within the company because that causes extra workload for everyone. Program will complete for all modules so that it will not be necessary to insert information for both applications.

In the shipping line company case are trying to understand about as a small and medium size company is it going to be smart and effective way to use as a information system services related with the business performance issue. How decision makers will see their firm's exact situations and can BI tools could be helpful detecting the main issues in this area. There are many challenges when it comes to strategic decisions that have crucial importance for the businesses. Also, people who need these systems are mostly top management and end users within the company. The reason behind requirements to change current operational, reporting and decision system into new one can be explained as data which needed to be handle is getting bigger and more complex. In order to get meaningful outcome and make decisions is only can be achieved by processing possessed information so it can be used as a source of intelligence. All tools including BI and other related applications have a source for data. Both a) internal data (financial reports, cost and expenses analysis, etc) and b) external data (competitors, government policies, agreements and problems between companies, other environmental information) will be needed to gather and work on it. In some of the shipping line company cases internal data processed by an internal platform. This local system has different modules which allow users to enter data into system and get reports from it. However, in order to get analysis or any report for using it as decision support source staff needed to work on it and may be combine some info or separate them in order to get meaningful outcome from this current system. The system causes heavy workload for personnel and waste of time and energy for all users.

Internal system does not answer basic reporting needs unless manually organized first. Internal data processing system is an old technology that has an old physical server and complicated database. Customer information, invoices and bills, documentation requirements, cost control mechanism, container movements and vessel details are organized in this platform. Local storage and computing causes many things including:

- Unstable program

- Energy and workload waste for double and manual data entering

- Unnecessary maintenance costs (paid by mountly)

- Unproductive and slow system

- Unsolved problems

- Unsatisfied end users

3.3.1. Business Software for Shipping Industry

Beside all data exchange ways and standards there are also many options as ERP (Enterprise Resource Planning) systems and tools for a shipping line company to be considered. Other than name them one by one it is better to focus the functions and capabilities of them. Those tools can be helpful for the following processes within an operation: planning container stowage, automated shipping stages, helps to achieve commercial purposes such as bid management, freight rates, analysis, fleet management, inventory warehouse, brokerage, contract management, finance requirements, calculate costs, reporting, scheduling, website, supply chain management, combine different types of transportation in one platform, shipment tracking, bookings, multi-carrier solutions, optimization, route creation, etc.

For this study, since a shipping line company aims that to carry highest amount of container at the same time it can be see that how this tool can be essential for it. Despite

the fact that stowage planning has huge importance for a container vessel operations it is still very thrill and takes too much of time and effort for a planner employee. However, since it creates big impacts on business performance there must have some detailed work in order to create a sufficient planning output. (Gärtner et al. 2015) The reason why any company use a tool that is basically decide which container will be where in a ship is to maximize the overall performance. Additionally, it decreases time of a planner use to plan the operation manual and gives them more opportunity to change plans easily. So, they can choose in order to create best circumstances for the operation. Since they already send a plan to loaders ship also will wait a bit less on the port as a result of this costs will decrease accordingly. However, creating an effective plan is not the only factor that affects the real loading process. There are still many factors including the elements that prevent human interaction to order such as weather conditions, wind, political events, government decisions etc. All cases can occur and effects operation even if take precautions. So even in this scenario still has a positive impact on overall operations. At least if there is any event that might take place those software gives the opportunity to intervene as fast as possible.

3.3.2. Container Shipping Line Company ERP System

As mentioned before explanation briefly sample container lines switching its local system into a web based which is supported by cloud. This platform created which the intention of availability. A shipping line may have different stakeholders which needs to cooperate with each other. Basically, those actors can be listed as follows: agent, subcontractor, service providers, customers and both government and private authorities. In the planned system, there are different modules to respond variety of requirements from people with different expectations. However, they are never been

in the same location so basic challenge to create an environment which is reachable 7/24 and sustainable availability. People from different companies with different intentions will enter system and they will affect each other's operation within the system. Therefore, there will be a second challenge as authorization problem.

Firstly, there will be some functions which only developer will be allowed to use. Those functions mostly coding framework and change management for the application. Only lead developer will be changing system based on the shipping line company's requests.

Second main category for the system would be Accounts. Account module used for the customer data which is entered by the all users from all agencies around the world. All shippers and consignees registered into system with their trademarks, names, addresses, communication details, person in charge and other relative information can be considered as important to know.
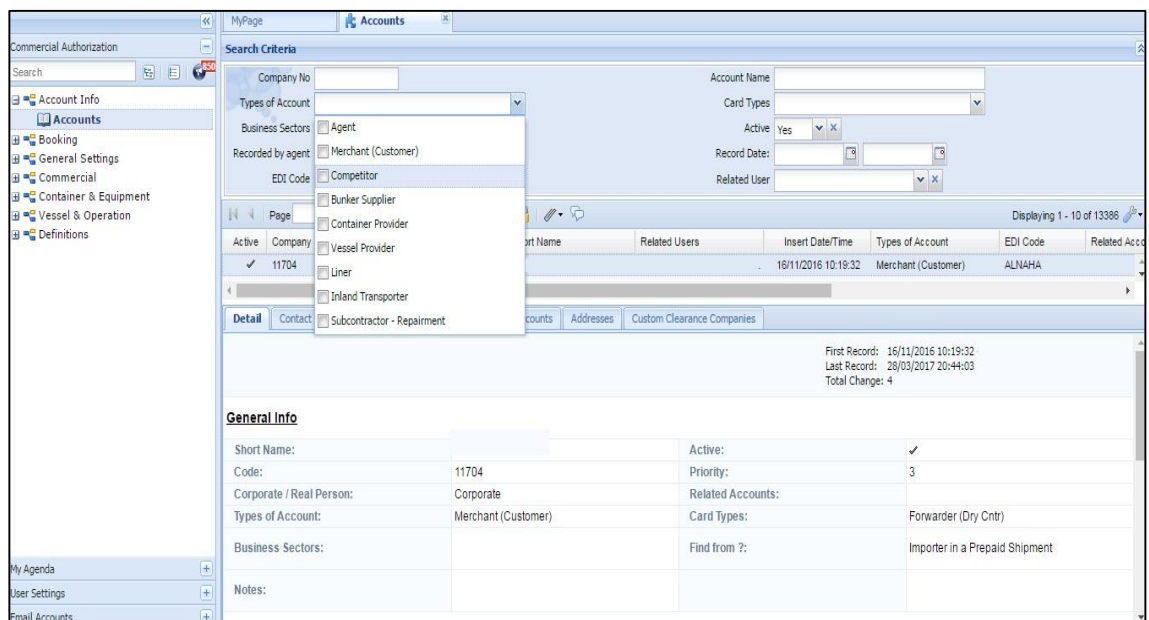
Figure 6: Account module screen

Third module is Commercial which allows users to request for price offers, negotiate through system, ask for inland transportation offers to decide if the cargo needs to be carried before shipped on board.
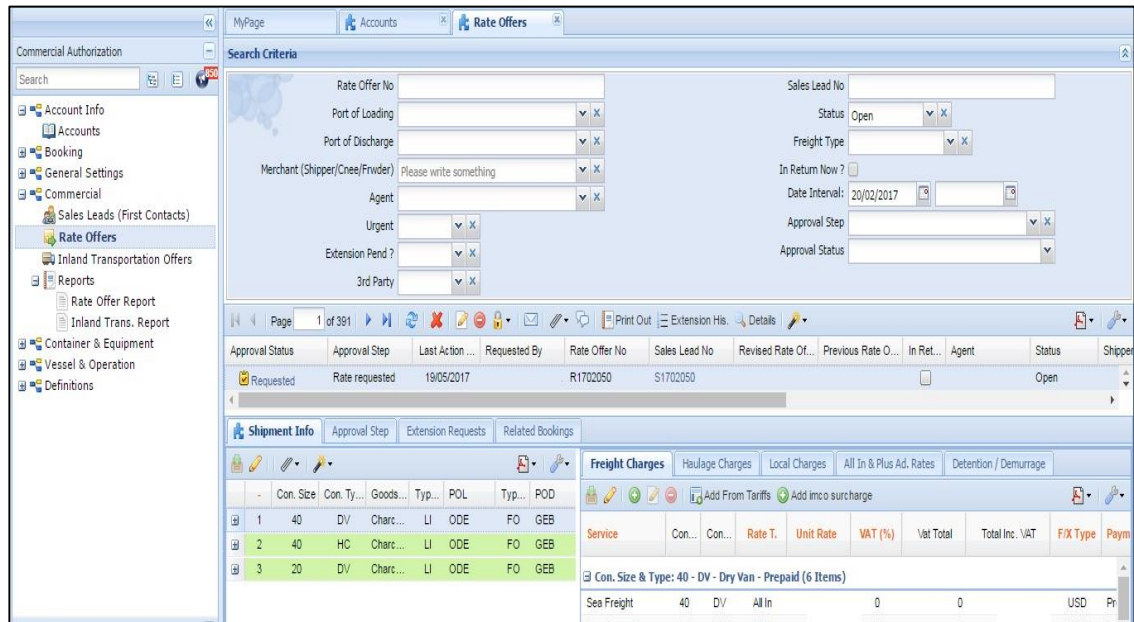
Figure 7: Commercial module screen

Fourth module named as Booking and used for to create reservation into a specific vessel. Agencies users are asking for space from the vessel and indicate how many containers they want to load, for which customer they want and what would be the content of this container. If it has chemical inside or any hazardous goods that vessel planner should know about will be well written inside price offer and booking. System will automatically create a number for both price and booking.
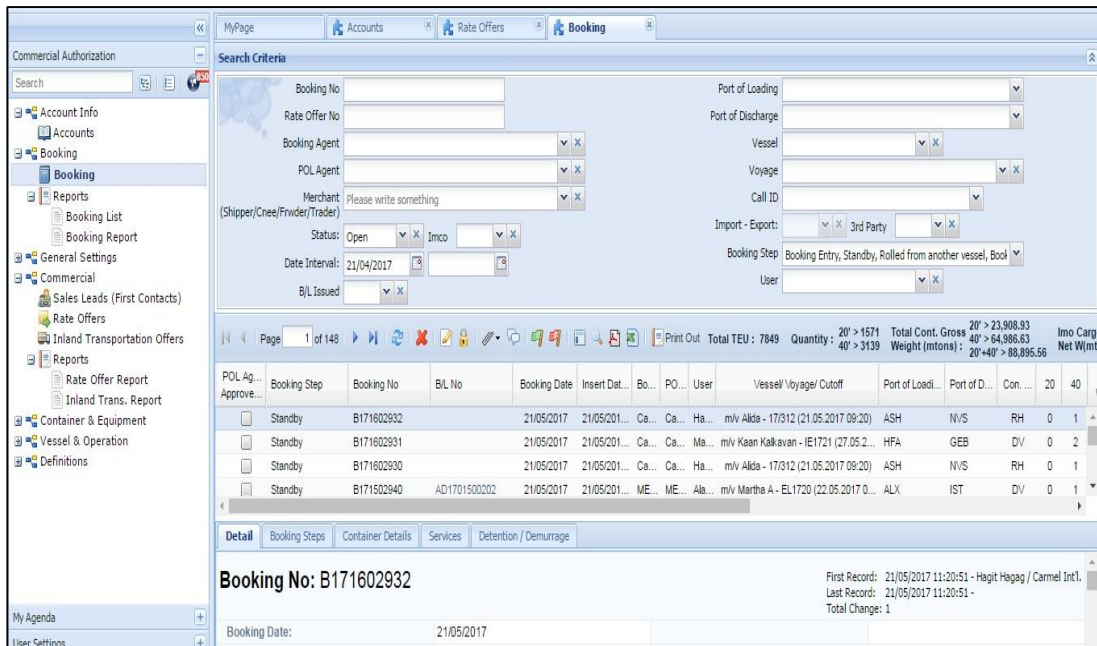
Figure 8 : Booking module screen

Fifth module used to create container database. Each container is registered in inventory if the company owns it. Otherwise contracts will created and leasing container will be added into it. Container's prefix, number, check digit, default tares and owner are added accordingly.
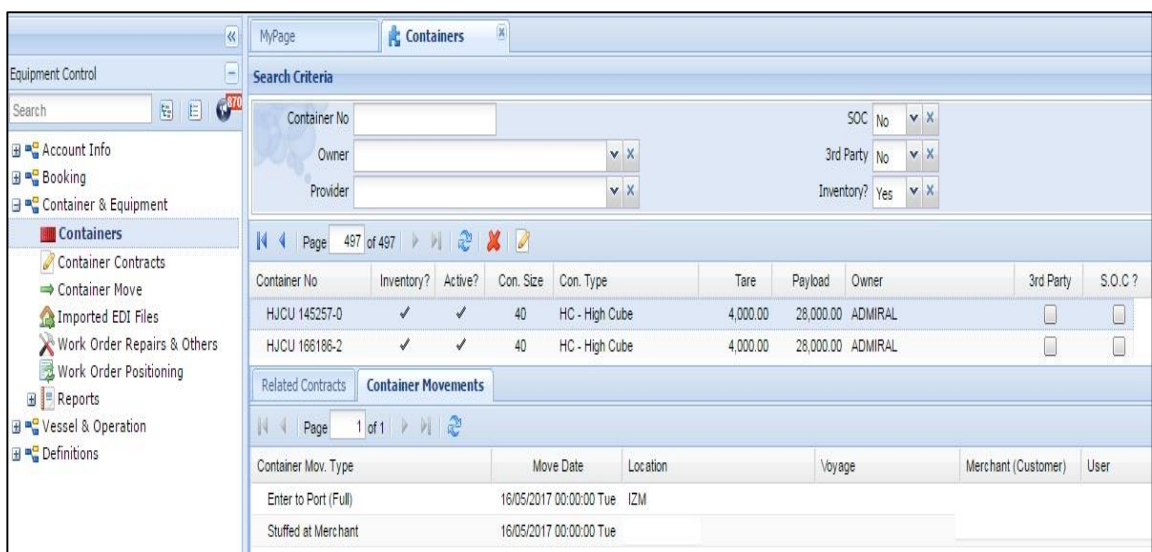
Figure 9 : Container & Equipment module screen

Sixth module is Vessel Operation module. Core of the business is inside of this one due to all ships, all routes and calls are planning and executing so creating voyages.
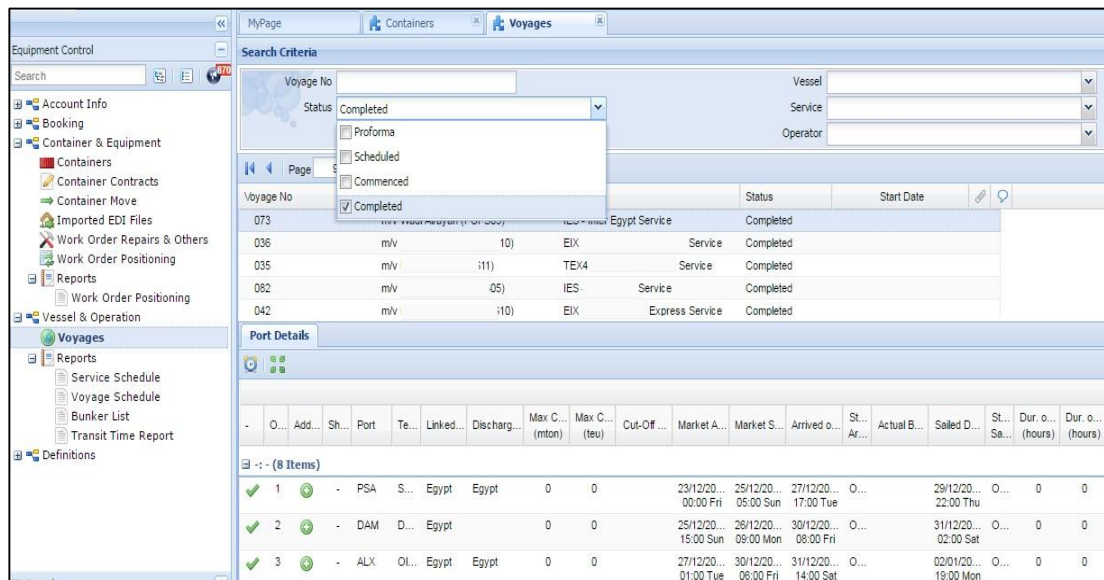
Figure 10 : Vessel & Operation module screen

Each module has their own reports. From booking you can get all bookings list as Excel or Pdf. You can filter them before creating list according to their vessel, voyage, date, calls etc. You can get rate offer report to see all price offers and their validity. Container type, goods type and customer information can be also found in this report if you choose accordingly.

