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Dokuz Eylül Üniversitesi Denizcilik Fakültesi Dergisi'nin 10. yılını kutlamaktan mutluluk duyuyor ve 2018 yılı 10. cilt 1. sayısını değerli okuyucularımızın ilgisine sunuyoruz. Dergimizin bu sayısında altısı İngilizce olmak üzere, toplam yedi adet değerli çalışma yer almaktadır. Bu sayıda 'limanlarda iş tatmini', 'limanlarda mavi okyanus stratejisi olarak arttırılmış gerçeklik', 'yenilikçi tersane proje yönetimi', 'gemiadamlarının mesleki hataları', 'Türkiye ile Ege Adaları ticareti', 'İskenderun Körfezi denizyolu ticareti', 'ham petrol fiyatlarının tanker piyasasındaki etkileri' gibi denizcilik bilim alanının farklı yönlerini ele alan makaleler yer almaktadır.

Dergimizin bugünlere gelmesinde çok büyük emeği ve katkıları olan sayın Doç. Dr. Gül DENKTAŞ ŞAKAR editörlük görevini bizlere devretmiş bulunmaktadır. Kendisine dergimize sağlamış olduğu değerli katkılardan dolayı sonsuz teşekkürlerimizi sunarız. Editörler olarak dergimizin ulusal ve uluslararası tanınırlığını arttırma çabalarını devam ettireceğiz.

Dokuz Eylül Üniversitesi Denizcilik Fakültesi Dergisi'nin bu sayısına değerli çalışmalarıyla katkıda bulunan bilim insanları başta olmak üzere, dergi sekretaryamıza, derginin bölüm editörlerine, İngilizce editörümüze, çok değerli görüşleri ile dergimizdeki çalışmaların bilimsel kalitesini arttıran sayı hakemlerimize ve alanın en değerli bilim insanlarından oluşan danışma kurulumuza şükranlarımızı sunmayı bir borç biliriz. Son olarak, dergimizin basımında gösterdikleri özverili ve titiz çalışmalarından dolayı Dokuz Eylül Üniversitesi Matbaası'na da teşekkürlerimizi sunarız.

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Doç. Dr. Çimen KARATAŞ ÇETİN
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Editorial

We are pleased to be celebrating the 10th publishing anniversary of Dokuz Eylül University Maritime Faculty Journal and herewith submitting 1st issue of the 10th volume of 2018 to the interest of our readers. This issue of our journal consists of seven appreciably worthwhile articles six of which are in English language. The articles on various fields of maritime studies that have been included in this issue discuss such topics as 'job satisfaction at ports', 'augmented reality as blue ocean strategy at ports', 'innovative shipyard project management', 'vocational errors of seafarers', 'trade between Turkey and Aegean Islands', 'seaborne trade through Iskenderun Bay', and 'the effects of crude oil prices on tanker market'.

Assoc. Prof. Dr. Gül DENKTAŞ ŞAKAR, who has made great efforts and contributed a lot to the progressive success of our journal, has handed the editing responsibility over us. We would like to submit our sincere thanks to her for her invaluable contribution to the journal. We, as the editorial board, will carry on making efforts and doing our best to promote the journal both nationwide and internationally.

We do owe many thanks indeed to the academics and scholars who have contributed with their appreciable studies to this issue of Dokuz Eylül University Maritime Faculty Journal, the section editors of the journal, the foreign language editor, the reviewers of this issue who have advanced the scientific quality of the studies included in the journal with their invaluable contributions and our Advisory Board consisting of distinguished academics. As the last, but not the least, we thank Dokuz Eylül University Publishing House for their prudent efforts in publishing our journal.

Editors-in-Chief

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AN INNOVATIVE THEORY OF CONSTRAINTS BASED APPROACH FOR IMPROVEMENT OF SHIPYARD PROJECT MANAGEMENT

Uğur Buğra ÇELEBİ[1]
Levent BİLGİLİ[2]

ABSTRACT

There is a major manpower requirement for process production in shipyard industry under hard working conditions with hazardous material. Shipbuilding period comprises cutting and marking of the steel plates, steel fabrication, assembly of the sections, erection on slipway, launching of the vessel, sea trials and the delivery of the vessel to the Owner. Block fabrication is the main production process in shipyards. It includes many kinds of inputs and interconnected processes and each process has an effect on the next stages of a ship's life cycle. Thus, a good planning ought to be developed to make an efficient producing process. Besides, due to the growing environmental awareness, new and innovative methods must be implemented in ship manufacturing. In this study, work-flow and data have been obtained from production stations of a shipyard, which has duplicate production concept, and critical chain, project and feeding buffers have been calculated. The obtained data has been compared with the results of calculation and result has revealed that the new findings have contributed to gaining a more fruitful production process.

Keywords: *Theory of constraints, bottleneck analysis, project management, shipyard.*

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KISITLAR TEOREMİ YAKLAŞIMIYLA YENİLİKÇİ TERSANE PROJE YÖNETİMİ GELİŞTİRİLMESİ

ÖZET

Tersane endüstrisinde ağır koşullar altında zararlı malzemelerle gerçekleştirilen üretim süreçleri için büyük bir işgücüne ihtiyaç vardır. Gemi inşaa süreci, çelik levhaların kesimi ve işaretlenmesi, çelik üretimi, blokların birleştirilmesi, kızakta inşa, geminin suya indirilmesi, deneme seferleri ve geminin gemi sahibine teslimi alt süreçlerinden oluşur. Blok üretimi tersanelerdeki en temel üretim sürecidir ve çok sayıda girdi ile birbirine bağlı ve gemi yaşam döngüsünde kendisinden sonraki süreçleri etkileyen alt süreçlerden oluşur. Bu yüzden verimli bir üretim süreci için iyi bir üretim planlamasının yapılması gereklidir. Gelişmekte olan çevresel duyarlılık nedeniyle yenilikçi yöntemlerin kullanılması da ayrıca önemlidir. Bu çalışmada tekrarlayan üretim konseptine sahip bir tersaneden iş akışı ve çeşitli veriler temin edilmiş olup kritik zincir, proje ve besleme stokları hesaplanmıştır. Temin edilen değerler, hesaplamalar sonucunda elde edilen sonuçlarla karşılaştırılmış ve yeni sonuçların daha verimli bir üretim süreci oluşturulmasına katkıda bulunduğu tespit edilmiştir.

Anahtar Kelimeler: *Kısıtlar teoremi, darboğaz analizi, proje yönetimi, tersane.*

1. INTRODUCTION

Shipping has the major part of the world's total trade network and ships are the most efficient vehicles in terms of carrying capacity/energy efficiency. Thus, they are used widely for various purposes such as trading, fishery, cruising and military.

Ships are built and repaired in shipyards. Due to the rapid and positive changes in economic rate, shipbuilding industry grew dramatically during the last decades. New ship constructing and ship repairing have many independent and interrelated processes. There are different methods, such as Life Cycle Assessment (LCA), six sigma method and lean manufacturing, offered and implemented for shipyards in order to re-organize the manufacturing processes and thus, increase the general efficiency. Despite LCA generally focuses on all manufacturing phases and considers all phases as one in a holistic perspective, six sigma method is a project-driven management approach to improve the organizations' products, services and processes by continually reducing defects in the organization. Lean manufacturing is an approach that aims to increase the production speed and thus, decrease the production time to

improve quality, cost and delivery performance at the same time (Bilgili and Çelebi, 2013; Bilgili et al., 2013). In a recent study, a new method was offered which automatically extracts the most frequent task flows from transport usage histories. A clustering technique was used to identify heterogeneous groups of process instances and derive a process model independently by group (Lee et al., 2013). In another study, it is indicated that the assembly and welding process of curved blocks are done mainly manually, which has been bottleneck of ship construction. The first recommended method to overcome the problem is advanced design method while the second one is using flexible process technology and equipment. Precision measurement technology can be used as third method (Zhao et al., 2017). Park et al., (1996) developed an algorithm for the spatial block scheduling problem in Korean shipyards. Cho et al., (1998) describes an integrated process planning and scheduling system for block assembly in shipbuilding. Ozkok and Helvacioglu (2013) implemented some improvements on the current production system and the building time of a double bottom block was shortened. According to the authors, the rate of the improvement of the cycle time is about 100 % in theory. Kafalı et al., (2018) focused on planning block manufacturing, updating the initial plan by considering new performance values and developing a production control system in order to prevent excessive stock increase.

1.1.Theory of Constraints

Theory of Constraints (TOC) is another method that is used in different industries and sectors. TOC is a management approach that mainly based on small number of constraints, which limit achieving the goals of a manageable system. TOC is used to identify and describe the constraints and reorganize the system in order to fix the weakest link in the chain. Studies on TOC can be classified in several subjects. There are many studies on capacity constraints such as source, political and logistic constraints that are presented by the theory. There are some studies on the main principles of the theory such as Haystack syndrome, Parkinson law and multiple assemblies.

TOC was introduced by Goldratt and Cox (1984), and the authors identified and brought a principal innovation to production systems. TOC is based on the concept, which is the basic purpose of an organization is to make money today and in the future. According to the authors, there are six variables, three of them are operational (throughput, inventory and operating expense), three of them financial (net profit, return on investment and cash flow). TOC identifies that the improving the

bottleneck of the system is the key for improving the total system performance. Şimşit et al, (2014) investigated the historical background and basic concepts of TOC.