Lastly there will be a Definition section which allow authorized people to save specification about a particular subject. In each department user may need description which can be used in every time they used a feature. Better to define them first and choose among later while doing the routine work.
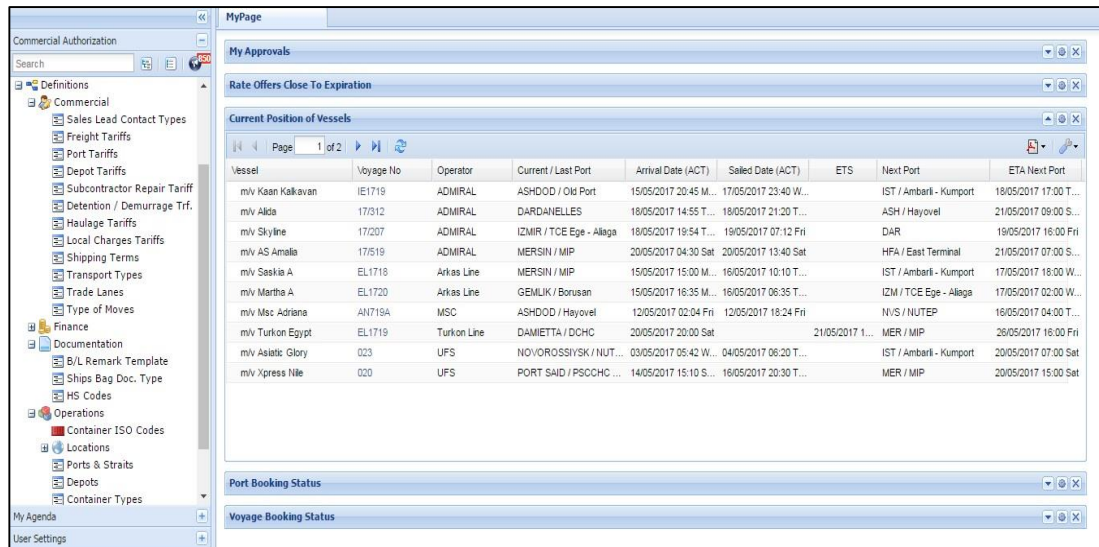
Figure 11 : Definitions and My Page overview screen

3.4. Comparison of Other Transportation IT Usage

Like mentioned in the introduction part there 5 other kind of transportation types used in the logistics along with the maritime. First and widely used after sea is the land transportation. In the land transportation, there are also ERP systems in order to create value about: route optimization, cargo tracking and following, EDI for data shared.

In the land transportation, same with the maritime there is a tendency to switch into web based systems in the last two decades. Also, in terms of safety location systems are used. In the governmental level, U-ETDS (Transportation Electronic Tracking and Auditing System) is created in order to keep track of the vehicles which carries passenger, cargo or loads. There are other systems which is used with the integration of GIS (Geographical Information Systems) in the land transportation. Adaption of European Union functions takes important place in the field so information systems try to close the gap between Turkey regulations and EU. Logistics information systems has created value for the supply chain same as maritime industry. ERP systems has many comment actors with sea transportation, in fact land transportation is one of the

important components to complete operations in maritime industry. So, they use similar ERP, data exchange and web based tendency with the container transportation. GPS (Global Positioning System) is another widely used technology in the field.

In some researches reveals that, IT usage is mostly used in order to create below values for the business: (Tekin et al. 2011)

Quick responses to the customer needs

To increase the quality of services

To reduce costs

To gain advantages in operation in terms of speed and easiness

To develop customer relationships

To have competitive advantage

Secondly, there are different types of railway transportation to carry people and cargoes. In the railway usage of IT is accumulate on the passenger carriage side of the sector due to there is more demand for it. However, systems are helpful for both passenger and goods carrying. There is integrated routing and mapping systems which is used for the plan a train's trip with the all stops and destination along with the where to start the route and where to finish it. This system has strictly work with the GPS in general usage. Solutions also take place for communication via network. However, we can say that railway is not using IT solutions as it needs to especially in the cargo transportation. High speed trains and infrastructure operations are helping for railway to grow. Also, infrastructure is developed for to assist trade operations and integrated railways with ports. According to the Ministry of Transport, Maritime Affairs and Communication Turkey has 12.532 km railways by the year of 2016. Total cargo number is occurred which carried by the railways is the 25.9 million ton in the 2015. (Ministry of Transport, Maritime Affairs and Communication, 2016) In railways there

are some projects for signalization and electrification which created with the cooperation between TUBITAK, TCDD, ITU and BILGEM in order to create railway software systems nationalized.

In addition to the transportation types, I would like to mention that logistics solution provider's information systems such as DHL and Fedex examples. To explain situation better we will use the DHL example. DHL is mainly established and focused on the documentation delivery however, by the time passed they also expand their business area by adding other stakeholders into their business. DHL is using the information systems as in three dimensions: operational, tactical and strategic level of business. Their main idea is to create an integrated information systems so that they can keep track all related section of the total work. They have different solutions for the different sectors as DHL Global forwarding, DHL freight and DHL supply chain for the lowest level as operational requirements. In the second level, they have decision support systems, networks and warehouse and inventory management software solutions. Since DHL has very large scope of network they need to follow the innovation trends very carefully which they have so that they create a significant competitive advantage when compared with the competitors. Also, for human resources, quality management and customer relationship management tools. Main purpose of their IT usage is to create maximum integration between the teams and input-outputs. On the contrary of Fedex which is very close competitor they operate the business from head office instead of represented by the subsidiaries. Being an innovative company pays off for the DHL from the IT point of view.

4. PERFORMANCE MANAGEMENT

The world of competition drives businesses to perform better. In order to achieve this purpose, shipping companies try to offer more efficient service and low prices for their customer. Even when you check the fuel consumption of the companies in the industry seen that most of the people tries to take measure in order to save costs. Moreover, also keeping track of the fuel and monitoring to reduce the usage become more crucial. (Hughes 2014) It is important to lower cost not even for profit just surviving in the tough market conditions. One of their assistance on this matter is using information technologies more often to create value for their business. Rise of the computer technology makes communication improved for the benefit of both intra-organizational and inter-organizational level. Using of the technological improvement allow companies to deliver their cargoes in the right time and place with the possible lowest cost. By configuring necessary infrastructure, combine software and hardware enable a company to create efficient environment not only their customer but also for their employees. Most of the companies and directors see an opportunity in information technology in order to growth their business and gain competitive advantages.

Performance measurement is the process of quantifying efficiency and effectiveness. To do this, performance measures should be chosen, implemented, and monitored. (Braz et al. 2011) In order to understand whether a company is successful or not there has to be some factors taking into consideration. Those factors should have below features so that they give results accordingly. Target setting and objectives must meet some requirements to work for the benefit of the shipping company. S.M.A.R.T goals idea has published by the George T. Doran who is a consultant and former director, in

1981. Now, it is widely used for management goals and activities. The acronym S.M.A.R.T. is often used to summarize these main criteria: (akereon.com, 2016)

S – Specific: The goal should be explained well detailed in order to be understood clearly.

M – Measurable: Determine the success depends on measurable targets which can be analyze and expressed numerically, graphically or any other way that can be represented as result.

A – Attainable: The target we determine should achievable or reachable for our firm

R – Relevant: Our mission and vision is related with the objective goals that we try to set and reach.

T – Time bound: We need a deadline for any kind of target for the company so we can measure it whether is it completed on time or not.

4.1. Key Performance Indicators in Maritime Transportation

In order to assume that a company is successful business goals and objectives should be set. All companies try to create solid strategies to meet their target. So, the whole activities and improvements in order to meet the target can be called as performance of the company. Business performance is seen equivalent with the finance which mostly measured by effectiveness and efficiency. (Konsta & Plomaritou 2012) Despite finance has great impact on performance it is not only criteria on the evaluation stage. It is important to forecast and cover the customer demand as much as meet the business objectives. In fact, it is one of the objectives itself. Another one can be count as create value for business. It will be listed what could be performance criterias in a container shipping company which can be improved by any system or activity.

It is important to set measurable and reachable targets for the company. Also, numbers and figures should belong to a time period for evaluate. The best value performance indicators can be used for five dimensions of performance: (Išoraitea, 2010)

1) Strategic objectives: why the service exists and what it seeks to achieve

2) Costs/efficiency: the resources committed to a service: the efficiency with which they are turned into inputs

3) Service delivery outcomes: how well the service is being operated in order to achieve the strategic objectives

4) Quality: explicitly reflecting user's experience of services

5) Fair access: relating to case and equality of access to service.

Key performance indicators for a shipping line have many distinguished features. Those features must include all logistics parties which take place in an operation. Customer is the essential element which is followed by freight forwarders and shipping agents. All lines trying to offer a service that can satisfy all parties in terms of time, budget and capacity. KPIs should have the following characteristics (Parmenterg, 2007):

Nonfinancial measure

Frequently measured

Acted on by the CEO and the senior management team

Understood by all staff

Ties responsibility to the individual or team

Has significant impact

Has positive impact

As the mentioned subject tries to create a link between maritime transportation with the information systems this study will mostly focus on effects might come along with the software and technological participation on maritime industry. So all below mentioned performance indicators will formed around the programs and applications which currently in usage and getting results for business. Many companies including shipping lines itself alongside freight forwarders, shipping agencies and other actors in logistics overall are using many different business software they think they might help them to achieve business objectives with the better results. As a result, we will stay focused on the IT perspective while we defined the subject business factors. Reviewing and updating performance measurement systems (PMS) based on internal and external environmental changes are as important as developing and implementing them. (Braz et al. 2011) Business components for a shipping line is wide, we try to narrow down only essential one for this writing. Some of components have directly related with the IT tools and gain benefit from them regularly. However, some of them are indirectly related with any technological advancements which even IT does help, it would not be an essential factor for success. According to shipping line that we have examine we reach that its own KPI that can categorize as below:

Table 9: KPIs for a shipping line company

Business Components	Key Performance Indicator	Expectation from Software
	Number of handling container	Quick data control
	Occupancy rate	Utilization
	Speed of vessel	Efficiency
	Weather conditions	Monitoring
	Port efficiency	Simulation
	Transshipment	Decision making
Operation	Act on schedule	Create and access schedules

	Hire costs for vessel	Automatic Calculation
	New vessel hire	Create pool for selection
	Vessel Information	Comparison between vessels
	On hire-off hire procedures	Less workload
Chartering	Fuel consumption	Correct Information

	Shifting expenses	Efficient Planning
	Salaries	Less people more work
	Port surcharge	Scenarios
	Waiting charges	
	Demurrage	
Finance (Cost, Income)	Other Expenses	Approval system

	Compatible prices	Competitive Information
	Freight rates	Growth on Market
	Market Conditions	Market share
	Rivals' Position	Customer Loyalty
Commercial		Target Actualization

	Infrastructure	Effectiveness
	Telecommunication	Time & Cost Saving
	Hardware & Software	User friendly
	Geographical systems	Safety
	Real time tracking	Security
IT	Data transfer	Eliminate Human Mistake

	Customer information	Access control
Documentation	Paperwork	Digitalization

	Availability	Filter and differentiation
	Procurement	Age of fleet
	Damage & Repair Management	3rd party involvement
	Leasing Contracts	Follow up and renewal
Logistics	Container Repositioning	Simulation

	Claim Policy	Archives
	Customer Satisfaction	Feedbacks
Claim & Insurance	Risk Management	Correspondence for Requirements

4.1.1. Business Components

Like many other industries, container shipping has its own components and performance indicators. For container shipping one of the most known indicator is The Liner Shipping Connectivity Index which publishes by the United Nations Conference on Trade and Development (UNCTAD) since 2004. In appendix B added from 2010-2016 for countries who have values determined by UNCTAD. Top 10 is mostly consist of Asian countries which has been dramatically developed last decade and other developed countries such as USA, Germany. Turkey is ranked 29th after eliminated empty valued countries. On the other hand, last lines have been shared with mostly Sub-saharan Africa countries and some Middle East countries. If index is high it tells us that the country has big share of the maritime industry and its performance is good. There are many different criteria which has been taken into consideration when index prepared such as vessel fleet, container loading capacities of vessels, service amount, and the measurement of vessels. Furthermore, there are other indexes published by

other institutions like Logistics Performance Index is created by World Bank. LPI, indicate that below measurements according to Worldbank: Logistics performance index focus on below six aspects of a logistics when measure a country's grade:

1) Efficiency in processes including governance offices and other functions

2) Infrastructure which can affect the nature of the business (e.g., ports, railways, ways, information technology)

3) To offer competitive prices which can contribute the trade

4) Capability and quality of transportation services

5) To follow up the cargo and documents
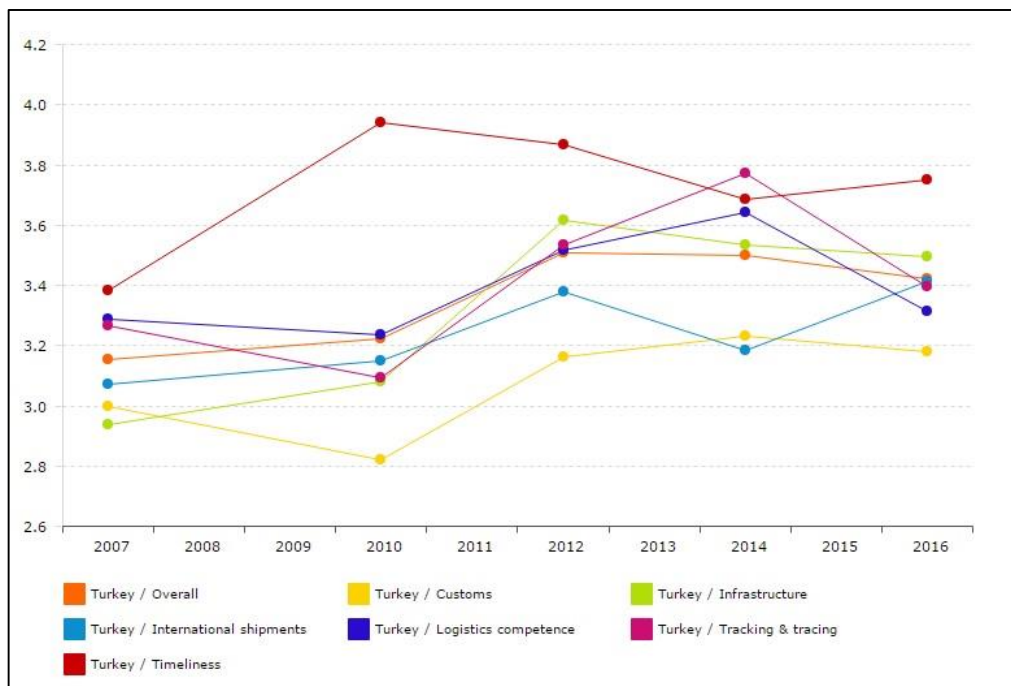
6) Deliver the cargoes which the time was exactly promised

Figure 12: Country Score Card, Turkey 2016 (Worldbank, Logistics Perfomance Index)

4.1.1.1. Operation

In maritime transportation, time consumed during operation is the key factor for a better service. Time period during operations plays a decisive role especially in container shipping.

In container transportation, main purpose is handling maximum container with less time, who achieve to perform operations with shorter time, have the advantage on their rivals. This rule is effective for all parties in container shipping i.e container lines, ports, shipper & consignees.

4.1.1.1.1. Number of handling container

In shipping business, there are so many inputs which are beyond control of container lines, ports such as unexpected weather conditions, strikes at ports, accidents on vessel & ports, vessel waiting time for passage entrances etc . All these listed factors have major impacts on vessel & port schedules. Actors in container shipping do not have much in their hand to change the situation to their favor since it is too late to take any precaution.

All above factors which are beyond control are all effective for all container lines, ports. In this instance, real difference between competitors will come into the open depends on who have the best planning on the points which they have control. Having the best organization will give the advantage to confront unknown factors in a superior way. The things which are in control of the line and port can be listed as following;

On container line side;

- Port and agent should be well informed on vessel rotations, schedules. Any change on shipping schedule is to be declared all parties.