In general terms, project management is a source planning, organizing and management discipline that is developed in order to finish the project at the projected time. Goldratt brings a new perspective to the project management in his book named 'The Goal' in which he tells the story of a factory manager who interference to the period that begins with a late-delivery and results with an improvement of production duration (Eliyahu, 1984). The perspective of the TOC for the business systems defends the opinion that the basic goal of a company is 'earning money today and in the future'. According to Goldratt, the goal and the necessary conditions and tools must be separated. For instance, customer service, product quality, and employee satisfaction, social and environmental responsibilities are generally necessities or they sometimes represent the tools of the organization performance (Eliyahu, 1990). TOC is a cornerstone of operational management. The main aim of TOC is to find a constraining or bottleneck in a production or supply chain. After identifying the constraint, the system and workflow is reorganized around it. The authors hypothesized that diversion times can be dramatically reduced and that these reductions can be sustained by applying TOC to patient care workflow (Strear et al., 2010). TOC represents an application of general systems theory for optimizing production. It uses the most constrained of the "rm's activities to guide production and process improvement decisions. Firms adopting TOC indicate that it has aided in reducing lead time, cycle time, and inventory, while improving productivity and quality (Kee and Schmidt, 2000). TOC, or synchronous manufacturing, is a very useful and valuable system in modern operation management. TOC methods provide companies a large reduction of work-in-process and finished-goods inventories, significant improvement in scheduling performance and substitute earnings increase. TOC also serves as a valuable addition to or even as a substitute for such well-known manufacturing systems as materials requirements planning (MRP) and just-in-time (JIT). The theory basically identifies the constraints and makes decisions on working with these constraints to synchronize a production process. System constraints can be workers, machines, market demand, company policies and regulation affecting a company. A physical constraint is usually a bottleneck resource- that is, any resource whose capacity is less than or equal to the demand placed upon it (Radovilsky, 1998). In a recent study, the implementation of the TOC rules for job-shop systems to advance the state of research on constraint scheduling in investigated. A number of simulation scenarios for a case

study in the automotive industry are discussed providing insights into the master production schedule (MPS), the drum–buffer–rope (DBR) scheduling method, the role of setup times in scheduling, the impact of free products (those that do not use constraint resources) on throughput, and the effect of priority rules in resource assignment to free products (Golmohammadi, 2015). Šukalová and Ceniga, 2015 discussed the possibility of applying TOC in the distribution systems for analyzing the system elements (inventories, planning of sale, the suppliers' reliability) and evaluating major shortcomings.

A recent study aims to bring evidence that TOC induces significant improvements considering TOC's bottleneck management strategy through the DBR methodology. By contrast with traditional management policies, TOC provides wide operational and financial advantages for each node in the supply chain without any undesirable collateral effect (Costas et al., 2015). Aguilar-Escobar et al, (2016) analyzed whether the TOC can be useful and applicable to the logistics of medical records in hospitals. They reached remarkable findings, which presents a significant increase in the level of service and employee productivity, as well as a reduction of cost and the number of patients' complaints. Wahlers and Cox, (1994) present an analysis on selection or proper competitive factors and modification to a firm's performance measurement system through the production process. They also investigate the effect of modifications implemented to the traditional manufacturing planning and control model to TOC. Steyn, (2002) explained why TOC is initially applied only to project scheduling and studied on a secondary TOC application to manage resources shared by a number of concurrent projects. He also developed a sample application on the statement 'Employees tend to finish the work in the duration that is determined for the work or more. If no duration is determined, then finishing the work is extended over a long period of time'. Critical chain responds to this statement with a formation of a project management in which the possibility of finishing the work is 50 % and it aims to remove this basic contrariness. Leach, (2000) schematized the 5 major points, which are defined as; determining the constraint, deciding how to use the constraint, re-organizing the other activities according to the new decision, removing the constraint and control for any other constraints. Rand, (2000) developed a schema in which he compares the critical chain with PERT and critical way applications in terms of activities. According to certain principles, adding the existing safeness area to an end of a work after each activity that is predicted by critical chain application is examined with the results. It is clearly understood that this system shortens the project duration. Jacob and McClelland, (2001) indicated that the programs are created with a

completion probability that is approximately 85-90 % in project systems such as critical way. Another indication is that the critical chain project management and the range of reliability are used in the duration in which the completion probability is 50 %. The authors also propounded that TOC doesn't use safety margin and thus, the process shortens comparing the statistical variation calculation. Steyn, (2000) in a sample theoretical application, presents schematically how the feeding and project reserves are included in a project. Radovilsky, (1998) calculated the reserve duration amounts in his study on feeding and project reserves. The study was made with finite elements method and the optimal duration is calculated.

1.2. Application of Theory of Constraints

Project applications of TOC remain limited in theoretical academic studies in Turkey; however, European and American companies and some government departments use this theory effectively. Competitiveness force the firms to produce faster, response the proposals as soon as possible and organize flexible production lines. The firms that have rapid response to the demanded productions keep one step ahead in supply and demand equilibrium and they increase their capacity by using the time that they gain from production process. These improvements provide the firms a situation in which they can survive in a world that becomes more competitive day by day. TOC is a management system philosophy that is created based on these parameters and the starting point is accepting that the performance of a firm is determined by constraints and understanding that every system has several constraints.

TOC claims that the main goal of a firm is 'earn money today and in the future. According to Goldratt, necessary conditions and tools must be separated. For instance, customer service, product quality, employee satisfaction, social and environmental awareness are generally appointed as necessities or they sometimes represent the tools of organization performance (Eliyahu, 1990). Figure 1 symbolizes a project system.

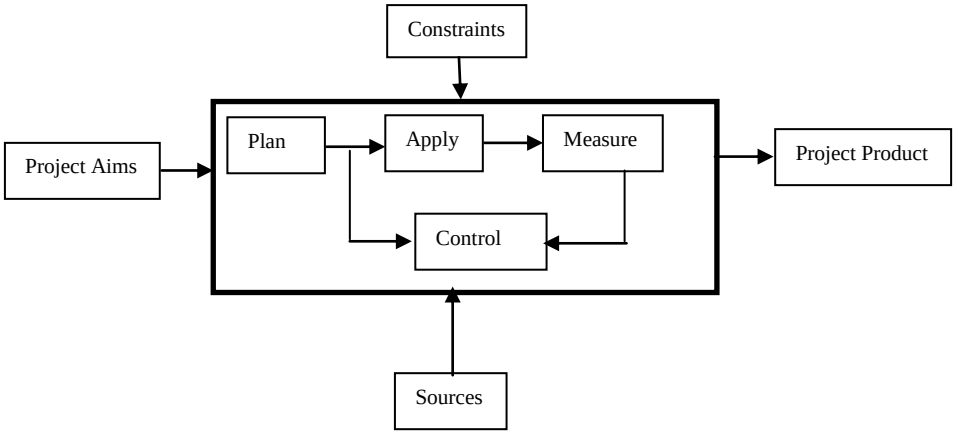

Figure 1: Project System Sample

1.3. Shipyard Processes

Great amount of manpower, complex work flows, variety of materials are the main points to describe shipbuilding industry as heavy industry. Production processes of the shipyards are divided into two main divisions: New building and ship repair industry. Production methods of these two divisions have similar characteristics. New ship construction and ship repairing have many industrial processes (Çelebi and Turan, 2011). Shipbuilding consists of cutting and marking of the steel plates, steel fabrication, assembly of the sections, erection on slipway, launching of the vessel, sea trials and the delivery of the vessel. In general, production type in the shipyards is block fabrication. In this production process, the vessel is composed of several blocks subject to the manufacturing and crane capacities of the shipyard. Each block is assembled in the workshops and after completion of the works and surveys; the blocks are erected on slipway. The vessel is launched after completion of all blocks' erection. The outfitting works of the vessel are completed in the sea and the vessels start their sea trials in order to test the efficiency and control whether they meet the requirements of the Owner and appropriate to the contract items. Consequently, the vessel is delivered to the Owner if the sea trial results can be accepted by the classification societies and the Owners (Turan and Çelebi, 2011).

In this study, the production flow of a shipyard, which has duplicate production process, is investigated in detail. The results of the new occurred conditions in case of applying TOC to a 1900 TEU

(Twenty-foot Equivalent Unit) container ship are assessed. In consideration of the shipyard data, the planned and real durations are investigated and calculated in detail. Following the investigations, the processes are enhanced, station duration, that occurred according to dates, are compared and the results are compared with TOC applications. The process improvement occurred due to the application of TOC in shipbuilding sector, in parallel with improvement, reduction of stock and costs, increase in practicability are the aims of this study. Figure 2 presents the flow chart of shipyard manufacturing and waste management plan. In Figure, processes on which Six Sigma and Lean Manufacturing can be implemented are presented such as Small Parts Production, Block Pre-Manufacturing, Block Outfitting, Block Manufacturing, Fabric/Harbor/Sea Trials and Tests. Error rates are tried to be reduced for each plate, pipe and profile production flow with the enhancement methods during Small Parts Production, Block Manufacturing and Block Outfitting processes. Waste management plan of the shipyard was formed with the former studies (Bilgili et al., 2013).

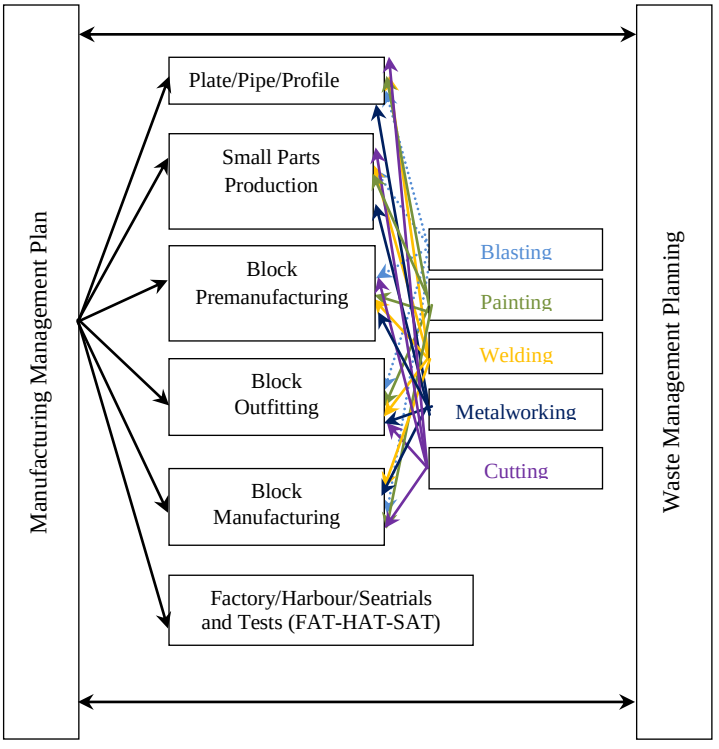

Figure 2: Flow Chart of the Shipyard Manufacturing Processes' Management Plan

2. SHIP MANUFACTURING PROCESSES FOR THE SHIPYARD A

This study was implemented in Shipyard A, which is located in Tuzla-Istanbul. Major improvements were developed in manufacturing plan of a 1900 TEU container ship. The length, breadth and draft of the ship are 180, 28 and 10 m, respectively. The 1900 TEU container ship is built based on block system. In order to compare the stations, there must be weight list per station. If the stations' weight lists are known, then it can be determined that which and how much equipment is needed. The weights of the blocks are determined by the design program. Due to the difficulties in production, the work load per tonnage in aft peak, fore peak and forecastle deck is much more than the work load in bulkheads and double bottom. This data is formed by using the information that is taken from production line. The calculated man-hour is 52,679. Man-hour calculation is the working capacity of the worker in an hour. The average number of workers is 80. Based on this data, it can be estimated that the duration between slipway block assembly and launching is 83 work-days. Calculating this data for all of the stations give the total situation of the ship. It can be known where and when the blocks stay and the total process is terminated with the correlation between previous and next data. Sheet steels are brought to the shipyard by sea or road and, by the help of warehouse personnel and riggers, they are placed to the stock field that is determined according to thickness and dimensions. Similarly, the profiles are placed to stock field according to their thickness and dimensions. After quality control, the sheet steels and the profiles are taken from the stock field by the special equipment. If the sheet steels are convenient for production, they are set to the conveyor, preheating and spray painting processes are made and after drying line the pieces are transmitted to the end of conveyor. The sheet steels that are painted with shop primer paint are sent to steel processing workshop. Figure 3 presents a flow chart of processes in shipyard.

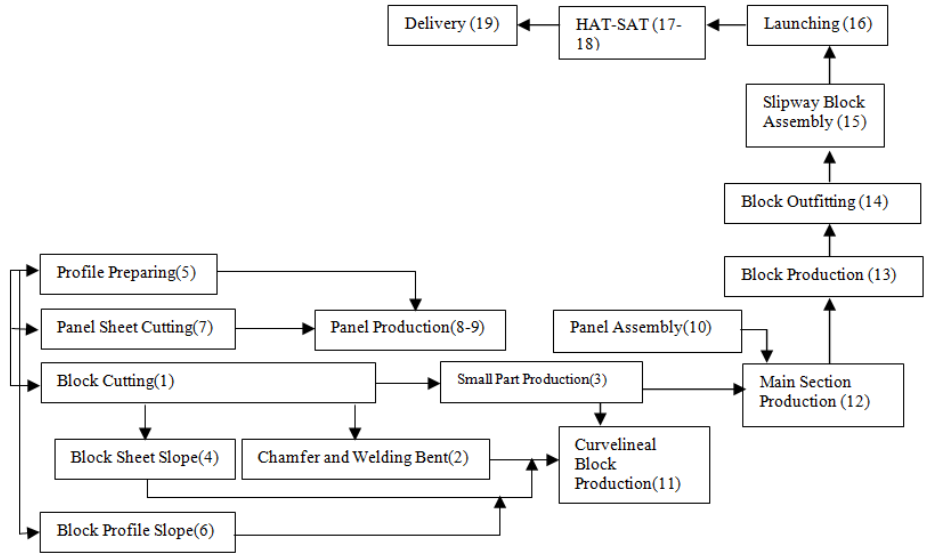

Figure 3: Flow Chart of Shipyard a Manufacturing Processes

2.1. Sheet Steel Curve Chamfer Profile Curve and Panel Cutting

After the cutting, the sheet steels are sent to press stock field as sanded in order to open a welding bent. During pressing process, wooden or chipboard molds are prepared pursuant to radii that are determined by CAD-CAM and these radii is used for bending process. All of these stages are applied to the profiles. There is also a cutting station for edge cutting of panels.

2.2. Small Group Pre-Production

A single plate and several elements are joined and the main object of this station is to make manual arc welding. In this station, turning the element and thus preventing overhead welding is possible. In this grade, the materials must be pre-painted, cut, curved, sanded and marked. The parallel production of starboard and port side materials makes the production faster. After finishing component production and sanding process, the material is sent to quality control and then, the next station.

2.3. Grouped Panel Production

Straight panel, curved panel or sub-groups and elements are joined in this grade. In this station, through joining the strengthened elements and joined panel sheet steel, front block production is done.

2.4. Block Production

The blocks are surrounded by board sheets that are prepared to production in the previous station. After this process, the blocks are turned down and sent to the paint shop.

2.5. Grade Painting

Considering the slipway montage queue, the blocks are sent to the paint halls. After finishing the welding, deburring and sanding processes, the block is sent to blasting and the surface is prepared for painting. After surface preparation, considering that the paint is flammable and can be deformed in high temperatures, the block is painted except the surrounding area or welded regions.

2.6. FAT-HAT-SAT and Delivery

In this station, the tests of circuit and related machine equipment and auxiliary equipment are made and these tests are called as harbor trial. In ship building sector, pre-delivery is defined as after finishing the feedbacks, which are determined between the customer and the shipyard via classification society, making the open sea trials that are realized several scenarios in generally two days period. The ship is delivered to the customer in this phase. Another ship's production flow follows the previous ship. After ending the production flow, it's possible to investigate the ship that is produced in this flow. The necessary data is completed with this investigation which shows how to calculate the raw and semi-finished materials.

3. RESULTS AND DISCUSSION

The determined and realized plan of the 1900 TEU container ship can be seen in Table 1. The determined plan is formed by project managers; the production durations based on the plan are taken from production monitoring programs. The 1900 TEU container ship is delivered after 217.66 days while the planned duration is 208.22 days. In

TOC, the flow plan is formed so that the stations follow each other's end point. Thus, while the work flow is being formed, the number of workers and capacities are determined considering the stations' weight. The planned dates are determined based on this information. Activities, which are applied until the first block is sent to slipway, are used as successive information for the work flow of TOC application. After sending all of the blocks to the slipway and slipway montage, activities are used as successive works.

Table 1: Real and Projected Results of Manufacturing Processes

JOB DEFINITION	REAL RESULTS	PROJECTED RESULTS
Block Cutting (1)	2 days	2 days
Chamfer and Welding Bent (2)	2 days	2 days
Pre-Production (3)	24 days	20 days
Block Sheet Slope (4)	4 days	4 days
Profile Preparing (5)	4 days	4 days
Block Profile Slope (6)	4 days	4 days
Panel Sheet Cutting (7)	3 days	3 days
Light Panel Production (8)	6 days	6 days
Panel Production (9)	6 days	6 days
Panel Assembly (10)	7 days	7 days
Curvilineal Block Production (11)	17 days	15 days
Main Section Production (12)	35 days	30 days
Block Production (13)	10 days	15 days
Block Painting (14)	5 days	5 days
Slipway Block Assembly (15)	80 days	80 days
Launching (16)	1 day	1 day
HAT (17)	40 days	38 days
SAT (18)	2 days	2 days
Delivery (19)	3 days	2 days
	217.67 d	**208.22 d**

Safety margin is determined considering that the completion possibility of the activities is 50 % and it is planned as projected in critical chain project plan that is based on the current project plan. The critical chain project plan is formed as 1-2-3-11-12-13-14-15-16-17-18-19with putting these tasks in order in project plan according to work queue. Critical chain gives the longest duration between the beginning and final days of a ship's production process. It is indicated that the source interference with capacity must be obstructed in the process. Labor force data is only used for the station that they are gathered from. The longest path is determined in the project in which source interference and 50 % completion problems are eliminated. The project and feeding stocks are placed by using the critical activities chain. The stock amounts

are calculated by square-root method in manual project. Project stock is calculated by the following formula:

$$\sqrt{1^2 + 2^2 + 3^2 + 11^2 + 12^2 + 13^2 + 14^2 + 15^2 + 16^2 + 17^2 + 18^2 + 19^2} \quad (1)$$

As a result, project stock will be added to the end of the project as 50.5 days. Adding the project stock to the end of the project brings a need of the determination of feeding stocks' places. Feeding stocks are used in the points in which the sub-tasks take part in critical chain as primary activity. A one-day delay in the critical chain results a one-day delay in delivery, thus, the feeding stocks and amounts must be in consider during planning the project. There are 3 feeding stocks in this project. Sheet steel curve, profile curve and panel montage supply the critical chain as primary activities. The feeding stocks are placed in these zones based on the calculations of the criteria of processes. Although the scheduled duration of the project is 217.22 work-days, it is delivered in 159.5 days with the critical chain project plan which provides a 58 days improvement. The delivery date is 2.5 months earlier than projected which corresponds to a 26 % improvement. Thus, labor-force and sources are used 2.5 months less which corresponds to a 20 % improvement. Critical chain project plan needs some computer programs for the projects that have more than 50 sub-tasks. ProChain and Concerto can be suggested as sample programs. In this study, CC(m) Pulse program is used in order to compare with manual project plan. Safety margin works are coded to the program and some arrangements are applied in accordance with the demand of the program. In ship building work flow, a sub-task can be begun before a related sub-task is finished. Manual project plans and computer programs don't accept this flow and they need the data that involves tasks which begins after finishing the previous task. Therefore, all of the consecutive activities until the first block's slipway process are used as data. Project stock is calculated as 54.5 days via the program. Feeding stocks are placed in stations sheet steel curve, profile curve and panel montage. Unlike manual project, the delivery date improved 53 days. There are a few reasons why the program results 5 days delay comparing the manual critical chain plan. For instance, statistical effects of the weighted activities on critical chain occurred during calculations of the projects that have less than 50 sub-tasks, wider knowledge and better calculating skills of the project operator comparing the program and the experiences of the operator on application.

Shipbuilding is a labor intensive sector. There are many problems due to the lack of production management on ship production. Project management concerns the weaknesses of Turkish shipbuilding industry such as high costs, non-efficient production, lack of in organization and

technology. It is well known that the ship building sector has weaknesses in project management and only a few shipyards have production flow. Shipyards are in need of changes in production flow, measurement of these changes' effects and increasing the capability of using these benefits. Providing the certain and measurable production planning system is the solution for Turkish shipyards. Figure 4 presents the compare of critical chain project management methods (PMM_1-PMM_2). The results are calculated for planned and realized production duration of 1900 TEU container ship.