- Line should define container readiness time at port depends on arrival of the vessel and inform port and agent on time. In this mean, all arrangements can be made just before vessel arrival and vessel can berth upon arrival without any lost time.

- Line should check the cargo volume regularly on ports in their usual rotations and gives the decision on time if any call omitting or adding is needed reckon increase / decrease on cargo volume.

- Line should inform technicians for them to make all arrangements before vessel arrival if any malfunction is reported by vessel for the container onboard or any repairment is needed on vessel for safe sailing. In this fashion, repairments can be performed during operations without any additional time at port.

- Line should arrange stowage plan before vessel arrival and present plan to both vessel & port. It is highly important to get confirmation from Master of the vessel that plan is convenient to follow. Making changes and / or discussions on plan with Master after vessel is berthed causes lost time on service schedule and also delays berthing time of the next vessel. Stowage plan is also, need to be checked by port for any missing containers or wrong declaration etc.

On port side;

  - ETA (estimated time of arrival) of the vessels which have regular / additional call to subject port should be followed regularly and adjustments should be made on berthing program accordingly.

- Port should inform container line, vessel side and the port after them in vessel rotation for berthing program, need to specify all informations including crane quantity, total container movements, estimated time of operation, berthing pier and estimated time of sailing.

- Port should make sure that all containers are in port until readiness time and inform line side in case of any missing container for loading.

- Port should make all arrangements before vessel arrival if any extra service is demanded by vessel such as oil, water, store supply.

- Port should inform vessel if any inspection will be performed by port authorities.

- Port should assist & inform technicians for the vessel they will perform repair.

- Port should inform all parties regularly for their work program on national holidays.

Clearly seems that, it is highly needed to use a software program in order to form a successful organization which all above tasks are planned, performed, followed and reported after completion. All these tasks can be performed in one program by giving authorization the personnel in organization depends on the task they have. Benefits of these software programs can be detailed as follows by explaining them as modules. Voyage Module on Vessel & Operation Section: Following information can be found on this module;

- Vessel, voyage, service information

- Current voyage status

- Latest rotation of the vessel

- Maximum accepted TEU / tonnage on vessel from per port

- Cargo readiness time declared by line management

- ETA & ETS of the vessel

- Actual arrival, operation, sailing dates, other operation details

- Accepted ports for discharge

- Transshipment details for ports which are not in vessel rotation

- Duration of stay in ports and passages

- Duration of voyages between ports and passages

While changes on vessel rotation, allocation, cargo readiness time, accepted ports of discharge and transshipment port details are being arranged by container line, same changes are being followed by port and agent simultaneously in this module. In this way, all parties have last updated information in their hand from one source. After operation is being completed; arrival, operation, sailing dates and other operation details are being updated on this page for further reporting tasks. These datas can be used for statistics, financial agreements or research and development studies. System also updates vessel schedule automatically by calculating the duration of voyage depends on last sailing time of the vessel.

Figure 13 : Operation dates and details screen

Figure 14: Port of call screen

Main point of this module is to inform all necessary parties at same time by only arranging vessel general plan and also avoid any adverse situation due to wrong declaration etc.

4.1.1.1.2. Occupancy rate

In order to sail vessel with her maximum capacity, two different software solutions are being used in container lines.

First programme is being used for vessel booking status. Booking datas are being entered to system by commercial department of agents. System collects booking information from all ports, gathers them in a table for line management planning.

m/v Pacoba		012		INX - Istanbul - N...		Commenced		13/05/2017		3.56		23		0	
Only Full Units	Egypt		Israel		Izmir		Marmara N.B.		Marmara S.B.		Mersin		Romania		Russia	
	TEU	Tonnage (mtons)	TEU	Tonnage (mtons)	TEU	Tonnage (mtons)	TEU	Tonnage (mtons)	TEU	Tonnage (mtons)	TEU	Tonnage (mtons)	TEU	Tonnage (mtons)	TEU	Tonnage (mtons)
Egypt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Israel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Izmir	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marmara N.B.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	166
Marmara S.B.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mersin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 15: Booking details screen

Program also allows user to get booking details as pdf or excel file for further check or use on other programs. In these detailed page, user can access port of loading, port of discharge, container type, container gross weight and also special remarks for stowage if any.

Booking List											
ort of Disc Vessel : m/v		Voyage : 050	Call IDs : DAMIETTA	Grouping : Group by POD							
Merchant	Merchant at	Booking Agent	Port of Loading	Port of Discharge	Con. Type	20	40	TEU	Cargo W.	Cont. Gross W.	Imco Weight
Cargo	Cargo	a Agent	DAM	ASH	DV	3	0	3	75	81.75	0
Cargo	Cargo	b agent	DAM	ASH	HC	0	2	4	20	28.2	0
		TOTAL		ASH		3	2	7	95	109.95	0

ns) : 20': 81,75 40': 28,20 Total Cargo Gross Weight: 95,00

l Cntr. Gross Tonnage : 109,95

mpty Cntr. Gross Tonnage : 0.00

Figure 16: Booking details screen

Second program is used for vessel utilization. Vessel planner prepares a loading list by taking all necessary information from booking list on first program, arrange a stowage plan, checks if vessel still have capacity to accept more cargo and inform related parties accordingly. Having updated booking list on system, gives planner to study on different scenarios without tied up to anyone.

4.1.1.1.4. Port efficiency

Port and terminal operations are one of the most critical components of the container shipping industry. Seeing that the time is the most important factor in container shipping, it makes port operations more important in this case. In order to increase port efficiency, first, need to know port & terminal performance measurements. These can be listed as below;

- Total cargo handling in a specific period

- Total container vessel in a specific period

- Equipment usage efficiency

- Amount of customer

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Using software program in ports reduces container movements both on vessel and terminal side. Having the exact positions of containers in port and on vessel makes possible to handle more cargo with less movements.
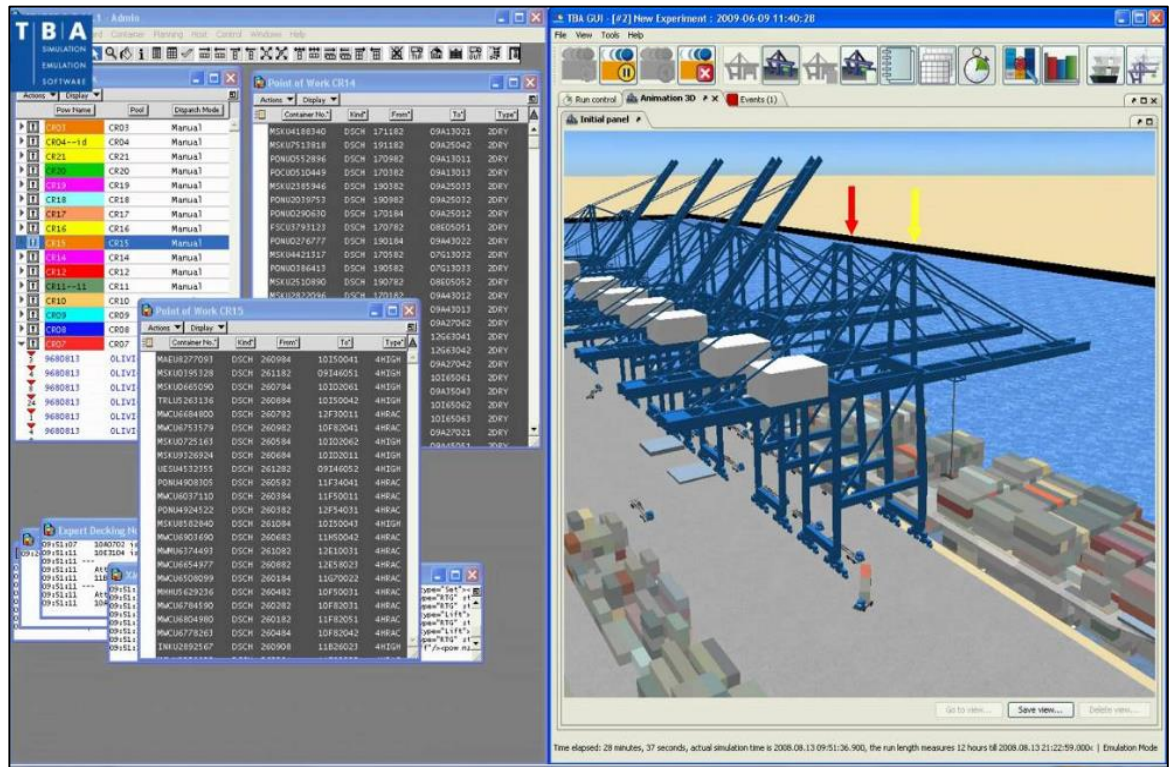
Figure 17: Port Simulation Software screen

Different than container lines, port and terminals also use simulation systems to decrease their workload. Using simulation systems maximizes efficient and reduces congestion in the terminal yard by coordinating loading, discharging, gate in and gate out operations. System also helps user to place containers strategically for loading, i.e if transshipment vessel is certain for transit discharged units, these units can be placed in another location for quicker operation.

Ports and terminals can also find answer of below questions by using terminal operation systems.

- Which areas of yard will be used for loading / discharging containers?

- Which areas of yard will be used for which type of containers?

- How high containers will be stacked?

- How many containers will be loaded and discharged?

- When most of the containers arrive and when they are collected?

- How many containers will be transshipped and what is the most used destination for transshipment?

- When vessels will arrive in terminal?

- How long they will be operated?

Answering above questions on a simulation system allows ports them to see big picture, clarify missing points and take precautions to prevent big losses before they did not happen.

4.1.1.1.3. Speed of vessels and Adaptation to Weather Conditions

In usual practice, container vessels have berthing windows per port. They have priority on berthing in a time period which is decided mutually by port. It is important to arrive on time in order not to lose chance of berthing upon arrival. Late arrivals such as 1-2 hours can cause major delays for about 1- 2 days on schedule. In this instance, speed arrangement can be very important for vessel schedules.

Speed instructions are usually given by vessel planner by taking into consideration of last sailing time of the vessel. Software applications can help planner decide to correct speed by using information from older voyage statistics. It can also act as a reminder to prevent planner s human mistakes. Being informed about upcoming weather conditions on ports and sea are essential for all parties in container shipping business.

Although certain weather conditions cannot be advised, even prospects can be vital for safe sailing of the vessel. In order to have prospects in hand, web based weather forecast program can be used.

4.1.1.1.5. Transshipment and Act on schedule

As it is well known, two methods are widely used in container transportation. While first one is called direct shipment (directly from port of loading to port of discharge), second one is called transshipment.

Transshipment can be described as follows; container is loaded from port of loading onto first vessel, discharged at transshipment port and loaded onto another vessel to its final delivery port. Reasons of making transshipments can be listed as below;

•   All ports cannot be in a single service, services are segregated into trade lanes.

•   More reasonable to load all cargo in one big vessel to transfer port and transship them to its final destination from transfer port, freight would be less in this case.

•   Some ports do not have berthing availability for big vessels, units only transported via transshipment.

•   By VSA (vessel share agreements) between two or more container lines, more option can be provided to customer.

As seen on above, transshipment can be a quite problem solver for container lines. The key point of arranging transshipment processes is the minimize cost. A small mistake on planning can cause unnecessary additional expenses. In order to, avoid human mistakes on planning transshipment a software program which contains simple algorithms can be used. These programs should be able to answer below questions;

•   Is discharge port in current vessel rotation?

- If not, which ports are suitable for transshipment (have vessel to final delivery point)?

- From suitable ports for t/s, which ports are convenient for easy custom process?

- Which ports have the lower cost of transshipment?

After port of loading and port of discharge information have been entered to system, solutions can be offered from top to bottom using an algorithm as shown on above. Same algorithm method can be used also for schedule arrangements. Schedule arrangements, also called schedule recoveries are needed when vessel is behind her regular schedule due to bad weather conditions, delays on port operations, strikes at ports and / or waiting at passage entrances. In this case, one or more ports are being omitted to keep vessel in her usual rotation again. Program should be able to answer below questions.

- Does vessel have any extra time?

- Is it possible to complete rotation with full speed instead of economic speed?

- Is there any chance to keep all destinations in rotation by changing their alignment?

- If not, what are the destination of the units onboard?

- What are the types of units onboard as per their destination (refrigerated containers, dangerous good containers, out of gauge containers)?

- Which destination have the lowest dry cargo onboard?

For making the right decision, guidelines of these kind of programs can be a powerful tool for the user.

4.1.1.2. Chartering

4.1.1.2.1. Hire costs for vessel

Container trade around the world changes continuously. Lines have hard times to fill up the vessel during peak season also, have problems to find space onboard during high season. Therefore, instead of using an owned vessel, hired vessel usage in container shipping can give lines competitive advantage. They may hire new vessels depends on current container traffic in their route.

In order to choose best option, lines need to know the total cost change on ports, fuel and oil consumption etc. Even though, software programs can be helpful on this stage with a small calculation module. They are not entirely effective on hire costs. So, we need to accept that despite that indirect effects to create efficiency IT tools are not proven ways to reduce costs. They can only help with the usage of vessel for creating more value with less energy consumption.

4.1.1.2.2. New vessel hiring

As already discussed before, lines change vessels during seasons. On every vessel change, on-hire and off-hire, there are some procedures to be followed by line chartering department. In order to eliminate any human mistake on paper work, these contents such as permanent voyage instruction, reefer malfunction reports, log abstracts etc. can be uploaded to software program and extracted from system with new vessel name on it on every vessel change. So, again IT helps with the procedure and make the process of hiring go smoothly. And after that circulate the information would be much easier.

4.1.1.2.3. Vessel Information and Fuel Consumption

Having statistics of voyage reports and fuel consumption details helps lines to work on new scenarios with current vessels. With these statistical data in hand, lines can have actual TEU, tonnage capacities, real fuel consumption, fuel consume change depends on bad weather conditions.

4.1.1.3. Finance (Cost & Income Aspect)

Price is one of the most important factor in terms of commercially speaking. Even some of the researches results show that price is the number one issue to choose a service or product. Also, it is something cannot be ignored that all shippers and consignees in the shipping industry market mostly focus on the price when it comes to choose a liner. There is always some amount of attention to the service quality and delivery promises however not as much as important as price conditions. (And & Dogan 2007) In order to be able to offer competitive prices for the customer, companies have to focus on their costs at the same time.

4.1.1.3.1. Shifting Expenses

Shifting means changing position of an onboard unit as a need of stability or discharge container under of it. Shifting expenses cause usually by the poor planning. When it happened, there is nothing to undone the expenses but it can avoid with the efficient planning tools that can measure the total weight of the vessel in order to depart or visualize which call will come first and which container will be discharged first. From IT point of view, contrary of the empty positioning shifting already a solved problem. In order to avoid shifting IT tools can be used to increase efficiency. There are many tools for planning container loading and discharge lists then create a report or list to share with other parties involved with the operation.

There is a VGM regulation has recently announced by the SOLAS. VGM stands for verified gross mass and regulation aims that to get correct weight of the container and cargo. Also any changes related with the VGM will be shared with involved parties.

4.1.1.3.2. Salary Costs

Starting from the salary, other surcharges and expenses does not involved with the new adapting system. Since the application has been designing and implementing module by module, there is only a plan to create a Finance module but no running system now. Since finance module is yet to come, we can focus on what would be the future benefit of the application from the salary cost related. This is more likely concern for HR (Human resources) point of view, but again this tools like any other ERP system is helping the company to do more work with less people with the help of automation of the processes. It is of course not a process such as manufacturing so we would eliminate mistakes and increase assurance for the rest. Anyway, it is still countable in terms of automated approach for the services so it easy to train someone to do the job. Training and apply of the module from each department is helping the divide the job equally and evenly for the employees. Allocation of the human resources is one of the main concern of the company.

4.1.1.3.3. Port Surcharges

In the shipping industry, there are many charges which occurs mostly in ports and terminals. See briefly explained as below:

Administrative Fee/ Bill of Lading Fee/ Doc Fee:

Fees for paperwork to be printed. This service covers the creation and processing of all standard transport documents like delivery order. Also, only applied for once for transportation even though cargo contains more than one container.

Ocean Freight (OFT):

It is taken for each container and covers the carrying service of cargo from the first port of loading to the last port of discharge. It is a general applied for all shipments accordingly.

Bunker Adjustment Factor (BAF):

BAF charge collecting to cover the gaps between freights with the fuel oil for vessel.

Security Service Surcharge (ISPS)

It is a service International Ship and Port Facility Security Code (ISPS Code) which is a collecting for all shipments per container. For the security and facilitate of the vessels.

Emergency Risk Surcharge (ERS):

this fee covers additional costs faced by the carrier when moving cargo in dangerous regions including those that are threatened by hazards, violence or piracy.The charge covers extra bunker cost (due to longer routing and/or faster sailing), insurance coverage, and additional security measures. The fee will be applied to bookings that are from, to or transited through the affected areas.

IMO surcharge is applied when transporting goods classified by the UN as hazardous (in accordance with the IMDG code (International Marine Dangerous Goods code)) , the shipping company imposes a surcharge on the sea freight. This relates to the additional handling required for planning the goods at the terminal and onboard the ship.

General rate increase (GRI) planned increase of a base rate from a certain date.

Empty Container Surcharges:

If the company provides a service to take and drop of a container from a depot or any other facility which does not mention in the BL as Place of Delivery then qccording to this transportation request for an empty container certain amount of money will collect

from the customer. Also, situation must fit the operational requirements. Collecting per containers.

Seasonal Surcharge (SS):

It is applied for any specific time period when a cargo volume goes up and make a peak in this season. Used for all cargoes in that amount of time.

Port Security (PSI for import/PSE for export):

a service to maintain port security compliant to the International Ship and Port Facility Security Code (ISPS Code) which is a comprehensive set of measures to enhance the security of ships and port facilities. The service is applied to origin/export as well as destination/import shipments. The ISPS Code is a global initiative and part of SOLAS (the international convention for the Safety of Life at Sea) and constitutes a legal obligation for the contracting parties to follow. Applied per Container.

Terminal handling charge (THC):

THC is an extra cost on the top of the other main charges like OFT (ocean freight or sea freight) and charged for handling containers on the terminal before loading on the vessel according to loading plan. It is only for FCL shipments. The reason to collect can be tie up to the necessities such as unloading the container from a truck, stacking the transport. It can differ as destination and origin THC.

Value Added Tax (VAT):

The carrier pays Value Added Tax (VAT) to local authorities, and this cost is charged to the customer. Applicable to all shipments where VAT payment is a market practice. Applied per Bill of Lading (B/L) / transport document.

Winter Surcharge (WSC): is imposed for all containers to cover extra costs related to serving the port due to harsh weather, convoy restrictions, ice conditions etc. This surcharge is only effective during winter season. Applied per container.

4.1.1.3.4. Waiting Charges

Waiting Time Fee is one of the charges is taken under below circumstances:

This fee is applied to shipments when trucks have to wait due to customer delays. This fee will be taken whenever the vehicles cannot leave company's customer's depot or warehouses.

4.1.1.3.5. Demurrage

Demurrage is one the most important income for a shipping line. It is applied by per container. If a customer keeps a container longer than the time which has been agreed upon and exceed the free time provided by liner then customer have to pay for a charge which is calculated for per daily basis. It continued as long as the day containers stayed at the terminal. Since the demurrage applied for export containers, there is also another charge for import container named as detention fee. Charges are not eligible for shipper's own containers.

For demurrage tracking company can use ERP system by checking container movement page in order to see if a container stays in a port over the days which is written in the part of Demurrage/Detention part as free time. Aim here is to get a report for each long standing container to see how much money will be calculated.

4.1.1.3.6. Other Expenses

Change of Destination Service (COD): It is not applied each container and re-export or return shipments. It is only applicable when customer wants to change the destination of cargo and to deliver it some other place. Reason is to collect it mostly doing the procedures, custom works, changing inland transport during the process etc.

Cleaning Fee: It is again a special request which can come from customer or demanded by the liner if container return as not cleaned as standards (both inside and outside). That fee can occur specially with the dirty goods or chemical contents.

Currency Adjustment Factor (CAF): It is an adjustment precautions when needed for exchange rates.

Electronic Data Interchange Fee (EDI)

Rates for additional operations: Any additional services which are not covered by the rate such as weighing, labels, seal and other similar services will be charged at port accordingly.

Storage: When the cargo has long stay at port it has start the first moment of landing at the terminal and since it left the port continue to charge in time. Measured by TEU based and excessive time of staying.

Switch Transport Document Service: If customer wants to change documents for transportation in order to prevent shipper's name and protect the involved parties. Used for creating second set of documents. The service is applicable upon the customers' request for this service.

4.1.1.4. Commercial

Commercial area describes all rates, freights, inland transport costs, local cost, taxes related to transportation operation and manage to cover other unexpected costs before it occurs. Despite that this part takes priority in every industry we would try to explain how IT might help with this process. To create a pricing policy for a liner is not easy one. There are many factors to be considered as affect or affected by the price. So, liner has to think about the other business stakeholders and also competitors' while decision making processes. (And & Dogan 2007)

4.1.1.4.1. Compatible Prices

As our interview with a shipping line's decision makers about prices we would be seeing there are many factors taking into consideration while a price offer was created or accepted. In special circumstances such as OOG (out of gauge) which describe a cargo has extraordinary sizes from sides or above. Also, chemical or dangerous good has different pricing choices. However, for regular basis prioritized factors when price offer will be explained in freight rates part in detailed.

In the system of subject container line, negotiation environment is created. Agencies are demanding a price for a shipper or consignee (depends on which side is asking and under which payment terms) and pricing supervisor/authorized people would approve the price. In this negotiation, communication depends on who gave the requested price before. Market has standard level for specific routes, ports and goods. Every player in market has to be taken into consideration for the rivals which is its on lane in terms of capacity, transit time, ports call, and schedule. So, system intends to create a database which can match the prices with the competitors. It helps for future cases as you know your rival, rivals' price and strategy for the market through local agency and other sources combined.

4.1.1.4.2. Freight Rates

In container shipping, main concern is how you decide freight rates. As price of any kind of freight is highly variable according to the origin and destination, route, risks covered, economic situation of the globe and legs and/or transit lands of the trade except contracts, we will use basic prices for our project. Naturally under the free market economy, even from company to company the base price of the freight will be different for a certain route, amount, condition, etc. Additionally, the liner conferences are very dominant on pricing of freight rates. Every member of a unique conference

must obey the rules of pricing under the conditions of agreement. (Konsta & Plomaritou 2012)

In the software system, there is an automated tariff for each from origin to each destination. When you register them into system once you can update them as you wish (price increase or decrease) and previous booking and reference numbers for that price would not effect from the change before that certain date. It is convenient to keep track all of the tariffs and prices in the system and create reports any time you need check a certain price for a destination, a customer or a specific cargo. System also log for who can the price and messaging system for price negotiations.

4.1.1.4.3. Market Share

Other main performance criteria for a shipping company can be its market share. However, market share does not always indicate sustainable success for many other reasons. With the example of Hanjin Shipping we can easily say that shipping line industry is a knife edged and very slippery market. Hanjin was ranked in top 10 from global scale in this industry however, due to very long processes which is related with the prices, fleet, spot rates and other force major reason such as Eurozone crisis and China slowdown they could not manage to survive. IT can somehow help with the process? No, not in this situation but it can be useful before this comes to end. IT has an impact on market share mostly as reinforcement and support not a major indicator. It can help with the processes of decision making and analysis of market conditions better so, top managers can see the scenarios clearly to move forward. It can help to maintain market share and reach out to the customer in order to create better customer relationships.

4.1.1.4.4. Customer Loyalty

In terms of customer loyalty, shipping industry company's does not have much of luck. Since, competition is so harsh and mostly depends on only who will give the lower prices to the customer. The customer of a shipping line company is also another business so it is hard to create and manage a business-to-business loyal relationship. So, to know what is rival's position in the market would help to create a strategy which allows a line to create better relations with the customer.

Since all customers' data has kept in the application it can be used to communicate with them in better conditions and with the correct information. In the current running system, there are more than 10.000 customer who is working with the line and worked on the past. It is a valuable resource comes from agencies who has been located at least 5 different countries. Their opinion, explanation and people who count on as contacts are registered. Customer's needs and requirements will be easily delivered to management and kept as confidential.

4.1.1.4.5. Measurable Goals

Another problematic area is how to create realistic and measurable goals for a shipping line. As mentioned in the introduction paragraph of the performance management all goals must be follow idea of SMART (Specific, Measurable, Attainable, Relevant, Time bound) The importance of the goals as mostly come to the sight with the sales target. All agencies, sales department, and related staff have specific target for both export and import cargo targets for each month. It is best to know and keep an eye on them is to follow them closely and when target does not achieved needs to get an answer for it.

In the current system, company has the allocation of each vessel and pages to follow each reservation for each booking. Since we know what would be the content and price

of a cargo we manage to measure if the responsible people reach the given sales figures/volumes. The target has set by looking up for the previous year's and season's figures. And sometimes there might some event which is not possible to anticipate that cause to fell behind of the targets. Such as Russian-Turkish tense relationship when Russia plane were crashed in 2016. These kind of events, always impact on trade in a negative way. So, target may not achieve as expected.

4.1.1.5. IT (Information Technologies)

4.1.1.5.1. Infrastructure

Infrastructure for the application is mostly depend on cloud computing solutions. Managers must first understand that information technology is more than just computers. Today, information technology must be conceived of broadly to encompass the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information. In addition to computers, then, data recognition equipment, communications technologies, factory automation, and other hardware and services are involved. Not only companies itself country and he region which is located are very important in terms of infrastructure. The main reason behind infrastructure become crucial is the fact that companies needs to be effective more than ever due to competition conditions. There is an expectation within the company that IT tools will make operations and transaction faster and more proper way.

4.1.1.5.2. Telecommunication

Telecommunication between ships and shores has much related with technical details. Last arrangements about communication has created by SOLAS (Safety of Life at Sea)

Convention. Telecommunication services also strictly tied with the geographical systems. Since SOLAS created recent updated rules they are mostly concentrated on safety and navigation systems within the vessel. Additionally, wireless maritime services can be useful for communication. In the USA, there is a specialized network known as Maritime Telecommunications Network which has a private satellite for providing service.

From the container shipping line point of view, safety and tracking always keep its importance. Since details have been explained in the IT transformation process for shipping industry section. However, the application does not include ship telecommunication such as mentioned. The benefit we can get from the software is mostly internal communication between company and its agencies. Firstly, there is a constant communication through application which you know that other side of the line there is always someone to take care of your requests. Since it is 7/24 reachable with its cloud based structure. Also after each activity system is creating a notification into home page what is the activity, who did it and whom is interested with it. Also, there are automatic mails going from system to determined related users about the processes such as a price requested, approved, container flow activities, and each movement made in the application.

4.1.1.5.3. Hardware & Software

Hardware and software system has explained in detail before in IT transformation section. But in order to be more specific we can clear what is the exact expectation from the software for this. Every company is following the technological advancement strictly if they convinced it will bring more benefit than it cost. The company has created this system since the old technologies are insufficient and inadequate to meet with the requirements. Team and stakeholders was not sharing same system while

running the operations. There was no integration between applications and systems, which creates more workload for everyone even though the expectation is reverse. So, the main subject about this application that everyone participated in design and creation phase in order to create user friendly and easy to use for every member.

4.1.1.5.4. Geographical Systems

The well recognized and mostly used in maritime geographical system is the GPS (Global Positioning System). Also, Geographical Information Systems (GIS) and maritime transportation has close relationships. For increasing the safety and security in the sea systems such as Automatic Identification System (AIS) and the Electronic Chart Display and Information System (ECDIS) is using. In addition, other geographical supporting system will help to increase the efficiency. Since information and telecommunication technology enables the mariner to check data and reach it from everywhere there are other issues has emerged. Systems show are supposed to manage the sea trade data is not integrated each other. There is a need to create a system which creates an environment to manage all other tools and data at the same time. (Cyril et al. 2007) So, as a future of this technology integration with the geographical system with the current used ERP system in order to check vessels and manage voyages effectively can be considered as further project. It will also effect real time systems as followed subject.

4.1.1.5.5. Real Time Systems

In previous sections, real system importance for shipping industry is mentioned which includes to follow vessels in marine traffic. Now, it is better to explain how the application is useful for tracking operations. All vessels have been followed concerned agency operation staff, after she complete the operation on port and move for next call

all related information is registered into system accordingly. Even before it occurs operators estimate an arrival and sailed time with the dates and hours.

To look a different aspect of real time data is the weather feeds which is also mentioned in detail on the operation section. Also, the real-time weather data is useful for the adaption to the windy and bad conditions and adjust it to save energy.

4.1.1.5.6. Data Transfer Solutions

Data transfer solutions have explained in the section of EDI and XML comparison. In detailed, SaaS solutions will be useful to data exchange between businesses. Since data system integration does not provide in the company and sent/received documents are not compatible with each other, there are many different kind of document types has been exchanging between parties. It can cause mainly by the systems are running both internally and web based. A paradigm shifting has occurred recently so businesses has started to move their data into cloud, analyze it in there and keep it in form you need. Cloud computing also contribute into storage and space efficiency issues accordingly. (healthparadize.wordpress.com, 2016) Which is also what subject software solution does: it creates XML files and users can download the data whether it is a historical container movement or all manifests for fully loaded vessel and integrate into their system without an issue. It is also possible to upload information in to system. Before this system, employees were uploading the EDI files into an internal system which cannot be reachable anyone but liner's staff with the time and place restriction or worse entering the all manifests, movements and other data by manually. After this implementation, all process become automatized or iterative.

4.1.1.6. Documentation

Documentation as a process majorly belongs to agencies due to government office relations and ports. In a very limited part of this documentation occurs or followed by the liner itself. Documentation duties takes a huge place in a shipping line company both export and import sides. We will not mention all documents and procedures related with the trade. However, the necessity to use the system emerged from mainly creating B/L's for the cargoes that been carried from one destination to another. B/L stands for bill of lading which is the used to ship any goods, a bill of lading is required and acts as a receipt and a contract. A completed BOL or B/L legally shows that the carrier has received the freight as described and is obligated to deliver that freight in good condition to the consignee. Even though, documentation takes care of bl creation and follow up duties it is not its only mission throughout the procedure. As it can be seen from below B/L this document is the identity of a cargo. There are all necessary information regarding its content, weight, which vessel it will be carried from where and delivery place if it same with the port or different location, other special remarks requested by the liner itself, or some special remarks according to origin/destination places.

Figure 18 : Sample bill of lading

4.1.1.6.1. Data Access

As mentioned previously, keeping customer information is a must for the companies.

Creating tables and charts does not apply the job the way it is supposed to be. Company

needs a reliable source to keep them both security and safety aspects at the same time

confidentially. In the related accounts section software help users to create a customer in database, update and change information details. Also, during the procedure of creating BL is easily add more shipper/consignee details, or update their information. After that all related parties could reach that document and check if something is wrong. There is always a chance to make a correction even the vessel has sailed from the subject port.

To make all operation from only one place is allowing the company to follow the operation more easily and allocate the resources to where they needed in the first place.

4.1.1.6.2. Digitalization

Digitalization of the processes is the star of our era. Digitalization provides a clear path for the businesses to create value for their work. We focus on the subject from the shipping point of view. Digitalization of processes does not occur with the parallel with other industries so, costs are increasing. Inefficiency has been feeding by the manual processes. An average of 86% of shippers believe that digitization will increase efficiency within the industry, and as 50% of the workforce will be millennials by 2020, shipper expectations for instant processes are growing.

Digitalization does not provide physical advantages for a ship or operational perspective however it can help the utilization of a vessel or any step of a processes and improve it in terms of time, capacity usage and etc. It is a guidance for long term operational efficiency. (http://www.supplychaindive.com, 2016)

Despite that the system made many promises catching the digitalization processes with the smart containers, real time data and other developments is not much high likely. It is only a promise for one step forward to reach those targets. However, what it is doing as currently can be explained as less paperwork for everyone. No manually enter for any transaction, no human errors to deal with to cost time and energy.

4.1.1.7. Logistics

4.1.1.7.1. Availability

In container lines, equipment control department is responsible for the containers that enters and exits from ports, depot, customer locations and also discharging and loading from vessels that they are carefully tracked, monitored, maintained and utilized. Equipment maintenance, renewal is also in their field.