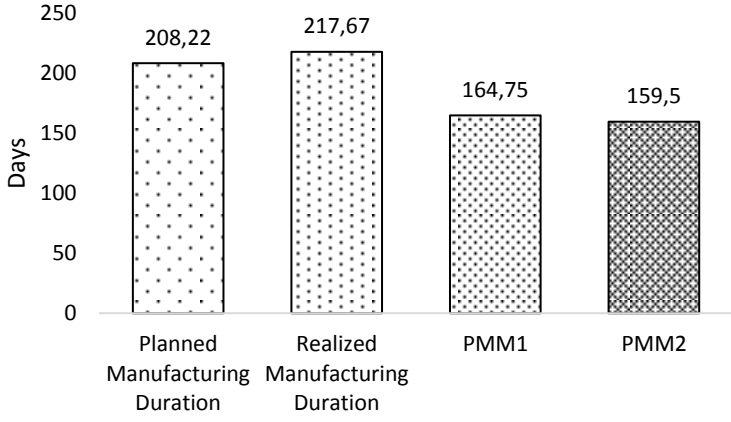

Figure 4: 1900 TEU Container Ship Production Duration

4. CONCLUSIONS AND RECOMMENDATIONS

The project was finished in 217.67 days and the improvements through the changes pursuant to the critical chain process can be seen in the graphic. TOC succeeded a 58 days saving with the design that considers the 50 % completion probability on realized durations and places the safety margin to the end of the project. The total improvement is about 26 %. Stock usage decreases in the same level and it is estimated that the operating expenses decrease about 20 % with the 2.5 months saving. This improvement has also effects on the next project and it can be begun 2.5 months before the planned date. An early delivery can have a positive effect on the company's prestige for the customers.

This study is mainly focused on time saving gained by implementation of TOC to a shipyard manufacturing process. Understanding the general benefits of TOC depends on the innovative studies, which use different perspectives. For instance, LCA and life

cycle cost (LCC) are holistic methods to identify and determine the total useful and useless impacts of implementing various methods on manufacturing processes. Thus, in further studies, the total economic and environmental savings may be estimated in accordance with LCA and LCC. Theoretical studies on TOC can provide improvements close to the practical studies that are realized in abroad. These improvements also provide positive views for the companies. TOC must be used for especially in the shipyards which have serial production and work-flow and it should be studied by the authorities and operators.

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GEMİADAMLARININ İDARİ CEZA ALMALARINI GEREKTİREN MESLEKİ HATA VE UYGUNSUZLUKLARIN BAHP YÖNTEMİ İLE DEĞERLENDİRİLMESİ

[1] Ünal ÖZDEMİR

ÖZET

Deniz ticareti birçok sistem ve yapıyı bünyesinde bulunduran ülkelerin ekonomik gelişmelerinde öncü olarak işleyen bir faaliyetler bütünüdür. Bu sistemin oldukça önemli bir bileşenini ise gemiadamları oluşturmaktadır. Gemiadamlarının performans ve kalitesi denizcilik sektörünün kalitesini doğrudan etkileyen oldukça önemli bir parametredir. Bu noktadan yola çıkılarak çalışmada gemiadamlarına uygulanacak idari yaptırımlara ilişkin yönerge kapsamında iş yaşantıları süresince yapmış oldukları veya yapabilecekleri mesleki hatalar nicel bir yaklaşım yöntemi ile değerlendirilmeye çalışılmıştır. Bu şekilde, Türk gemiadamlarının görev ihmallerinde en fazla hangi hatayı yapma eğiliminde olduklarına ilişkin görüşler belirlenmeye çalışılmıştır. Ayrıca, gemiadamlarının çalışmada bahsi geçen uygunsuz eylemlere olan yatkınlığı ile bu durumların gemi ve hukuki açıdan karşılaşılma sıklığına yönelik bir analiz yapılması da sağlanmıştır. Çalışmanın verilerinin analizi için bulanık Çok Kriterli Karar Verme (ÇKKV) Tekniklerinden birisi olan AHP (Analytic Hierarchy Process) yönteminden yararlanılmıştır.

Anahtar Kelimeler: *Gemiadamı, Deniz Ticareti, Bulanık AHP, ÇKKV, Türkiye.*

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EVALUATING SEAFARERS' VOCATIONAL ERRORS AND NON-COMPLIANCES SUBJECT TO PUNISHMENT BY USING FAHP METHOD

ABSTRACT

Maritime trade is a whole set of activities that are the cornerstones in the economic development of countries comprise many systems and structures contained within itself. As to seafarers, they are a very important component of this system. The performance and quality of seafarers is an important parameter that directly affects the quality of the maritime industry. From this point of view, within the scope of the directive regarding administrative sanctions to be applied to seafarers, this study evaluates the occupational errors that seafarers might have made or are likely to make during their work. In this evaluation a quantitative research method has been used. The purpose is to reveal the most likely encountered rule violations and non-compliances as a result of overall negligence. The analytic hierarchy process (AHP) method has been used for the analysis.

***Keywords**: Seafarers, Maritime Trade, Fuzzy AHP, MCDM, Turkey.*

1. GİRİŞ

Denizcilik sektörü kendine özgü sistematik bir yapısı olan çok boyutlu ticari ve teknik kavramların bütünleştiği bir alandır. Sektörün uluslararası anlamda sürdürülmesi, yönetilmesi ve organizasyonu zorunlu olmakla birlikte birçok farklı alanlar ile etkileşim içerisindedir (Benito vd. 2003:205; Brett ve Roe, 2010: 3; Özdemir ve Güneroğlu, 2018). Bu yapının her bir bileşeni zincirin birer halkası olarak varsayıldığında ise binlerce halkadan oluşan bir bütünlük ortaya çıkmaktadır. Bu bütünlük sayesinde dünyada her yıl milyarlarca dolar değerinde bir ticaret hacmi denizcilik faaliyetleri neticesinde ortaya çıkmaktadır (Brett ve Roe, 2010: 2). 2016 yılı itibariyle dünyada tüm taşıma modları toplamda 13,55 milyar/ton olarak bir hacme sahip iken deniz taşımacılığı bu oranın %84'ünü oluşturduğu belirtilmektedir (Clarksons Research, 2016:7). 2016 yılında Denizyolu taşımacılığında Türkiye'nin uluslararası taşımacılığı ise yaklaşık % 87'si denizyoluyla taşınmıştır (UDHB, 2017). Ekonomik anlamda böylesi büyük bir sistemin verimli çalışabilmesi sektörü oluşturan alt bileşenlerin şüphesiz ki uyumuna bağlıdır. Bu alt bileşenlerden en önemlilerinden birisi de gemiadamlarıdır (Parker, 2001:5). Gemiadamlığı çalışma şartları, koşulları, iş çevreleri, çalışma saatleri, risk ve tehlikelere maruz kalma, sosyal hayat, eğitimleri vb. birçok konu ele alındığında diğer mesleklerden hissedilir şekilde ayrılabilecek özveri ve yoğun işgücü gerektiren bir meslek grubunu

oluşturmaktadır (Duan vd. 2017: 572; Zhang ve Zhao, 2017: 260). Bu mesleği icra edenler en temel faaliyet olan taşımanın fiziksel boyutunu yerine getirerek sistemin devamını sağlamasında ihmal edilemeyecek boyutunu kapsamaktadırlar (Simons, 2013: 63). Hem dünyada hem de ülkemizde bu nedenlerden dolayı; gemiadamlarının eğitimleri, belgelendirme, çalışma koşulları, iş güvenlikleri gibi konularda ulusal ve uluslararası birçok düzenleme, çalışma, araştırmalar ve revizyonlar yapılmaktadır. Bu çalışmaların genel amacı gemiadamlarının kalitesinin artırılmasını amaçlamaktadır. Bu sayede deniz ticaretinin gelişmesine de katkı sağlanması hedeflenmektedir. Bu kapsamda, Türk deniz ticaret hacminin mevcut gelişme hızını artırarak daha da gelişebilmesi için ülkemizde de gemiadamlarına ilişkin birçok yeni düzenleme ve uygulamalar yapılmaktadır. Yapılan çalışmalar neticesinde Paris Memorandumu Liman Devleti denetimleri kapsamında Türk bayraklı gemiler Kara listeden 2006 yılında gri listeye 2008 yılında "Beyaz Liste' ye geçmeyi başarmıştır. Bahsedilen bu uygulamalardan birisi de Resmi Gazete' de, 7 Eylül 2016 tarih ve 29824 sayılı "Gemiadamları Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik"tir. Bu düzenlemede 31/07/2002 tarihli ve 24832 sayılı Resmî Gazete'de yayımlanan Gemiadamları Yönetmeliğinin bazı maddelerinde değişiklikler yapılmıştır. Bu değişikliklerden birisi de 2nci maddenin revize edilerek "gemiadamlarına uygulanacak disiplin işlemleri" ifadesinin eklenmesi olmuştur. O tarihe kadar gemiadamlarına yönelik "*disiplin işlemleri*" ifadesi ilk olarak bu yönergede geçmiştir. Bu durum yönergenin dikkat çeken noktalarından birisi olmasına neden olmuştur. Ulaştırma Denizcilik ve Haberleşme Bakanlığı (UDHB) tarafından ortaya konan bu düzenleme; "*gemiadamlarına ve denizcilik alanında faaliyet gösteren kılavuz kaptan, deniz trafik operatörü, denizci eğitimci ve profesyonel sualtı adamlarına uygulanacak idari yaptırımlara ilişkin usul ve esasları belirlemek"* için oluşturulmuştur. Bu sayede uluslararası gemilerde ve denizcilik sektörünün kara operasyonlarında görev alan Türk gemiadamlarının hizmetleri sırasındaki davranışlarının denetlenmesi amaçlanmaktadır. Ayrıca, gemiadamlarının mesleki anlamda yaptıkları hataların tespit edilerek, bu hata ve kusurların önüne geçilebilmesi için de idari yaptırımlıların uygulanması hedeflenmektedir. Bunun yanı sıra dünya denizlerinde Türk deniz ticaret faaliyetlerinin daha iyi bir seviyeye gelebilmesi ve PSC (Liman Devleti Kontrolü) kontrolleri esnasında gemiadamlarına bağlı tutulma ve cezaların en aza indirgenmesi de temel amaçlar arasındadır. Gemiadamlarına uygulanacak idari yaptırımlara ilişkin yönerge, mesleğin gerekliliklerinin yerine getirilmemesinden, sahte evrak ve belge düzenlemeye kadar çeşitli hüküm ve düzenlemeleri içermektedir. Bu düzenlemenin uygulanabilmesi amacıyla da Ulaştırma

Denizcilik ve Haberleşme Bakanlığı bünyesinde gemiadamları disiplin komisyonu kurulması kararlaştırılmıştır.