Shortly, this department is responsible of every move of every container that in usage of line. Tasks of equipment control department in a container line can be listed as below;

• Daily coordination with the depots, ports by agents for full & empty container releases

• Planning the empty container positioning on vessels reckon export booking levels of agents and import return rate of containers

• In case it is needed, making arrangement of new container contracts with container providers and / or other container lines. One – way contracts (it is a win-win situation for both sides, while one line needs to load its container to a destination but does not have any cargo to there, other line needs to load its cargo but does not have any available equipment at port of loading) also can be arranged between these parties.

• In case it is needed, making arrangement of empty positioning with other lines.

• Current statute of containers always should be updated. In order to, reply customer needs, it is important to know that which containers are empty, full, damaged etc.

- In order to fulfill needs in most appropriate way, all details of containers such as container number, ISO code, tare weight, payload, owner information, year of manufacture should be on system without any missing point.

- Maintenance and repair of the containers should be arranged with 3rd party contractors. Process should be monitored carefully and department should be sure that all units are in standard of a container after repairment.

- For refrigerated containers, a performance test should be applied called PTI before container sent to customer for loading. Container set degree is arranged depends on cargo type and department ensure that there is no malfunction on container.

- Reporting to management for container stock status, age of the fleet, empty positioning, repair costs, etc.

- Following and making official applications to authorities for long standing units which are apprehended at ports for negligence detected by local authorities.

As seen on above, this department needs to have all information about containers in their hand. This information should be updated day by day, otherwise making decisions without updated info in hand may lead them to unnecessary or wrong empty positioning which will increase the cost and time of loss.

In equipment control departments, software programs are being widely used. User of these application are from container line, agents and 3rd party contractors for container repairs. In some of these solutions, such as local applications, all information from regions gathered in a center (container line head office) and system is updated by equipment control department from head office. Any missing / wrong information on received files won't allow to update system. Department worker needs to communicate with agent in region, explain her/him that there is a mistake and wait for her / him to send correct file to update system. It is obvious that, data entry from center is not

feasible for time management, especially for container movement uploads. It creates unnecessary workload for both side. Web-based software offer solutions to prevent these time losses.

On web-based software, user scale is larger. Not only container line workers, agents and 3rd party contractors can be included to system updates. System updates i.e, container movement updates are being performed by agent and container line together. Different than local applications, needed file for system update is arranged by agent, uploaded to the system by agent and if any error is received, is directly corrected by agent. Container line worker checks if all updated information on system is correct and informs agents on any missing / wrong movement. In order to find out who uploaded incorrect data, system also automatically records user information when data is uploaded. In this method, daily update of container movements on system can be divided to different users, making data more on time. When system is updated with correct data, all users with observation authorization can access to system to check latest movement of containers.

Users with authorization also extract specific data from system as their need. Data may be filtered with below areas;

- Container number
- Container type
- Data uploader
- Vessel information
- Voyage information
- Movement dates (from – to)
- Customer
- Container movement type

- Location

- Agent in region

This system also enables customers to track their container movements at line website. Application is being used for keeping record of container contracts, equipment repair correspondences and empty equipment positioning approvals.

On container contracts module, users may update & view all information on contracts such as container number, container size, container type, contract limit (if any) contract type, contract date, period, unit rate, container numbers, tare and payload information. Any off- hired unit can be extracted from system by using this module, off-hired container movement records are still kept in system for reporting and financial settlements.

In practice, cost control and financial approvals are settled about 3 months later, therefore having easy access on contract details can build a healthy communication between finance and equipment control departments and avoid human mistakes. On equipment repair modules, agent is also accepted as user in system. Repair request is prepared by responsible agent with the 3rd party contractors and send approval request to container line head office for approval. Any operation on container that will change its status to non-standard will be prevented as repair type can be only chosen from system. Same as equipment repair module, agent sends empty positioning request to head office. Before approval is sent, head office checks export booking and import return rate of containers to find out if requested empty positioning is really necessary. If agent stocks are not enough to cover their planned bookings, head office approves their request.

4.1.1.7.2. Procurement

In order to see general situation of the fleet, stock reports are being used by container lines. These reports can summarize surplus and deficit regions of fleet and plays a decisive role on empty container positioning.

All containers in fleet are listed by;

•   Container size

•   Container type

•   Container status (full import, at consignee, full export, empty)

•   Container quantities at ports and on vessels

•   Hired and owned units

In software program, stock report gets the data from container movements. Means, it is enough to update container movement page only to prepare stock report of the fleet. Report page is prepared automatically by taking account the last movement of the container.

4.1.1.7.3. Damage & Repair Management

Damage and repair management takes place with the 3rd parties involved with the system. When a container damage in any phase of the transportation it comes to the system as a requirement of repair. Repair requests comes from via agency in the subject container line company. However, in a big scale of company it might occur with the participation of outsource service. If we mention from the first

4.1.1.7.4. Leasing Contracts

A small-medium size container shipping may not have its own containers in the inventory. From time to time, in case requirement, a contract can be arranged with a container provider to lease container(s). The reason why they buy can be explained with sustainability issue. Due to no certainty as being sure that needs of a container or

larger fleet would be long term. So instead of buy it and try to sell it when it gets old better to lease it for a certain period of time in some cases. Software helps users to register all container providers into system and keep track all of the contracts with their content which mean all container is registered into contracts one time and system automatically assigned a movement for that container to indicate that it enters to the fleet now. All information regarding containers such as prefix, container number, check digit, tare etc. also be added with them at the same time of register. User can see all contracts which are about to expire with their dates in his/her Mypage screen to follow. Additionally, background created for financial issues when invoice has arrived for related contracts.

4.1.1.7.5. Empty Container Repositioning

Needs to reposition of an empty container and make it efficient is sophisticated subject within container shipping lines. However, in order to understand many complex necessities in this industry better mentioned what is the content of this matter.

The main reason to create this issue is the differences between export and import when you compared different continents, regions, even cities. When some countries have surplus manufactured goods other may not have. Those countries who have surplus are regularly exporting goods within containers or any other transportation modes but the return of this containers and equipment are not equally distributed. So this issue bring the question of we will get the empty container from where they pile. If you do not bother to reposition existing containers you will end up manufacture the new ones. However, this would cost much more for a container line than to repositioning costs. Beside container quantity around the world seems enough for the industry. The reason why companies trying to avoid empty container that even it does not create any added value also creates big amount of logistical cost. There is no benefit of transporting an

empty container between port, depots and other facilities. Also, when freights are low for a direction there might be a strong chance to create container surplus in that region. Even assumptions and speculations about prices might have huge impacts on container cargo traffic in different regions.

The main problem is that there is no optimum solution for the empty container repositioning. In literature, there are some perspectives about this issue from the mathematical angle and heuristic modelling. (Ding & Chou 2015) However, none of them are able to go to beyond to find some partial solutions such as, finding a near-by depot to pile containers or leasing when it is urgent. There is no well-accepted software solution for this problem from the IT point of view. Physical solutions such as foldable containers are always on the table to work on for improvement so space issue will resolve itself. Still there is a need for better planning and predict in order to create efficient container management.

In the subject company's software solution is not only offering a systematic approach for empty container repositioning but also full container positioning and repair details. Third party service providers and subcontractors join system as restricted authorities and try to help container line to manage inventory to increase productivity. A mutual request - approval system takes place so, for each and every container all movement from the past are registered and request for movements followed by related person in charge. For one step later for this system predictions can be calculated for the necessities of containers amount for each port as seasonal, regional and type based.

4.1.1.8. Claim & Insurance

4.1.1.8.1. Claim Policy

Claim departments try to solve all issues which comes from the customer or port or any other subcontractor which demand to open a case for a specific cargo or an equipment's damage. The idea is coming an agreement about the case. This procedure requires a documentation collecting, dividing and evaluate the situation in general. Cases mostly needs lawyers to be involved, marketing and commercial related departments to see what was the terms and conditions for the sales, insurance associated. ERP solution does not provide exact respond this need however, it can help to gather information from the logs.

4.1.1.8.2. Customer Satisfaction

To put customer satisfaction into Claim and Insurance part might seem as off the topic. However, customer satisfaction mostly become important to remember in such cases that there will be a risk to occur, a delay happened or any bad events or lack of services. For a container line one of the most common thing to happen is to be out of container or a special equipment. If customer wants to a special equipment for the cargo or they want it in a certain time absence can be unbearable. Also, there might some accidents, technical issues, problems, delays, or major causes to lead for creating a problem between line and its customer. Current ERP system does not aim to create customer satisfaction and company does not have a CRM program. In order to gain trust below as an upcoming function of the system has considered as follows: all customer can keep track of their cargoes from the company's website which it gets all related information from the SaaS solution. There will be a registration first, once customer register the system it is possible to see where is the cargo by giving BL number or container number in that matter.

4.1.1.8.3. Risk Management

Since all containers, contracts, container movements and related data can be through the system it is much easier to check the situation of the inventory, contracts about expire, fleet aging (it refers to see container's age which means how old are they in a fleet), long standing containers in one certain place such as a port, depot, or merchant's premises which is also important to avoid demurrage expenses, lack of container and some legal issues. Legal issues refer to a situation when a container stayed in one place such as in a custom area for so long without any claim to take it from a consignee or any party involved then government can announce the cargo inside the box as nationalized goods. So, all risky situations can be better evaluated once it is in the system and getting reports as inventory report, contracts lists, fleet aging report, long standing reports then it is much convenient for to follow and manage risks accordingly.

5. ANALYSIS

To create better understanding what people in the industry thinks about the IT and shipping industry relations a questionnaire is created. Questions are started with the basic information with their position, country and company business area. Name, age and profession is not mandatory but encourage to be answered. It consists of 20 questions with the 3 sections as shipping industry, IT and business performance. Questions are straightforward and not open ended. It is aimed that to measure their perspective and opinions about if IT makes things easier for different professions in maritime industry. There were 50 participants in total and %96 of them is familiar with the subject ERP solution and using it regularly. They are also using an internal application at the same time.

5.1. Shipping Industry

Questionnaire starts with the basic question about participant's business area. It indicates that 62% of the total is in shipping agency followed by the 30% of liner's employee.
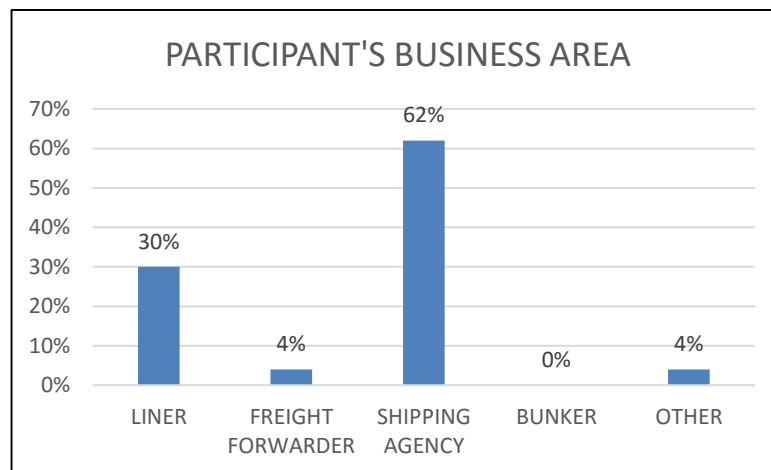
Figure 19: Q1 Participants' Business Area

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Secondly, which country they have attend from. It is important to understand that majority of the people with 68% is from Turkey. So, it indicates that conducted survey is giving an idea what would Turkey market opinions rather than others.
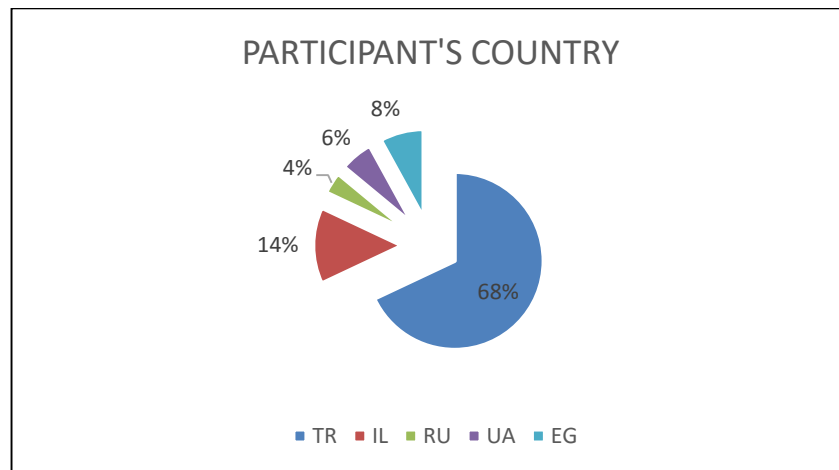
Figure 20: Participants' Country

Then next question will show that group has experienced in the field. 62% percent of the attenders has job experience from 5-10 and more than 10 years. So, we can confidently say that it is group of people who knew about shipping industry now and then so capable to compare with past and present in terms of technological advancements.
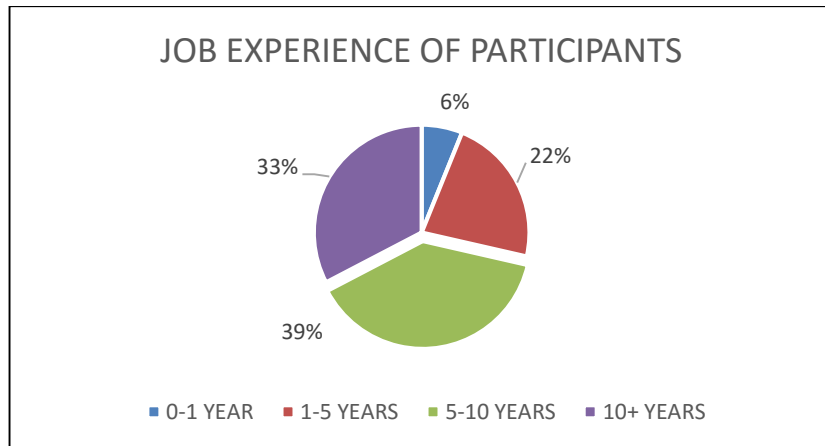
Figure 21: Job experience of participants (years)

Lastly, attendees mostly from the companies from 10-50 and 100 people size of businesses. So, the results indicate that the opinions of the group represent of the small and medium sized of companies from the industry. There is no participant from micro or large scale enterprises.
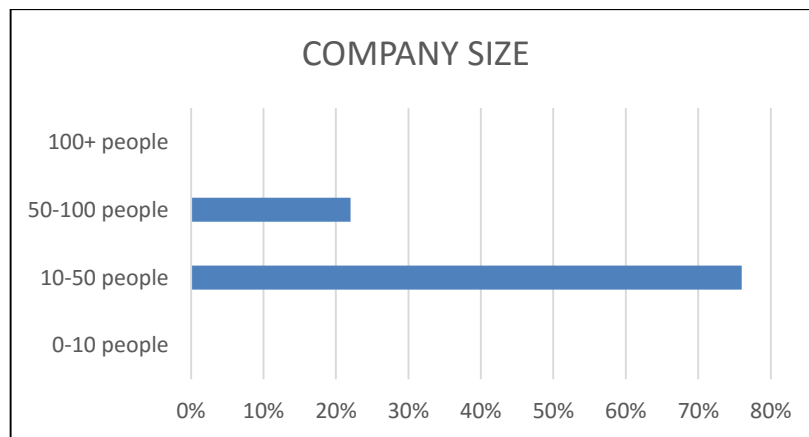
Figure 22: Company size

5.2. Information Technology

Results from this section mostly focus on whether participants using ERP or any other related software solutions in their daily job. All of the participants (100%) say that they are using an ERP or other specific application for the job. The breakdown of their application is turn out as below:
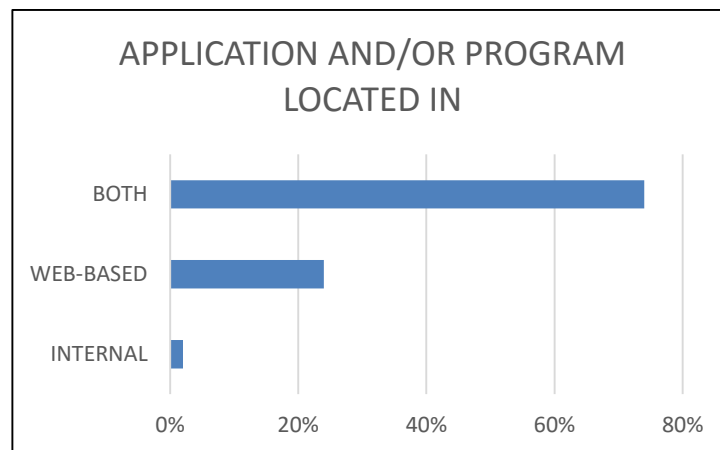
Figure 23: Location of applications

It seems that there is still some internal systems have been using along with the web-based solutions. It indicates an integration problems since there is an overlap between numbers. So, group has been using both internal and web-based system.