Ulusal ve uluslararası literatür incelendiğinde gemiadamları odaklı olmak üzere, değişik yöntem ve teknikler kullanılarak çeşitli bilimsel çalışmalara ulaşmak mümkünüdür. Buna ilişkin çalışmalar Ek 1'de özetlenmeye çalışılmıştır. Çalışmaların daha çok gemiadamlarının mesleki eğilim ve problemleri üzerinde olan çalışmalar olduğu görülmektedir. Yapılan bu çalışmada ise UDHB tarafından yürürlüğe konulan "Gemiadamlarına Uygulanacak İdari Yaptırımlara İlişkin Yönerge" ele alınmıştır. Bu kapsamda düzenlemenin uygulama aşamasında oluşturacağı etkiler, işleyişi, içeriğindeki maddelerin etkileri nicel yöntemler yardımı ile ortaya konulmaya çalışılmıştır. Yönerge kapsamında gemiadamlarına verilebilecek idari cezalar arasında bu durumlara yol açabilecek olan yatkınlıklar incelenmiştir. Ayrıca, Türk gemiadamlarının görev ihmallerinde en fazla hangi kural ihlali yapma olasılıkları ile ilgili görüşler sunulmaya çalışılmıştır. Yapılan çalışma ile Türk gemiadamlarının görevlerini eksik, kusurlu veya görevi kasten kötüye kullanmaları neticesinde alacakları cezaların önem dereceleri sıralanarak, bu cezaların gemiadamları tarafından hangilerinin daha caydırıcı ve önleyici bir algı oluşturduğu da değerlendirilmeye çalışılmıştır. Denizcilik alanında bu tarz idari yaptırımlar genel kamu düzeninin etkin ve doğru işleyişini gerçekleştirmek amacıyla caydırıcılık ve cezalandırıcılık özelliklerine göre oluşturulmuş (Erdinç, 2012:242) olmasının yanında hataların en aza indirilerek Türk deniz ticaretinin dünya piyasalarındaki verimliliği açısından da önem arz etmektedir. Bu noktadan yola çıkılarak ilgili yönergedeki idari cezalar Türk gemidamlarının yatkınlıkları göz önüne alınarak bir bulanık AHP tabanlı metodoloji oluşturularak değerlendirilmiştir. Elde edilen sonuçlar neticesinde yönergenin uygulama aşamasında ki başarısı ve etkinliği ile ilgili bir ön değerlendirme sunulması amaçlanmıştır. Ayrıca çalışmanın, bir bütün olarak düşünülmesi gereken deniz ticaretinin can damarlarından birisini oluşturan gemiadamlarına, meslek yaşantılarında karşılaşma ihtimali olan durumlar ile ilgili farkındalık oluşturulmasında da katkı sağlayacağı düşünülmektedir.

2. METODOLOJİ

Bu çalışmada "Gemiadamlarına Uygulanacak İdari Yaptırımlara İlişkin Yönerge" kapsamında, Türk gemiadamlarının mevcut uygulamaya bakış açıları temel alınarak, mesleki yaşantıları sürecinde idari ceza gerektiren fiillerin önem sıralamalarının analizi yapılmaya çalışılmıştır. Ayrıca düzenlemenin uygulamadaki etkinliği ve düzenlemeye karşı gelişen algının seviyesi konusunda da görüşler sunulmuştur. Bu amaçla

yönergede gemiadamlarına verilebilecek cezalar; "gemiadamına ihtar cezası verilecek haller", "gemiadamının yeterlilik belgesinin askıya alınmasını gerektirecek haller", "gemiadamının yeterlik belgesinin bir alt yeterliğe indirilmesi cezası verilecek haller" ve "gemiadamına yeterlik belgesinin iptali veya ilgilinin denizde çalışmaktan men edilmesi cezası verilecek haller" olmak üzere dört kısımda toplanmıştır. Çalışmada, gemiadamlarının karşılaşması durumunda mesleklerini yapamama veya mesleklerini bulunduğu pozisyonun daha altında bir seviyede yapmasını gerektiren ve meslek yaşantılarını doğrudan değiştirebilecek durumlar ele alınmıştır. Bu durumlar gemiadamlarının maddi ve manevi yönden çöküntü yaşamalarına sebebiyet verebilmektedir. Ayrıca çalışmada gemiadamlarının yeterlik belgesinin bir alt yeterliğe indirilmesi, yeterlik belgesinin iptali ve denizde çalışmaktan men edilmesi cezası verilecek haller"i oluşturan durumlar da ele alınmıştır. İncelenmesi planlanan bu kısımlar, çeşitli alt madde ve fiilleri içermektedir. Elde edilen tüm bu verilerin yorumlanabilmesi kişilerin öznel yargılarına başvurmayı gerekli kılmaktadır. Ayrıca verilerin farklı avantaj/dezavantaj sunmaları, birbirleri ile çakışan durumların bulunması, birbirleri ile olan etkileşimleri neticesinde klasik sayısal modelleme tekniklerinin etkinliğini düşürerek gerçek dünya ile uyumlu olmayan sonuçların çıkmasına neden olabilmektedir. Böylesi durum ve problemlerde literatürde de sıklıkla kullanılan bulanık çok kriterli karar verme yöntemlerinin tercih edilmesi daha doğru bir yaklaşım olarak gösterilmektedir (Liang, 1999; Tsaur vd. 2002; Ting vd. 2004; Pan, 2008; Özdemir, 2016; Gedik, 2017; Özdemir ve Güneroğlu, 2018). Bu nedenle de çalışmada literatürde sıklıkla farklı alanlarda uygulanan Buckley (1985) tarafından önerilen bulanık AHP metodunun ele alındığı bir analiz süreci tercih edilmiştir. Bu teknik sayesinde çalışmanın problemini oluşturan kriterlerin kendi içeresindeki ilişkileri, ağırlıklandırılmaları ve önem dereceleri tespit edilebilmiştir. Çalışmada kullanılan teknik aşağıda özetlenmeye çalışılmıştır.

2.1. Bulanık AHP

AHP yöntemi, ilk olarak 1968 yılında Myers ve Alpert tarafından ortaya çıkarılmış ve 1977'de ise Thomas Lorie Saaty tarafından bir model yaklaşımı olarak geliştirilmiştir. Saaty tarafından önerilen bu model daha sonra literatürde değişik uygulama ve yaklaşımlar ile kullanılan çok kriterli karar verme yöntemlerinden birisi haline gelmiştir. AHP yöntemi nitel ve nicel verilerin bir arada değerlendirilebildiği bir yaklaşım olarak kabul edilmektedir (Yaralıoğlu, 2001; Gülenç ve Bilgin, 2010; Kurdoğlu vd. 2016; Özdemir, 2016). Klasik AHP yöntemine göre bulanık AHP yöntemi; çok kriterli karar verme tekniklerinin temelinde yer alan,

belirsiz bir durum veya fazla sayıda tercih seçeneği içerisinde ideal olan çözüm yolunu karar verici grubun gerçek yaşamda olduğu gibi görüşlerini direk olarak aktarabilmesi imkânı sağlar (Pan, 2008: 959). Bu sayede uzmanlar iki alternatifi karşılaştırırken daha esnek davranabilerek ve sözel olarak da daha zengin ifadeleri kullanabilmelerine olanak sağlar. Bu durum sonuçların ve değerlendirmenin gerçek dünya ile uyumlu olmasına imkân tanır. Ayrıca ikili karşılaştırma sürecinin belirsiz yapısından dolayı uzmanlar yapacağı kıyaslamaları sabit bir değer olarak belirlemektense, bir aralık üzerinde ifade ederek ağırlıklandırılmanın daha tutarlı olmasını tercih etmektedirler (Zadeh, 1965; Liang, 1999; Ting vd. 2004; Gedik, 2017; Ayhan, 2018). Klasik matematik temelli sistemlerin modellenebilmesi, kısıtlamaları tam olarak belirlenemeyen ve kesin değerlere dayanan düşünme yerine belirsiz sistemleri içeren problematikler için karmaşık olabilmektedir. Bunun yerine, bulanık mantık temeli, hassas nicel analiz ve hesaplamalar kullanmadan insan bilgi ve tecrübelerinin çözüm sürecine dâhil edilerek uygulanabilir çözüm önerileri sunabilmeyi sağlar (Pham, 1997; Liang, 1999; Ramot vd. 2003:457; Wang ve Liang, 2004; Rocacher ve Bose, 2005; Özdemir, 2016; Özdemir ve Güneroğlu, 2018).

Bulanık AHP yönteminin literatürde değişik biçimlerde uygulamaları bulunmakta olup çalışmada ifadelerin bulanık duruma genişletilmesinin daha sade ve net olmasının yanında tek bir sonuca ulaşma imkânı sağlaması nedeni ile Buckley (1985) tarafından önerilen yaklaşım tercih edilmiştir.