Next question is asked to understand if the participant thinks that solution is covering all their needs and requirements on business. Results do not represent a crashing majority in that case but people seems satisfied with the program.
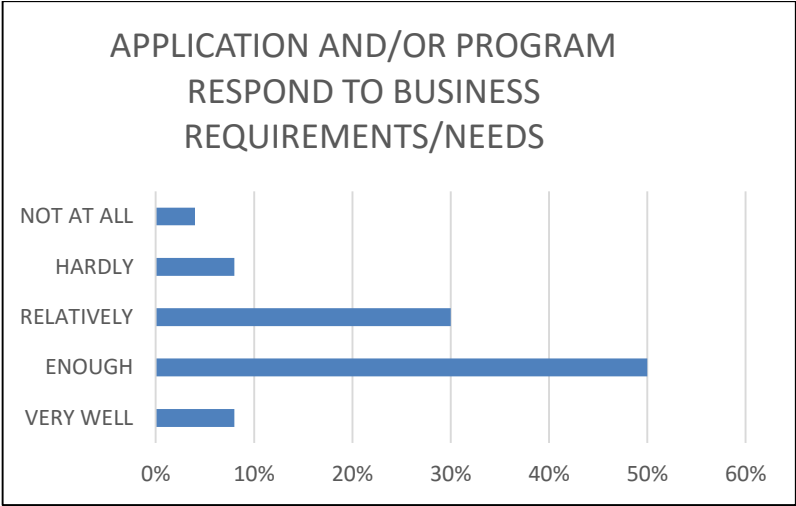
Figure 24: Solution responding business requirements

People also asked if they have more than one applications are they using. 86% of the total number state as they use 2 or more applications in general. Integration of the applications with each other turn out to be not exactly provided. 52% of the group says that programs integrated each other meanwhile %46 people says they are not integrated. There 2% with no idea comes from the people use only one program so, no need or idea about integration whatsoever.
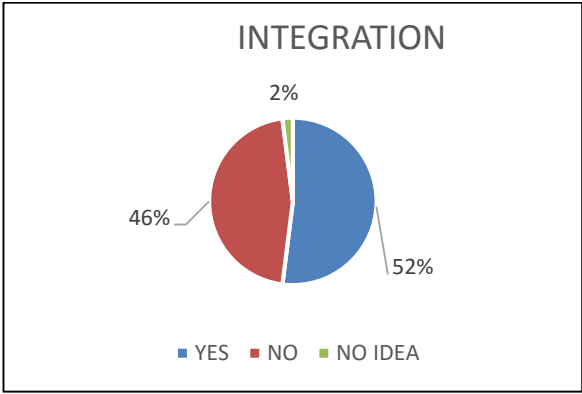
Figure 25: Integration

Lastly, we asked to the group if they found the ERP application easy to use in other words user friendly. %74 of participants thinks that it is.
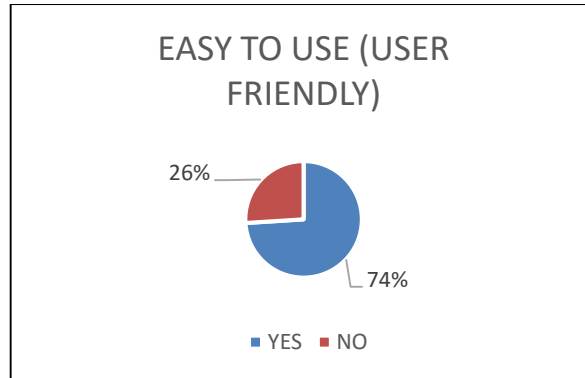
Figure 26: User friendly

5.3.Business Impacts

In this section, we tried to analyze if participants agree with the main idea of this study that IT has positive impacts on maritime industry. So that below questions has been asked and shown in graphics. As we mentioned before subject ERP solution is given as an example while they were answering. On the Q13 people are not fully satisfied with their company's infrastructure both as software and hardware. They think it is not enough and to create sufficient system and expect more.
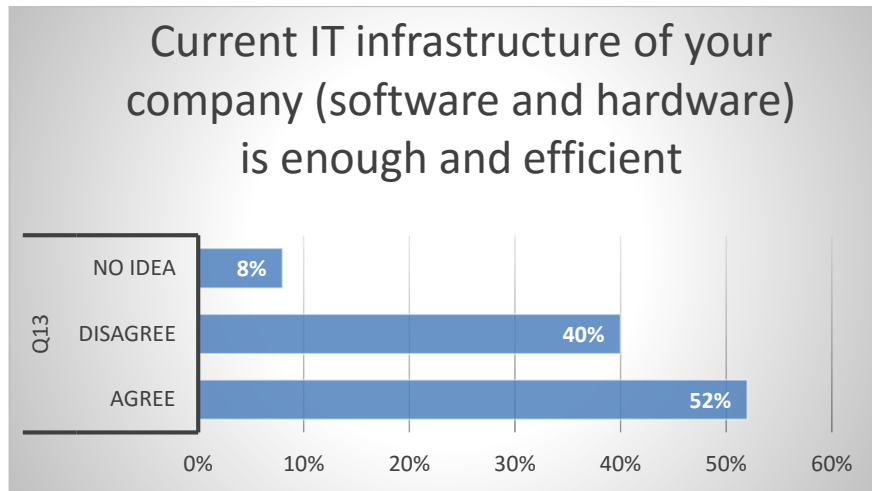
Figure 27: Current IT infrastructure of your company (software and hardware) is
enough and efficient

Q14 indicates that people agree with the idea that when IT advancements occur there

is a positive impacts on maritime industry as well.
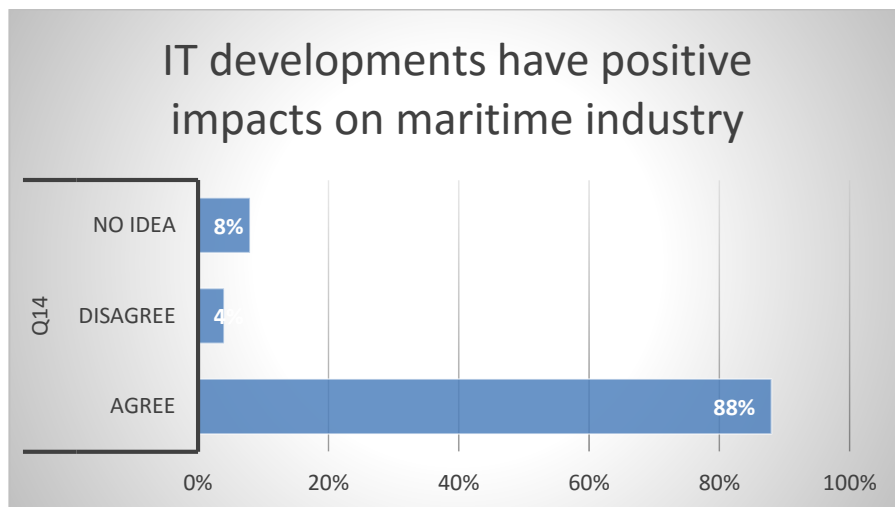
Figure 28: IT developments have positive impacts on maritime industry

Q15 also provide prove that even though they are in different profeesion and they have

different level of usage in IT solutions almost everyone (with 92%) believe that tools

increase their productivity and efficiency.
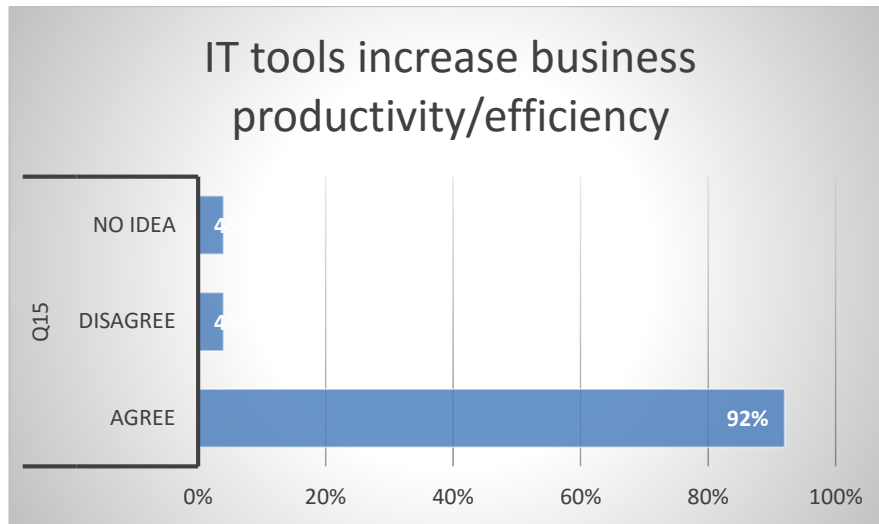
Figure 29: IT developments have positive impacts on maritime industry

In planning and stowage activities there is 14% of no idea due to every employee does not involve with the stowage and planning personally. Only operation, logistics departments and vessel planner's using and know their effects. Still there is 80% of people from the rest agree with the tools make vessel planning and loading activities easier. We explained which kind of tools have been using for this purpose in the previous section in details. Subject ERP solution does not offer a way to do it. So, there is extra stability and stowage solutions to do the planning for onboard cargoes. Q16 shown in below graphics:
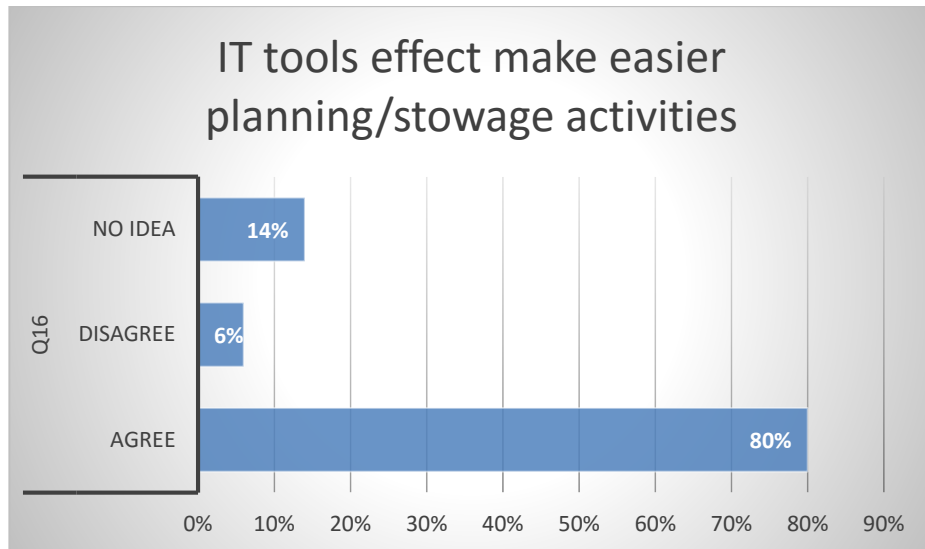
Figure 30: IT tools effect make easier planning/stowage activities

Also, participant thinks that the solution helps them to eliminate mistakes and errors from the procedures.
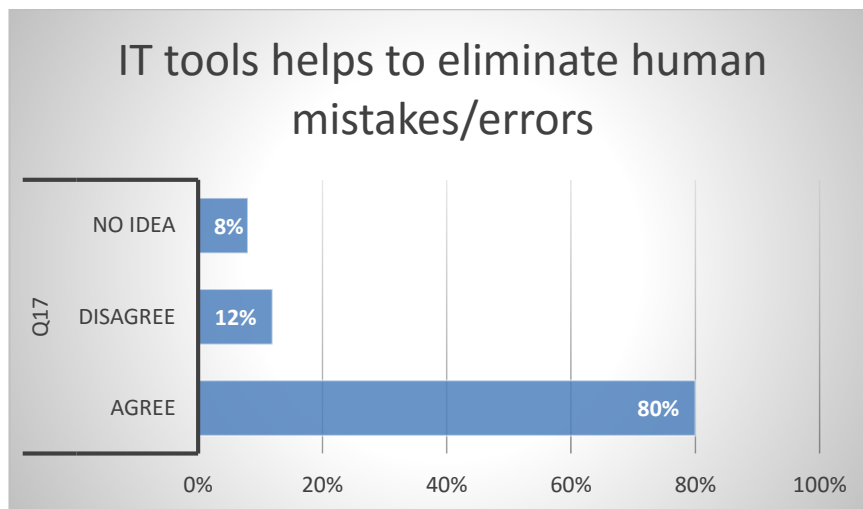
Figure 31: IT tools helps to eliminate human mistakes/errors

There is majority of the opinions indicate that IT helps to save time. As mentioned in in the interviews about the subject ERP especially there is a satisfaction to eliminate double work among employees. For instance, in documentation when a B/L created every involved parties such as port of loading agency, port of discharge agency,

transshipment party if there any, liner itself had to create same B/L in different internal systems previously. However, now one register is enough to proceed for everyone.
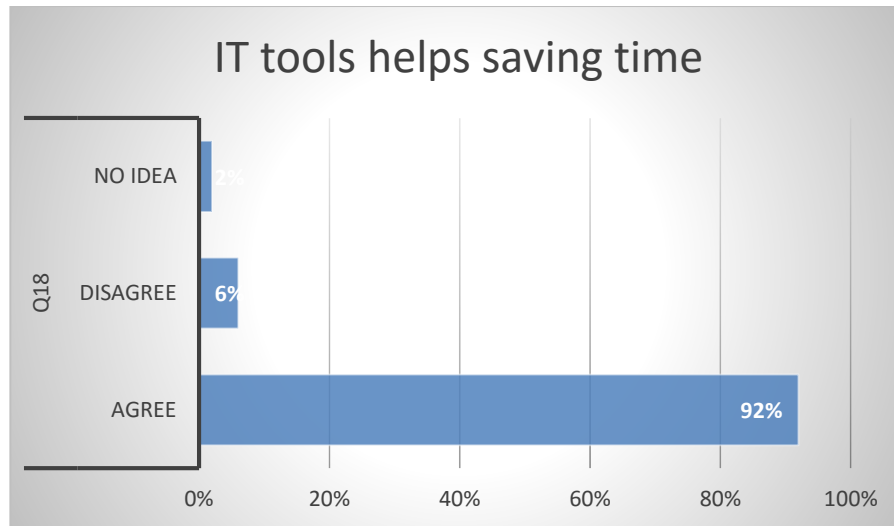
Figure 32: IT tools helps saving time

Q19 has lower agreement on which is a surprising result because it indicates that people from the industry cannot be sure if they can gain competetive intelligence through an ERP solution or any other IT tools. It can cause mostly the traditional way of handling business and depending old but secure ways instead of taking risk to take one step forward and changing systems. There is lack of knowledge about cloud computing, SaaS solutions, ERP or other systems that can create value for the business. Still result is not negative only open for improvement.
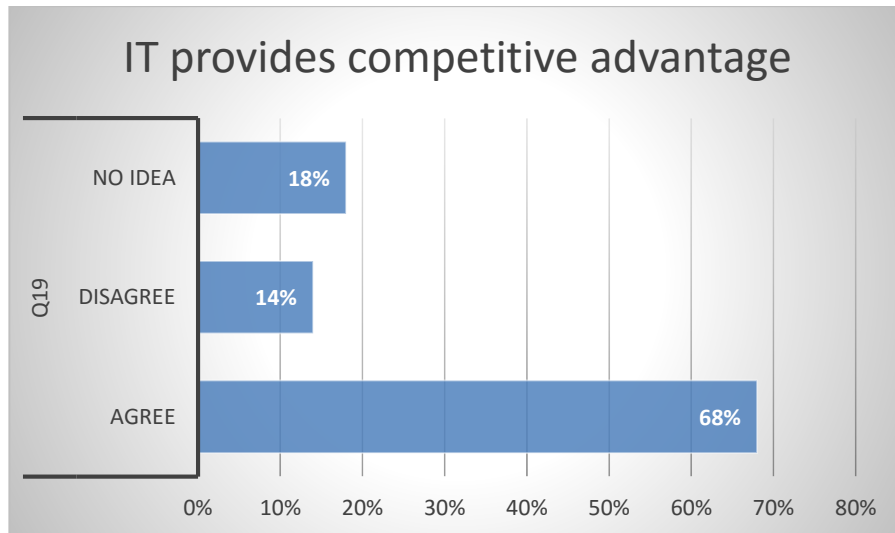
Figure 33: IT provides competitive advantage

Last question is focused on the communication. 76% of the participants agree with the idea that information technology is helpful to develop communication between within organization. When you think about the organizational structure in the industry the importance of communication reveal itself. Many shipping lines small medium or large scale is not matter on this subject have their agencies in different countries. At least 2 country involved in a cargo shipping for sure from one destination to another. So, operations required full communication within parties and attendees agree that IT helps communication within organization. In the subject ERP solution there is 7/24 reachable service to send and receive messages between users. Negotiation and information exchange is encouraged. Also, constant mail flow has been sending from the system to user when an action takes place.
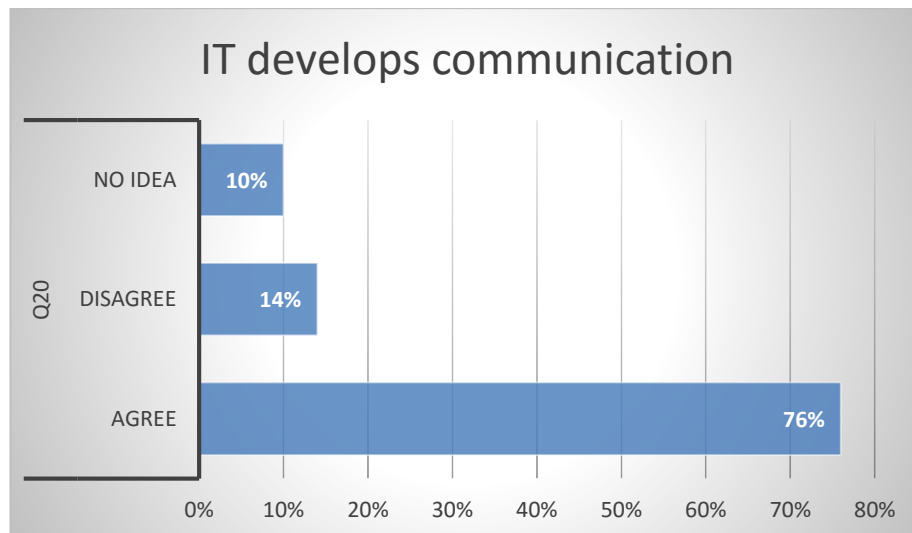
Figure 34: IT develops communication

5.4. Gap Analysis

In the gap analysis, we try to come a conclusion for the most important points for a shipping line company to focus, the current situation and requirement with the actions to create them. It is always possible to add more functions and subjects that company can work on. However, we narrow it down only main subjects and requirements which seems as urgent to fix. The difference and the gap to be filled with the necessary actions in the last column. In order to relate the features and content we use references from the literature. Each resource support the idea of the features that we try to explain. Results which was born from the gap analysis was taken from several resources. First as participant observation I tried to put all experiences into the study. Many of the challenges in the previous system have experienced in the first hand and also had the chance to observe new system and analyze the outcomes personally. Additionally, we take the surveys into consideration while creating the table. After that there have been interviews from different department to understand IT usage and effectiveness so all conclusions have been added into the analysis results. Since different departments

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contributed to the study we had the change to collect different perspectives in the container shipping industry and put into the study accordingly. After all the information taken by the resources we came up with the insight of the situation in order to create the table correspondingly. How the system work and what can change in the system displayed after the related information. As a summary, this study's result for the gap analysis to perform is ground on the insight which is taken from survey, interviews, personal experience, and some related previous studies in the literature.

Table 10: Gap Analysis

RELATED STUDIES
1. The role of relational and operational performance in business-to-business customer's adoption of self service technology (Bhappu, *D. Anita*, Schultze, *Ulrike*) 2. Adoption of Internet Services in Liner Shipping : An Empirical Study of Shippers in Taiwan Adoption of Internet Services in Liner Shipping : An Empirical Study of Shippers in Taiwan (Lu, *Chin Shan* Lai, *Kee Hung* Cheng, *T C E*)
1. EDI Basics (Rochelle, *P.Cohen*)(*book*) 2. A new efficient EDI system for container cargo logistics (Lee, *Tae-Woo* Park, *Nam-Kyu* Joint, *John F* Kim, *Woong Gyu*) 3. A practical approach to Web-based Internet EDI (Shiwa, *F.* Chung, *J.* Dietrich, *W.* Gottemukkala, *V.* Cohen, *M.*
1. Handbooks in Operations Research and Management Science, Maritime Transportation Chapter. Christiansen, *Marielle* Fagerholt, *Kjetil* Nygreen, *Bjørn* Ronen, *David* (*book*)
1. An ERP Solution for container terminal operating systems (Choi, *Hyung Rim* Kim, *Hyun Soo* Park, *Byung Joo* Park, *Nam-Kyu* & Lee, *Sang Wan*)
1. An empirical study of fleet expansion and growth of ship size in container liner shipping (Tran, *Nguyen Khoi* Haasis, *Hans Dietrich*) 2. RFID in ports and terminal (Dempsey, *M.*)
1. An empirical study of the role of information technology in effective knowledge transfer in the shipping industry (Fei, *Jiangang*)

SUBJECT /FEATURE	CURRENT STATE (As is)	NEEDS (To be)	ACTION
3rd Party Involvement	Subcontractors are partially involved while customer has no involvement with the system	To put 3rd parties (subcontractor, customer) into system	Creating convenient modules for customer to use the system (such as B/L or container tracking)
Double Entry	Sent/received documents do not match	Compatible documents to shared between parties	Generating commonly usable output from system
Container Registration	Each container has to registered one by one and when you create a BL for another line you have to first register the container then add into BL manually	Uploading container lists to system when needed (for owned or leased)	Upload other line's containers into system all it once from a file (i.e. with Excel)
Container Movement Update	Agents send excel files for container movements to line, line enters them to system	Data entries could be directly done by agent to system instead of sending file to line	Agent can enter data for container moves directly into system and line can control them.
Easy Access to Fleet	Line logistics supervisor checks fleet status locally, collect all of them in a file and present to management	Managers need to know current status of fleet anytime to take correct decisions	With update movements on program, system automatically prepare a stock report by using last movement of
Mobile Usability	It can be open though mobile devices but it is does not have mobile interface so it is hard to use	System can be work through mobile devices easily	To create mobile interface and/or a mobile application at least for essential modules

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6. CONCLUSION & RECOMMENDATIONS

In conclusion, shipping industry depends on IT in order to operate faster, communicate better, try to gain competitive advantage, eliminate human mistakes and errors from processes, make operation to cost less time and effort so increase productivity and efficiency. When think about many industries which driven by technology shipping industry is not one of them. Especially in Turkey. There are still traditional approaches to handle the operations. Ports, liners, shipping agencies and freight forwarders have to transform their process into more innovational in order to survive. In this study, main idea was to indicate IT usage in maritime in general and giving an idea that how a custom-made ERP solution for a shipping line company can change the way of operations in different direction. Unstructured interviews, questionnaires and experience from field show as a result shipping industry has been continuing changing process. In literature, there is limited resource to explain relationships of IT usage and shipping industry especially for Turkey. Even though Turkey is an advantages location for shipping still did not reach the full potential and technological advancement can help to do that. For further studies, there are 3 options to go: Firstly, data integration is a huge problem between parties in the industry. There are different kind of software, type of output and results. XML based data exchange can be a way to harmonize data flow between shipping operations parties such as ports, liners, shipping agencies, custom offices and other government authorities, freight forwarders and even customers. Secondly, mobility can be discussed and implemented. Subject ERP solution can be first step to create a mobile application for usage of every concerned of shipping industry. Lastly, people from the container shipping industry even the top managers have not clear understanding about cloud computing and SaaS based

solutions to added value into their profession in small medium size shipping companies. To use this solution to gain competitive advantage must be work on and explained in detail. Beside all technical and physical infrastructure inefficiencies small and medium size container shipping companies suffer from lack of technological usage.

The summary of the study extract from the Gap Analysis. In the first subject, we mention the 3rd party involvement issue. In the earlier subjects, we explained in detail that shipping industry have an interorganizational structure. This bring the situation that many parties involved with the operation must use similar system or at least get compatible results with each other. Since customer is not involved with the system at all there is a need to create convenient module or at least a tracking system for containers or b/l's. Additionally, subcontractors only partially joined the system so, their participation can also expand. Also, we added secondly important issue as double data entry which is another crucial point. Main target is to create, send/receive compatible files to share between parties especially between liner and shipping agencies. From logistics perspective, there are three main subjects as follows: container registration, container movements and accessing to the fleet. Container registration occurs as each container has to be registered one by one and when you create a BL for another line you have to first register the container then add into BL manually. It is possible to make it easier by uploading the container list all at once so that no need to add it manually. Also, container registration required that the agents send excel files for container movements to line, line enters them to system. Instead data entries could be directly done by agent to system instead of sending file to line. To access fleet done by the logistics team or supervisor via collecting all data from the agencies and put them together to create fleet report. However, it is possible to get

stock and current status of fleet via system. It can happen after the container movement update become automatized and possible to get last movement of a container will create the report consequently. Another issue rises from the operational dimension of the business. Since we focus on a liner, schedule is really essential part of the operations. However, there is a need for creation of schedules according to the route, ports even different terminals in the same port. Transshipments and timing must be carefully planned and published to the agencies and customers. System has partially responding this need due to lack of understanding of the irregular situations such as add or omit of a call or transshipment or repetitions. Last issue is written for further development of ERP solutions because they are not mostly convenient to mobile usage. Our subject ERP does not have any difference in that term. So, last issue address the need of creating mobile interface and/or a mobile application at least for essential modules.

REFERENCES

And, C.S. & Dogan, Y., 2007. Key performance Indicators for Maritime Transport System : Graduate Business School. *Measurement*.

Angeloudis, P., Greco, L. & Bell, M.G.H., 2016. Strategic maritime container service design in oligopolistic markets. *Transportation Research Part B: Methodological*, 90, pp.22–37.

Anon, 2016. Demiryolu Sektörü. *Ulaştırma Denizcilik ve Haberleşme Bakanlığı*.

Arunachalam, V., 1995. EDI: An analysis of adoption, uses, benefits and barriers. *Journal of Systems Management*, 46(2), pp.60–64.

Ateş, A., Karadeniz, Ş. & Esmer, S., 2010. Dünya Konteyner Pazarında Türkiye'nin Yeri. *Dokuz Eylül Üniversitesi Denizcilik Fakültesi Dergisi*, 2, pp.83–98.

Aydın, G.T. & Öğüt, K.S., Lojistik Köy Nedir ? , pp.1–10.

Bray, T. et al., 2006. *Extensible Markup Language (XML)*,

Braz, R.G.F., Scavarda, L.F. & Martins, R.A., 2011. Reviewing and improving performance measurement systems: An action research. *International Journal of Production Economics*, 133(2), pp.751–760. Available at: http://dx.doi.org/10.1016/j.ijpe.2011.06.003.

Chou, D.C., Tan, X. & Yen, D.C., 2004. Web technology and supply chain management. *Information Management & Computer Security*, 12(4), pp.338–349.

Crainic, T.G., Bektas, T. & Crainic, T.G., 2007. A Brief Overview of Intermodal Transportation. , (January).

Cyril, R. et al., 2007. Special : Traffic Planning and Logistics European Scene. *European Research Consortium for Informatics and Mathematics*, (68).

Dempsey M., 2011. RFID in ports and terminals. , p.21.

Ding, D. & Chou, M.C., 2015. Stowage planning for container ships: A heuristic algorithm to reduce the number of shifts. *European Journal of Operational Research*, 246(1), pp.242–249.

Ducruet, C. & Notteboom, T., 2012. The worldwide maritime network of container shipping: Spatial structure and regional dynamics. *Global Networks*, 12(3), pp.395–423.

Elgarah, W. et al., 2005. Data exchange in interorganizational relationships: review

through multiple conceptual lenses. *The DATA BASE for Advances in Information Systems*, 36(1), pp.8–29. Available at: http://portal.acm.org/citation.cfm?doid=1047070.1047073%5Cnhttp://delivery.acm.org/10.1145/1050000/1047073/p8-elgarah.pdf?key1=1047073&key2=2645335521&coll=GUIDE&dl=GUIDE&CFID=56061939&CFTOKEN=93827737.

Gärtner, R. et al., 2015. *StowMan : A case study*,

Giessmann, A. & Stanoevska-Slabeva, K., 2013. Business Models of Platform as a Service (PaaS) Providers: Current State and Future Directions. *Journal of Information Technology Theory and Application*, 13(4), pp.31–55. Available at: http://aisel.aisnet.org/jitta/vol13/iss4/4/.

Gonzalez, F.J. et al., 2002. (12) United States Patent. , 1(12), pp.0–5.

Goralski, R.I. & Gold, C.M., 1997. the Development of a Dynamic Gis for Maritime Navigation Safety. *Simulation*, pp.1–4.

Hu, Y. & Zhu, D., 2009. Empirical analysis of the worldwide maritime transportation network. *Physica A: Statistical Mechanics and its Applications*, 388(10), pp.2061–2071. Available at: http://dx.doi.org/10.1016/j.physa.2008.12.016.

Hughes, C., 2014. Ship performance.

Kim, K.H. & Hong, B.H., 2010. Maritime logistics and applications of information technologies. In *40th International Conference on Computers and Industrial Engineering: Soft Computing Techniques for Advanced Manufacturing and Service Systems, CIE40 2010*.

Konsta, K. & Plomaritou, E., 2012. Key Performance Indicators (KPIs) and Shipping Companies Performance Evaluation: The Case of Greek Tanker Shipping Companies. *International Journal of Business and Management*, 7(10), pp.142–155. Available at: http://www.ccsenet.org/journal/index.php/ijbm/article/view/13633.

Kothari, B.S., 2008. *The Maritime Commons : Digital Repository of the World The role of technology in maritime security : a survey of its development , application , and adequacy SECURITY : A SURVEY OF ITS*.

Lancioni, R.A., Smith, M.F. & Oliva, T.A., 2000. The Role of the Internet in Supply Chain Management. *Industrial Marketing Management*, 29(1), pp.45–56.

Lawrence, R., 2004. The space efficiency of XML. *Information and Software*

Technology, 46(11), pp.753–759.

Lee, T.-W. et al., 2000. A new efficient EDI system for container cargo logistics. *The flagship journal of international shipping and port research*, 27(2), pp.133–144.

Lu, C.S., Lai, K.H. & Cheng, T.C.E., 2016. Adoption of Internet Services in Liner Shipping : An Empirical Study of Shippers in Taiwan Adoption of Internet Services in Liner Shipping : An Empirical Study of Shippers in Taiwan. , 1647(December).

Lu, E.J.-L., Tsai, R.-H. & Chou, S., 2001. An empirical study of XML/EDI. *Journal of Systems and Software*, 58(3), pp.271–279. Available at: http://www.sciencedirect.com/science/article/pii/S0164121201000449.

Mossa, S. et al., 2005. The worldwide air transportation network: Anomalous centrality, community structure, and cities' global roles. *Proceedings of the National Academy of Sciences of the United States of America*, 102(22), pp.7794–7799. Available at: http://www.pnas.org/cgi/content/abstract/102/22/7794%5Cnhttp://www.pubmed central.nih.gov/articlerender.fcgi?artid=1142352&tool=pmcentrez&rendertype= abstract.

Nurmilaakso, J., 2008. Adoption of e-business functions and migration from EDI-based to XML-based e-business frameworks in supply chain integration. , 113, pp.721–733.

Park, D.J., Choi, Y.B. & Nam, K.C., 2006. RFID-based RTLS for improvement of operation system in container terminals. *2006 Asia-Pacific Conference on Communications, APCC*, p.4023142.