Yöntemin uygulama aşamalarına göre öncelikler problemi oluşturan kriterler tespit edilir. Daha sonra, uzman görüşlerinin bulanık ifadeler şeklinde alınabilmesi için çalışmada kullanılacak ölçekler belirlenir. Üçüncü aşama olarak, kriterlerin önem derecelerinin hesaplanabilmesi için uzman görüşleri neticesinde elde edilen veriler sonucunda aşağıda gösterilen matris şeklindeki gibi her bir uzman için ayrı ayrı oluşturulur (Buckley, 1985).

$$C^k = \begin{bmatrix} 1 & \tilde{c}_{12} & \cdots & \tilde{c}_{1b} \\ \tilde{c}_{21} & 1 & \cdots & \tilde{c}_{2b} \\ \vdots & \vdots & & \vdots \\ \tilde{c}_{a1} & \tilde{c}_{a2} & & 1 \end{bmatrix}$$

Daha sonra karar verici gruptan toplanan sözel veriler önceden belirlenen skalaya göre üçgen bulanık sayılara dönüştürme işlemi gerçekleştirilir. Bu işlem için çalışmada kullanılan dilsel ifadeler ve bunların bulanık sayı karşılıkları Tablo 1'deki gibidir (Özdemir vd. 2017: 163).

Bir sonraki aşama olarak tüm uzman görüşlerinin değerlendirilmeye alınabilmesi için birleştirilmesi gerekmektedir. Literatürde bu işlem için farklı hesaplama yöntemleri bulunmakta olup çalışmada ağırlıklı ortalama yönteminden faydalanılmıştır. Buna ilişkin formül 1 aşağıdaki gibidir.

$$\tilde{C}_{ab} = \frac{z_1 C_{ab}^1 + Z_2 C_{ab}^2 \ldots\ldots\ldots\ldots Z_k A_{ab}^k}{Z_1 + Z_2 + \cdots\ldots\ldots\ldots\ldots + Z_k} \quad (1)$$

Tablo 1: Çalışmada Kullanılan Sözel Ölçek İfadeleri ve Üçgen Bulanık Sayı Karşılıkları

Sözel İfade	Bulanık Karşılık	Bulanık Sayıların Tersi
Satır Biraz Önemli	(1; 3; 5)	(0,200; 0,333; 1,000)
Satır Oldukça Önemli	(3; 5; 7)	(0,143; 0,200; 0,333)
Satır Çok Önemli	(5; 7; 9)	(0,111; 0,143; 0,200)
Satır Kesin Önemli	(7; 7; 9)	(0,111; 0,111; 0,143)
Eşit Önemli	(1; 1; 3)	(1; 1; 3)

Birleştirilmiş karar matrisinin elde edilmesinin ardından bulanık sayı ağırlıkları tespit edilir. Bu kısım 2 aşamada gerçekleştirilir. İlk aşama olarak elde edilen birleştirilmiş karar matrisinin her satırının geometrik ortalaması alınır. Bu işlem formül 2 yardımı ile gerçekleştirilir. Daha sonra formül 3 yardımı ile ağırlıklar belirlenir. Formül 3'deki "$\widetilde{w_i}$" değeri "i." kriterin bulanık ağırlığını ifade etmektedir.

$$\widetilde{b_i} = (\widetilde{a_{i1}} \otimes \widetilde{a_{i2}} \otimes \ldots \otimes \widetilde{a_{in}})^{1/n} \quad (2)$$

$$\widetilde{w_i} = \widetilde{p_i} \otimes (\widetilde{p_1} + \widetilde{p_2} + \cdots + \widetilde{x_n})^{-1} \quad (3)$$

Bulanık ağırlıkların elde edilmesinin ardından bulanık sayıların durulaştırılması ve normalizasyonu gerçekleştirilir. *C=(x,y,z)* bir üçgen bulanık sayı olmak üzere C'nin durulaştırılması formül 4 yardımı ile hesaplanır.

$$C = \frac{x+y+z}{3} \quad (4)$$

Daha sonra formül 5 yardımı ile normalizasyon işlemi gerçekleştirilir.

$$\left(w_i^L\right)^T = \frac{w_i^T}{\sum_{i=1}^{n} w_i^T} \quad (5)$$

Formül 5'deki " $\left(w_i^L\right)^T$ "i. ana kriterin normalize ağırlığı; n, ana kriter sayısını ifade etmektedir.

3. YAPILAN ÇALIŞMALAR VE ANALİZ

Çalışmada uzman grubun görüşlerinin alınabilmesi amacıyla problemi oluşturan kriterler "Gemiadamlarına Uygulanacak İdari Yaptırımlara İlişkin Yönerge"nin üçüncü bölümünde yer alan "*gemiadamının yeterlik belgesinin bir alt yeterliğe indirilmesi cezası verilecek haller*" ve "*gemiadamına yeterlik belgesinin iptali veya ilgilinin denizde çalışmaktan men edilmesi cezası verilecek haller*" kısmındaki tüm maddeler değerlendirmeye alınarak kriterler oluşturulmuştur. Buna göre çalışmanın da kullanılan kriterler Tablo 2'de gösterilmiştir.

Tablo 2: Çalışmada Kullanılan Kriterler

M1	Gemide bulunan personele yönelik istenmeyen uygunsuz cinsel içerikli söylemler gibi sözel veya fiziksel davranışlarda bulunmak.
M2	Diğer gemi adamlarından biri veya birkaçını organize ederek emre itaatsizlik, görevi ihmal etmek veya geminin seyrüseferine engel olmak.
M3	Geçerli bir mazereti olmaksızın gemiyi terk etmek.
M4	Gemiadamının herhangi bir kursa gitmeden, kendisini kursa gitmiş gibi göstererek ilgili gemiadamı belgelerini aldığının tespit edilmesi.
M5	Geçerli bir nedeni olmaksızın gemiye katılmayı veya sefere çıkmayı reddetmesi ya da geminin sefere hazırlanması ve sefere çıkmadan önceki herhangi bir 24 saatlik bölümünde gemide bulunmaması veya yeterli bir sebebi olmaksızın gemide olmaması veya görevini terk etmesi.
M6	Gemide yapması gereken görevi veya amirleri tarafından verilen görevleri mesleki yetersizlik nedeniyle yerine getirememesi.
M7	Kasten ve makul sebep olmaksızın gemiye hasar vermek, gemideki herhangi bir mala zarar vermek veya gemideki herhangi bir malı denize atmak.
M8	Gemiadamı sözleşmesi tamamlanmadan geminin limandan ayrılmasından sonra haksız olarak iş bırakması.
M9	Kaçakçılık yaptığının mahkeme kararı ile tespiti.

Kriterlerin uzman grup tarafından değerlendirilebilmeleri için ikili karşılaştırma matrisleri elektronik ortamda düzenlenerek 21 kişiden oluşan uzman gruba sunulmuş ve görüşleri sözel bulanık ifadeler şeklinde alınmıştır. Uzman grup sayısı oluşturulurken literatürde herhangi bir kısıtlama olmayıp, genel olarak alt limitin 5 olması beklenmektedir (Liang, 1999; Pan, 2008; Özdemir, 2016; Ekşili vd. 2017). Uzman grubun değerlendirmeyi yaparken, gemiadamı, akademisyen ve yönetici grubunda bulunan kişilerin; gemide karşılaşılma olasılığı daha yüksek, vuku bulan durumları göz önünde bulundurulmaları istenir iken, hukukçu grubunda yer alan kişilere ise idari ve hukuksal açıdan karşılaşılma durumlarını göz önünde bulundurmaları talep edilmiştir. Uzman grup belirlenirken çalışmanın konusunu oluşturan gemi idaresi ve yönetiminin yanında hukuksal açıdan bir değerlendirme ihtiyacı ortaya çıkması nedeni göz önünde bulundurulmuştur. Bu nedenle 12 gemiadamı, 3 gemi tecrübesine sahip akademisyen ve 3 denizcilik firmalarının personel bölümünde görev yapan kişilerden oluşturularak, gemi yönetimi ve idaresine ilişkin görüş, tecrübe ve kazanımlarının alınabilmesi amaçlanmıştır. Bunun yanında hukuksal ve teknik açıdan değerlendirmenin yapılabilmesi içinde 3 kişiden oluşan hukukçu katılımcıya yer verilmesi düşünülmüştür. Uzman grubun probleme yönelik değerlendirmelerinde kişisel yaşam ve mesleki deneyimleri, yargıları ve sezgilerinin objektif bir şekilde sağlanabilmesi amaçlanmıştır. Uzman gruba ait detaylı bilgiler Tablo 3'deki gibidir.

Tablo 3: Uzman Grup Profili

Uzman Kişi Sayısı ve Pozisyonu	**AÇIKLAMA**
Gemiadamı (12 Kişi)	5 kişi uzakyol kaptan yeterliliğine sahip olup denizde halen aktif olarak konteyner, tanker ve kuru yük tiplerindeki gemilerde çalışmaktadırlar. Uzakyol kaptan yeterliliğindeki 4 kişinin denizde ortalama çalışma süresi 12 yıl olarak tespit edilmiştir. 3 kişi uzakyol birinci zabit yeterliliğine sahip konteyner ve tanker tipi gemilerde aktif olarak çalışan kişilerden oluşmaktadır. Uzakyol birinci zabit yeterliliğine sahip 3 kişinin denizde ortalama çalışma süresi 6 yıl olarak tespit edilmiştir. 4 kişi uzakyol başmühendis yeterliliğine sahip olup denizde halen kuruyük ve konteyner tipindeki gemilerde aktif olarak çalışmaktadırlar. Uzakyol başmühendis yeterliliğine sahip 4 kişinin denizde ortalama çalışma süreleri 10 yıl olarak tespit edilmiştir.
Akademisyen (3 Kişi)	1 kişi uzakyol kaptan yeterliliğine sahip olup bir üniversite bünyesinde doçent unvanı ile çalışmaktadır. Diğer 2 kişi ise uzakyol kaptan yeterliliğine sahip olup farklı üniversitelerde doktor öğretim üyesi unvanında görev yapmaktadırlar.
Hukukçu (3 Kişi)	Farklı hukuk fakülteleri bünyesinde ilgili konuya benzer özellikte çalışmaları bulunan Doç. Dr. ve Dr. Öğretim Üyesi unvanlara sahip öğretim üyeleri.
Yönetici (3 Kişi)	Denizcilik firmalarında gemi personeli departmanı bölümünde insan kaynakları pozisyonunda görev alan kişilerden oluşmaktadır. 3 kişinin 2'si uzakyol kaptan yeterliliğine sahip iken 1'si uzakyol birinci zabit yeterliliğindedir. 3 kişinin denizde ortalama çalışma süresi 8 yıl olarak belirlenirken, denizcilik firmasında ortalama çalışma süreleri 4 yıl olarak tespit edilmiştir.

Daha sonra uzman gruptan elde edilen sözel ikili karşılaştırma verileri Tablo 1'deki değerler yardımı ile "*9x9"* boyutunda 21 adet matrise dönüştürülmüştür. 21 adet matrisin birleştirilebilmesi için ağırlıklı ortalama yönteminin ifade edildiği formül 1'den yararlanılmıştır. Çıkan sonuçlar Tablo 4'deki gibi hesaplanmıştır. Tablo 4'deki değerler birleştirilmiş bulanık karar matrisine ait üçgen bulanık sayıları ifade etmektedir.

Tablo 4: Kriterler için Birleştirilmiş Bulanık Karar Matrisi

	M1	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**	**M9**
M1	1,000 1,000 1,000	0,398 0,621 0,901	0,148 0,214 0,687	0,685 0,721 0,795	0,459 0,521 0,914	1,325 1,874 1,962	0,257 0,369 0,398	0,148 2,145 3,362	1,624 2,310 3,205
M2	0,387 1,147 1,687	1,000 1,000 1,000	0,985 1,214 2,301	1,698 1,810 3,145	0,687 1,120 1,687	0,647 1,379 2,310	0,675 1,325 3,014	0,241 0,745 2,378	0,361 0,624 1,398
M3	1,078 2,056 3,203	0,724 0,932 1,325	1,000 1,000 1,000	0,178 0,875 0,961	0,912 1,321 3,010	0,478 0,632 0,740	0,081 0,698 3,145	0,361 0,810 1,340	1,351 1,456 3,145
M4	0,968 2,178 4,624	1,198 2,358 3,014	1,202 1,698 3,201	1,000 1,000 1,000	0,874 0,963 4,123	0,369 0,452 0,895	0,624 0,862 1,301	1,125 1,387 1,434	0,175 0,638 2,014
M5	1,319 1,485 1,985	0,985 1,651 3,214	0,547 0,867 1,269	0,304 1,274 2,312	1,000 1,000 1,000	1,348 1,741 2,021	0,914 1,256 3,145	0,329 0,717 0,920	0,621 0,752 1,214
M6	0,398 0,874 1,682	0,368 0,674 2,365	0,378 1,597 3,145	0,569 1,314 1,785	2,351 2,415 3,321	1,000 1,000 1,000	0,514 0,620 1,320	0,361 1,092 1,374	0,145 0,314 1,045
M7	1,325 1,687 2,041	1,231 1,329 1,477	0,985 0,994 2,304	0,632 0,710 0,825	1,368 2,361 4,321	0,951 1,254 3,145	1,000 1,000 1,000	0,593 0,635 0,639	0,188 0,621 3,045
M8	0,687 0,756 0,962	0,856 0,915 0,969	1,147 1,320 1,632	1,369 1,420 1,521	0,965 0,998 1,324	0,148 0,698 0,847	0,874 0,952 3,145	1,000 1,000 1,000	1,368 1,412 2,321
M9	1,098 1,321 1,578	0,128 0,874 1,303	0,423 0,659 0,981	0,874 0,911 1,121	1,326 1,451 2,014	1,145 1,360 2,841	1,025 2,014 2,365	0,280 1,214 1,369	1,000 1,000 1,000

Birleştirilmiş bulanık karar matrisinin hesaplanmasından sonraki kısım, iki aşamadan oluşan kriterlerin ağırlıklarının belirlenmesi aşamasıdır. Formül 2 ve formül 3 yardımı ile hesaplanan ağırlıklandırılmış bulanık karar matrisi sonuçları Tablo 5'deki gibi bulunmuştur. Tablo 5'de ağırlıklandırılmış bulanık karar matirisini oluşturan değerler yer almaktadır.

Tablo 5: Ağırlıklandırılmış Bulanık Karar Matrisi Değerleri

Ağırlıklandırılmış Karar Matrisi			
M1	0,124	0,345	0,614
M2	0,045	0,248	0,365
M3	0,156	0,358	0,712
M4	0,135	0,471	0,521
M5	0,214	0,324	0,452
M6	0,514	0,610	0,841
M7	0,075	0,145	0,387
M8	0,341	0,521	0,621
M9	0,211	0,357	0,412

Ağırlıklandırılmış bulanık karar matrisi elde edildikten sonra formül 4 yardımı ile durulaştırma işlemi yapılmıştır. Daha sonrada bu değerler formül 6 yardımı ile normalize edilmiştir. Normalizasyon işlemi sonrasında hesaplanan değerler Tablo 6'daki gibidir. Tablo 6'da normalizasyon değerleri ve önem dağılımlarına ilişkin yüzde değerleri yer almaktadır.

Tablo 6: Normalizasyon Değerleri

Kriterler	**Normalizasyon**	**%**
M1	0,148333333	14,83
M2	0,124333333	12,43
M3	0,091333333	9,13
M4	0,110333333	11,03
M5	0,118333333	11,83
M6	0,128333333	12,83
M7	0,107333333	10,73
M8	0,097333333	9,73
M9	0,074333333	7,43
∑	**1**	**100**

4. SONUÇ VE ÖNERİLER

Yapılan çalışma ile Türk gemiadamlarının ilgili yönerge kapsamında, idari ceza alarak yeterliklerinin bir alt seviyeye düşürülmesi veya yeterliklerinin ellerinden alınmasına neden olabilecek uygunsuz davranışların önem dağılımları tespit edilmeye çalışılmıştır. Çalışma gemiadamlarının bahsi geçen uygunsuz eylemlere olan yatkınlığını ve bu durumların gemi ve hukuki açıdan karşılaşılma sıklığına yönelik durumlarını ortaya koymaktadır. Çalışma sonuçlarına göre önem sıralaması; %14,83 ile M1 (Gemide bulunan personele yönelik istenmeyen uygunsuz cinsel içerikli söylemler gibi sözel veya fiziksel davranışlarda bulunmak), %12, 83 ile M6 (Gemide yapması gereken görevi veya amirleri tarafından verilen görevleri mesleki yetersizlik nedeniyle yerine getirememesi), % 12,43 ile M2 (Diğer gemi adamlarından biri veya birkaçını organize ederek emre itaatsizlik, görevi ihmal etmek veya geminin seyrüseferine engel olmak), %11,83 ile M5 (Geçerli bir nedeni olmaksızın gemiye katılmayı veya sefere çıkmayı reddetmesi ya da geminin sefere hazırlanması ve sefere çıkmadan önceki herhangi bir 24 saatlik bölümünde gemide bulunmaması veya yeterli bir sebebi olmaksızın gemide olmaması veya görevini terk etmesi), % 11,03 ile M4 (Gemiadamının herhangi bir kursa gitmeden, kendisini kursa gitmiş gibi göstererek ilgili gemiadamı belgelerini aldığının tespit edilmesi), % 10,73 ile M7 (Kasten ve makul sebep olmaksızın gemiye hasar vermek, gemideki herhangi bir mala zarar vermek veya gemideki herhangi bir malı denize atmak), %9, 73 ile M8 (Gemiadamı sözleşmesi tamamlanmadan geminin limandan ayrılmasından sonra haksız olarak iş bırakması), %9, 13 ile M3 (Geçerli bir mazereti olmaksızın gemiyi terk etmek) ve %7,43 ile M9 (Kaçakçılık yaptığının mahkeme kararı ile tespiti) olarak tespit edilmiştir.

Uzman görüşleri neticesinde yapılan değerlendirmeler sonucunda, gemiadamlarının yaptıkları veya yapma ihtimallerinin daha yüksek olan uygunsuz davranışlar arasında en önemli kriterin M1 (Gemide bulunan personele yönelik istenmeyen uygunsuz cinsel içerikli söylemler gibi sözel veya fiziksel davranışlarda bulunmak) olduğu belirlenmiştir. Gemi ortamının fiziksel çevresi ve denizcilik mesleğinin doğasında bulunan zorlu ve ağır çalışma süreci gemiadamlarında; mesleki tükenmişlik, yıpranma, psikolojik baskı altında hissetmeye neden olabilmektedir. Buna bağlı olarak ortaya çıkan yüksek stres seviyeleri gemi içerisinde bazı durumlarda; tartışma, diğer bireyler ile anlaşamama, çatışma gibi olaylar neticesinde her ne kadar istenmeyen bir durum olsa da sözlü veya fiziksel tacizlerin yaşanmasına sebebiyet verebilmektedir. Bu durum ise gemi çalışma ortamındaki performans ve huzurun kaçmasının yanında

sadece bu eylemi yapan/maruz kalan değil tüm gemi personelinin olumsuz etkilenmesine neden olmaktadır. Bu eylemi gerçekleştiren gemiadamı, gemiadamları disiplin komisyonu tarafından verilecek olan karar neticesinde yeterliliğinin elinden alınması cezasına çarptırılabilmektedir. Bu ceza bir gemiadamı için verilebilecek en ağır cezalar arasında sayılabileceğinden ilgili yönerge sayesinde bu tarz davranışların gemilerde vuku bulmasındaki sayının düşeceği tahmin edilmektedir.

Çalışma sonuçlarına göre bir diğer önemli etkeni ise M6 (Gemide yapması gereken görevi veya amirleri tarafından verilen görevleri mesleki yetersizlik nedeniyle yerine getirememesi) kriteri oluşturmaktadır. Gemide verilen bir görevi veya sorumluluğunda ki işi mesleki açıdan yetersiz olması nedeni ile yapamaması neticesinde ise idare tarafından gemiadamının yeterliğinin bir alt seviyeye düşürülmesi istenmektedir. Yoğun iş yükü ve prosedürlerin yer aldığı gemideki iş süreçlerinin eksiksiz ve sistematik şekilde yürüyebilmesi için her bir personelin görevini eksiksiz olarak yerine getirmesi gerekir. Aksi halde sistem sekteye uğrayarak sürecin durmasına neden olabilir. Eğer bir gemiadamı mesleğine haiz değilse ve bu şekilde gemide çalışmaya devam ediyor ise teoride mümkün olmasa da bu kişinin iş yükünü gemideki bir başka personel üstlenmek durumunda kalacaktır. Bu durum zaten kısıtlı sürede dinlenme ve istirahat imkânı bulan gemi personelini hem fiziksel hem de psikolojik açıdan yoracaktır. Ayrıca bu durum potansiyel kazalara da davetiye çıkaracaktır. Nasıl ki cerrahi bilgisi olmayan bir doktorun hastasını ameliyat etmesi kaçınılmaz bir sonu hazırlıyorsa gemiadamı için de bu durum aynıdır. Verilecek cezalar neticesinde bu durumların önüne geçilebilmesi amaçlanmaktadır.