Petering, M.E.H. et al., 2009. *Development and simulation analysis of real-time yard crane control systems for seaport container transshipment terminals*,

Richard, E. et al., 2011. (12) United States Patent. , 2(12), pp.19–35.

Salleh, S.M., Teoh, S.Y. & Chan, C., 2012. Cloud Enterprise Systems: A Review Of Literature And Its Adoption. *Pacific Asia Conference on Information Systems*, p.12. Available at: http://www.pacis-net.org/file/2012/1451.pdf.

Shiwa, F. et al., 1999. A practical approach to Web-based Internet EDI. *Proceedings. 19th IEEE International Conference on Distributed Computing Systems. Workshops on Electronic Commerce and Web-based Applications. Middleware*, 10598.

Stopford, M., 2003. *Maritime Economics*,

Tekin, M., Zerenler, M. & Bilge, A., 2011. Bilişim Teknolojileri Kullanımının İşletme Performansına Etkileri: Lojistik Sektöründe bir Uygulama. *İstanbul Ticaret Üniversitesi Fen Bilimleri Dergisi*, pp.115–129.

Tomlinson, J., 2009. History and Impact of the Intermodal Shipping Container.

Tran, N.K. & Haasis, H.D., 2015. An empirical study of fleet expansion and growth of ship size in container liner shipping. *International Journal of Production Economics*, 159, pp.241–253. Available at: http://dx.doi.org/10.1016/j.ijpe.2014.09.016.

Voss, S., 2007. Container Terminal Operation and Operations Research Recent Challenges. *Transportation Systems: Engineering & Management*, (February), pp.387–396.

http://www.edibasics.com/edi-resources/document-standards/

http://www.supplychaindive.com

Appendices

Appendix A: Questionnaire

Questions

* This questionnaire prepared for a better understanding of IT systems in shipping industry. Please mark your choice with an X as shown.

1- Which country you are working

2- Type of your company's business area

3- How many years have you been working in this industry

4- Company size

5- Do you use any specific program or application for your job

6- How many program or application you are using

7- They (apps/programs) are located

8- Are apps/programs are integrated with each other

9- Apps/programs respond to business requirements/needs

10- Apps/programs are user friendly (easy to use)

11- How many years passed since they implemented (on average)

12- Do they updated/maintenance accordingly (weekly/monthly/annual)

13- Current IT infrastructure of your company (software and hardware) is enough and efficient

14- IT developments have positive impacts on maritime industry

15- IT tools increase business productivity/efficiency

16- IT tools effect make easier planning/stowage activities

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17- IT tools helps to eliminate human mistakes/errors

18- IT tools helps saving time

19- IT provides competitive advantage

20- IT develops communication within organization

<div align="right">

* Thank you for participated!

</div>

Options:

Section A- Shipping Industry

You may add your name, age and
your profession here:

*Choose from drop
down

X	liner		freight forwarder		shipping agency		bunker		other: _____
	0-1 years	X	1-5 years		5-10 years		10+ years		
	0-10 people		10-50 people	X	50-100 people		100+ people		

Section B- Information Technology

X	yes		No				Name of the application:		
	1	X	2		3		4		5+
	internal		web-based	X	both				
	yes	X	No						
	very well	X	enough		relatively		hardly		not at all
X	yes		No						
	0-1		1-5 years	X	5-10 years		10+ years		
X	yes		No						

Section C - Business Performance

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	Agree	X	Disagree		No idea
X	Agree		Disagree		No idea
X	Agree		Disagree		No idea
X	Agree		Disagree		No idea
X	Agree		Disagree		No idea
X	Agree		Disagree		No idea
X	Agree		Disagree		No idea
X	Agree		Disagree		No idea

Appendix B: Liner shipping connectivity index, annual, 2010-2016

	YEAR	2011	2012	2013	2014	2015	2016
1	China	152,06	156,19	157,51	165,05	167,13	167,48
2	Singapore	105,02	113,16	106,91	113,16	117,13	122,7
3	Korea, Republic of	92,02	101,73	100,42	108,06	113,2	115,61
4	Malaysia	90,96	99,69	98,18	104,02	110,58	106,79
5	China, Hong Kong SAR	115,27	117,18	116,63	115,99	116,76	101,02
6	United States	81,63	91,7	92,8	95,09	96,74	98,7
7	Germany	93,32	90,63	88,61	93,98	97,79	97,75
8	United Kingdom	87,46	84	87,72	87,95	95,22	97,23
9	Netherlands	92,1	88,93	87,46	94,15	96,33	95,73
10	Belgium	88,47	78,85	82,21	80,75	86,96	88,64
11	Spain	76,58	74,44	70,4	70,8	84,89	86,13
12	France	71,84	70,09	74,94	75,24	77,06	83,9
13	Japan	67,81	63,09	65,68	62,14	68,82	78,9
14	China, Taiwan Province of	66,69	66,62	64,23	75,38	76,22	75,75
15	United Arab Emirates	62,5	61,09	66,97	66,48	70,4	70,57
16	Italy	70,18	66,33	67,26	67,58	67,43	67,41
17	Morocco	55,13	55,09	55,53	64,28	68,28	64,72
18	Sri Lanka	41,13	43,43	43,01	53,04	54,43	63,21
19	Viet Nam	49,71	48,71	43,26	46,08	46,36	62,84
20	Egypt	51,15	57,39	57,48	61,76	61,45	62,5
21	Saudi Arabia	59,97	60,4	59,67	61,25	64,83	61,79
22	Sweden	30,02	49,45	42,32	54,9	55,95	58,84
23	Malta	40,95	45,02	49,79	50,51	54,68	57,68
24	Denmark	26,41	44,71	38,67	51,96	52,28	54,85
25	Panama	37,51	42,38	44,88	43,65	45,59	53,42
26	Colombia	27,25	37,25	37,49	33,13	42,25	52,98
27	Poland	26,54	44,62	38,03	51,08	51,19	52,5
28	Mexico	36,09	38,81	41,8	40,09	42,95	50,88
29	Turkey	39,4	53,15	52,13	52,37	51,97	49,61
30	Portugal	21,08	46,23	46,08	46,28	45,71	48,16
31	Greece	32,15	45,5	45,35	47,25	46,81	47,41
32	Oman	49,33	47,25	48,46	49,88	48,37	47,35
33	India	41,52	41,29	44,35	45,61	45,85	46,24
34	Thailand	36,7	37,66	38,32	44,88	44,43	44,32
35	Canada	38,41	38,29	38,44	42,49	42,88	42,64
36	Russian Federation	20,64	37,01	38,17	37,65	43,34	42,57
37	Brazil	34,62	38,53	36,88	42,28	41,02	39,93
38	Peru	21,18	32,8	32,84	33,6	36,95	37,8

39	Israel	28,49	31,24	32,42	31,77	33,22	37,36
40	South Africa	35,67	36,83	43,02	37,91	41,41	37,1
41	Pakistan	30,54	28,12	27,71	27,5	32,33	36,58
42	Argentina	30,62	34,21	33,51	37,69	36,72	36,38
43	Chile	22,76	32,98	32,98	32,52	36,26	36,3
44	Lebanon	35,09	43,21	43,16	42,63	41,81	35,1
45	Uruguay	24,38	32	31,37	34,93	35,22	34,93
46	Slovenia	21,93	21,94	20,82	24,25	29,64	33,23
47	Croatia	21,75	21,38	20,44	23,47	28,13	32,51
48	Ukraine	21,35	24,47	26,72	27,72	30,06	31,37
49	Ecuador	22,48	23,05	21,74	21,8	21,65	31,36
50	Australia	28,34	28,81	29,87	31,29	32,02	30,64
51	Togo	14,08	14,07	14,76	19,09	20,44	30,29
52	Romania	21,37	23,28	25,73	26,66	28,77	29,89
53	Angola	11,27	13,95	13,8	19,28	19,57	29,67
54	Djibouti	21,02	16,56	20,29	20,22	20,76	29,41
55	Jordan	16,65	22,75	22,68	22,63	26,15	29,27
56	Congo	10,78	12,57	15,82	19,1	19,55	29,24
57	Mauritius	15,37	23,86	24,72	20,02	29,88	28,64
58	Bahamas	25,18	27,06	26,41	26,7	27,69	27,67
59	Indonesia	25,91	26,28	27,41	28,06	26,98	27,19
60	Bahrain	9,77	17,86	17,9	27,01	26,72	26,48
61	Iran (Islamic Republic of)	30,27	22,62	21,3	5,85	11,91	24,63
62	Dominican Republic	22,87	23,72	25,57	26,29	22,82	24,55
63	Côte d'Ivoire	17,38	16,45	17,55	21,87	31,35	22,01
64	Nigeria	19,85	21,81	21,35	22,91	32,68	21,93
65	New Zealand	18,5	19,35	18,95	21,05	20,07	20,81
66	Ghana	18,01	17,89	19,35	21,69	21,85	20,7
67	Guatemala	20,88	20,07	20,28	21,17	20,27	20,3
68	Jamaica	28,16	21,57	25,32	24,55	21,73	20,05
69	Cyprus	17,12	16,02	16,39	17,71	17,32	19,32
70	Benin	12,69	15,04	14,28	17,21	17,67	18,34
71	Philippines	18,56	17,15	18,11	20,27	18,27	17,81
72	Trinidad and Tobago	17,89	18,9	17,26	17,26	17,89	17,39
73	Cameroon	11,4	13,44	10,85	12,74	10,96	15,01
74	New Caledonia	9,17	9,41	9,23	9,51	8,58	14,79
75	Namibia	12,02	15,18	15,5	18,94	18,45	14,32
76	Kenya	12	11,75	11,38	11,94	11,34	13,66
77	Syrian Arab Republic	16,77	15,64	16,53	17,46	17,43	13,37
78	Senegal	12,27	13,59	11,08	12,9	12,19	12,77
79	Bangladesh	8,15	8,02	7,96	8,4	9,31	12,62
80	French Polynesia	8,59	10,86	9,9	12,09	11,88	12,09
81	Costa Rica	10,69	14,13	14	12,24	11,27	11,49

82	Madagascar	7,72	11,8	11,85	11,36	11,37	10,73
83	Honduras	9,42	10,03	10,73	11,13	10,43	9,96
84	United Republic of Tanzania	11,49	11,07	11,1	11,81	10,62	9,67
85	Finland	11,27	15,51	9,34	10,13	9,61	9,64
86	Mozambique	10,12	9,82	10,23	8,96	10,91	9,51
87	Ireland	5,94	12,99	12,68	10,08	9,81	9,49
88	Gabon	7,97	9,23	8,95	8,59	8,49	9,38
89	Equatorial Guinea	3,68	4,54	4,02	8,37	9,23	8,96
90	El Salvador	12,02	8,75	8,36	9,16	9,06	8,93
91	Guinea	6,21	7,42	8,06	5,78	9,01	8,92
92	Kuwait	5,6	6,6	7,12	8,22	8,89	8,89
93	Nicaragua	8,41	8,23	8,3	9,1	8,82	8,84
94	Fiji	9,23	12,39	12,05	9,43	8,56	8,56
95	Venezuela (Bolivarian Rep. of)	19,97	18,93	18,9	19,43	12,36	8,46
96	Guam	8,76	8,41	7,85	8,38	8,33	8,33
97	Seychelles	6,45	6,5	8,08	8,07	8,01	7,92
98	Belize	3,85	9,99	10,32	7,8	7,8	7,8
99	Liberia	6,17	8,11	5,88	6	8,47	7,78
100	Sierra Leone	5,41	7,4	5,15	5,64	8,3	7,61
101	Maldives	1,62	1,6	8,12	7,79	7,59	7,59
102	Papua New Guinea	8,83	6,86	6,61	9,02	7,57	7,52
103	Solomon Islands	5,87	6,07	6,04	6,9	6,64	6,62
104	Somalia	4,2	4,34	4,2	5,45	5,43	6,52
105	Myanmar	3,22	4,2	6	6,25	6,23	6,37
106	Haiti	4,75	5,08	5,12	5,07	6,54	6,31
107	Mauritania	5,62	8,2	6,53	6	8,63	6,26
108	Lithuania	9,77	9,55	5,84	6,14	6,14	6,22
109	Aruba	6,21	6,03	6,3	6,14	5,93	6,2
110	Vanuatu	3,7	3,88	3,42	6,44	6,17	6,17
111	Sao Tome and Principe	2,13	2,28	6,87	6,07	6,04	6,04
112	Gambia	5,24	7,81	5,89	5,64	8,21	6,04
113	Norway	7,32	5,31	5,28	4,99	4,75	5,89
114	Yemen	11,89	13,19	19	18,45	24,17	5,76
115	Cuba	6,55	5,96	5,77	5,85	5,8	5,76
116	Georgia	3,79	4,99	4,17	5,58	5,61	5,73
117	Cambodia	5,36	3,45	5,34	5,55	6,69	5,61
118	Algeria	31,06	7,8	6,91	6,94	5,92	5,55
119	Estonia	5,84	5,43	6,44	6,64	5,31	5,4
120	Comoros	7,14	5,17	5,21	6,83	6,78	5,38
121	Tunisia	6,33	6,35	5,59	7,52	5,71	5,35
122	American Samoa	4,56	4,39	4,19	4,42	5,22	5,22
123	Samoa	4,56	4,39	4,19	4,42	5,22	5,22
124	Qatar	3,6	6,53	3,35	3,86	5,2	5,2

125	Suriname	4,16	4,48	4,91	5,03	5,09	4,98
126	Barbados	5,85	4,82	5,18	4,71	4,86	4,92
127	Iraq	4,19	7,1	5,69	5,17	4,88	4,88
128	Libya	6,59	7,51	7,29	6,82	5,93	4,86
129	Bulgaria	5,37	6,36	5,89	4,98	5,01	4,86
130	Saint Lucia	4,08	4,55	4,93	4,57	4,48	4,63
131	Guyana	3,96	4,06	4,31	4,13	4,64	4,52
132	Iceland	4,68	4,68	4,66	4,41	4,43	4,36
133	Saint Vincent and the Grenadines	3,95	4,02	4,1	3,85	4,28	4,25
134	Antigua and Barbuda	2,4	2,41	2,43	4,07	4,07	4,22
135	Cabo Verde	4,24	4,48	4,12	4,1	4,1	4,1
136	Dem. Rep. of the Congo	3,73	4,05	4,01	4,11	4,33	4,07
137	Northern Mariana Islands	3,65	3,44	1,37	4,06	4,01	4,01
138	Grenada	3,93	4,04	4,59	4,45	4,02	4
139	Guinea-Bissau	4,07	4,31	4	3,98	3,97	3,97
140	Faeroe Islands	4,2	4,21	4,21	4,18	4,18	3,96
141	Brunei Darussalam	4,68	4,44	4,61	4,3	4,56	3,86
142	Latvia	5,51	5,45	4,07	3,62	3,62	3,62
143	Eritrea	4,02	4,17	4,02	4,02	3,49	3,49
144	Albania	4,54	0,53	4,43	4,11	3,88	3,37
145	Marshall Islands	3,08	2,91	2,91	3,02	3,02	3,02
146	Tonga	3,72	3,37	3,17	3,58	2,94	2,94
147	Kiribati	3,11	2,91	2,91	2,91	2,91	2,91
148	Saint Kitts and Nevis	2,66	2,67	2,58	2,35	2,37	2,35
149	Greenland	2,3	2,3	2,3	2,3	2,3	2,3
150	Cayman Islands	4,03	4,07	1,34	1,11	2,12	2,12
151	Dominica	2,08	2,08	1,59	1,59	2,05	2,05
152	Micronesia (Federated States of)	3,62	3,58	2,17	1,32	1,32	1,32
153	Palau	3,62	3,58	2,17	1,32	1,32	1,32
154	Bermuda	1,57	1,57	15,92	1,52	1,51	1,29

Curriculum Vitae

I, Ayşe Demirhas, was born in 30 July 1992 in İstanbul. I received my bachelor degree from Kadir Has University Applied Sciences Faculty, International Trade and Logistics in 2014. I graduated as top student of my faculty with the 3.64 GPA. In the same year, I started my MS program in Graduate School of Science and Engineering in Management Information Systems program. I finished all of my classes and my GPA is 3.11. I worked in a private shipping line company as IT for 2.5 years.