Sonuçlara göre önem sıralamasına göre üçüncü sırada yer alan M2 (Diğer gemi adamlarından biri veya birkaçını organize ederek emre itaatsizlik, görevi ihmal etmek veya geminin seyrüseferine engel olmak) kriteri ise gemi düzeninin bozularak kargaşa ortamının doğmasına neden olabilir. Gemideki hiyerarşik düzenin gerekliliği denizcilik eğitimi alan kişiler açısından eğitimleri boyunca giydikleri üniforma ve okul kurallarından başlayarak gemiye ilk adım attıkları ana kadar devam eden elzem bir ihtiyaçtır. Gemideki bu yapının kasten bozulması gemideki iş süreçlerinin bozulmasından, kazalara kadar birçok boyutta istenmeyen durumların oluşmasına sebebiyet verebilir. Bu davranışlarda bulunan kişilere idare tarafından kişinin yeterliğinin iptal edilmesi cezası verilmekte olup davranışın önüne geçilmesi istenmektedir.

Çalışmaya göre önemli bir diğer nokta ise gemiadamlarına mevcut bu yönerge maddelerinin bildirimi sağlanarak karşılaşabilecekleri durumların farkında olmaları sağlanmalıdır. Aksi halde birçok gemiadamı neyin suç neyin suç olmadığının farkında bile olamayacaktır. İlk bakışta basit gibi duran sözlü bir sataşma, aslında gemiadamının yeterliğinin iptal edilerek yıllarca ulaşmak için harcadığı çabaların yok olmasına neden olabilmektedir. Bu durum kişinin kendisine zarar verdiği gibi Türk denizciliğini de dolaylı da olsa olumsuz yönde etkileyebilmektedir.

Çalışma sonuçları genel olarak ele alındığında, gemiadamları kaynaklı sorunların önüne geçilerek denizcilik sektörünün gelişmesine nasıl katkı sağlanacağı sunulmaya çalışılmıştır. Çalışma hem konu olarak hem de kullanılan yöntem modelinin benzerinin, denizcilik odaklı çalışmalarda araştırmacılara yol gösterici olacağı düşünülmektedir. Ayrıca, meslek odaklı insan kaynakları yönetiminde çalışmada da tercih edilen ÇKKV yöntemlerine dayalı analitik yaklaşımların uzun vadede verimliğin artmasına katkı sağlayacağı da düşünülmektedir.

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Ek 1: Geçmiş Yıllara Ait Gemiadamı Odaklı Yapılan Çalışmalar

Yazar	Yıl	Eser	Yöntem	Amaç
Parker, C.J.	2001	Shipping and the human factor	Derleme	Denizcilikte insan hatalarının tespiti.
Brett, V. ve Roe, M.	2003	A cluster analysis of the maritime sector in Norway	Küme analizi	Norveç'teki denizcilik sektörü ve gemiadamlarının kümelenme açısından analizi.
Arslan, Ö.	2006	Türk Gemi Adamları İçin İnsan Kaynakları Yönetimi	Deneysel veri toplama	Türkiye'deki mevcut gemi adamı arz ve talebinin araştırılması.
Terry, W.C.	2009	Working on the Water: On Legal Space and Seafarer Protection in the Cruise Industry	Veri toplama	Yolcu gemilerinde çalışan Filipinli gemiadamlarının istihdam ve mevcut haklarının incelenmesi.
Ellis, N., Sampson H. ve Wadsworth, E.	2011	Fatalities at Sea	Veri Analizi	Gemiadamlarına yönelik mesleki yorgunluğun irdelenmesi.
Magramo, M. ve Eler, G.	2012	Women Seafarers: Solution to Shortage of Competent Officers?	Anket ve mülakat yöntemine dayalı veri toplama	Kadınların denizcilik mesleğine katılımlarının belirlenmesi.
Simons, SA.	2013	Ships as "total Institutions". Acculturating seafarers for a Global Political economy.	Kavramsallaştırma yaklaşımı	Gemiadamlarının sosyal etkileşimlerini ve buna ilişkin düzenlemelerin analizi.
Nas, S.	2014	Profesyonel Türk Kadın Denizcilerinin Kısa Tarihsel Süreci Üzerine Bir Araştırma	Veri toplama, mülakat yöntemi	Türk kadınlarının denizcilik mesleğindeki kariyerlerinin incelenmesi.
Özdemir, Ü. ve Güneroğlu, A.	2015	Strategic Approach Model for Investigating The Cause of Maritime Accidents	Bütünleşik çok kriterli karar verme teknikleri	Deniz kazalarında insan hataları payının araştırılması.
Sertkaya, Y.	2015	Vardiya Zabitliğinde Yeterlilik Kriterleri	Değerlendirme	Vardiya zabitliğinde aranan yeterlilik kriterlerinin değerlendirilmesi.
Kum,S. ve Boşnak, T.	2015	Türk Gemiadamlarının Beslenmesi Üzerine Nitel Bir Araştırma	Anket yöntemi	Türk gemiadamlarının gemide beslenme alışkanlıklarının belirlenmesi.
Jepsen, R.J., Zhao, Z. ve Leeuwen, W.M.A	2015	Seafarer Fatigue: A Review of Risk Factors, Consequences for Seafarers' Health and Safety and Options for Mitigation	Literatür taraması	Denizcilere ilişkin yorgunluk ve buna neden olan faktörlerinin incelenmesi.
Özdemir, Ü. ve Güneroğlu, A.	2015	Strategic Approach Model for Investigating The Cause of Maritime Accidents	Bütünleşik çok kriterli karar verme teknikleri	Deniz kazalarında insan hataları payının araştırılması.
Sertkaya, Y.	2015	Vardiya Zabitliğinde Yeterlilik Kriterleri	Değerlendirme ve analiz	Vardiya zabitliğinde aranan yeterlilik kriterlerinin değerlendirilmesi.
Kum, S. ve Boşnak, T.	2015	Türk Gemiadamlarının Beslenmesi Üzerine Nitel Bir Araştırma	Anket yöntemi	Türk gemiadamlarının gemide beslenme alışkanlıklarının belirlenmesi.
Özdemir, Ü., Güneroğlu, A., Yazır, D. ve Çetin, M.S	2016	Determining Reasons of Decommissioning In a Short Span Tıme for Seafarers wıth Dematel Method	DEMATEL tekniği	Gemiadamlarının mesleği bırakma sebeplerinin araştırılması.
Özdemir, Ü.	2016	Bulanık DEMATEL ve Bulanık TOPSIS Yöntemleri Kullanılarak Limanlarda Yaşanan İş Kazalarının İncelenmesi	Bulanık DEMATEL yöntemi	Limanlarda yaşanan meslek kazalarının incelenmesi.

Ek 1: Geçmiş Yıllara ait Gemiadamı Odaklı Yapılan Çalışmalar (Devam)

Yazar	Yıl	Eser	Yöntem	Amaç
Nas, S., Fışkın,R. ve Çakır, E.	2017	The Current Profile of Merchant Marine Officers' Manpower in Turkey	Veri toplama	Ticaret gemilerinde çalışan Türk zabitanlarının detaylı bir profilinin oluşturulabilmesi.
Özdemir, Ü., Altınpınar, İ. ve Demirel, F.B.	2017	Investigation of Occupational Accidents on Board with Fuzzy AHP Method.	Bulanık AHP	Gemiadamlarının gemilerde karşılaştıkları yaşanan iş kazalarının incelenmesi.
Duan, ZL., Cao, H., Ren, G., Zhang, JD.	2017	Assessment Method for Engine-Room Resource Management Based On Intelligent Optimization	İnsan-gemi sistem modeli ve akıllı tabanlı bir değerlendirme optimizasyonu	Gemi makinalarındaki insan hatalarına neden olan hataları azaltmaya yönelik model önerisi sunmak.
Gedik, N.	2017	Gemilerde Elektro-Teknik Zabiti Olarak Çalışacak Kişiler için Mesleki Yeterlik Ölçütlerinin Bulanık AHP Yöntemiyle Değerlendirilmesi	Bulanık AHP	Elektro-teknik zabitlerine yönelik mesleki ölçütlerin incelenmesi.
Nas, S., Fışkın,R. ve Çakır, E.	2017	The Current Profile of Merchant Marine Officers' Manpower in Turkey	Veri toplama	Ticaret gemilerinde çalışan Türk zabitanlarının detaylı bir profilinin oluşturulabilmesi.
Özdemir, Ü., Altınpınar, İ. ve Demirel, F.B.	2017	Investigation of Occupational Accidents on Board with Fuzzy AHP Method.	Bulanık AHP	Gemiadamlarının gemilerde karşılaştıkları yaşanan iş kazalarının incelenmesi.
Duan, ZL., Cao, H., Ren, G., Zhang, JD.	2017	Assessment Method for Engine-Room Resource Management Based On Intelligent Optimization	İnsan-gemi sistem modeli ve akıllı tabanlı bir değerlendirme Optimizasyonu	Gemi makinalarındaki insan hatalarına neden olan hataları azaltmaya yönelik model önerisi sunmak.

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A JOB SATISFACTION RESEARCH ON SEAPORTS

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ABSTRACT

Job satisfaction theories are based upon motivation theories of researchers like Maslow, Herzberg and Adams. There are many studies in literature to underline the importance of job satisfaction of workers and managers on organizational success, especially in service industries.

The Minnesota Satisfaction Questionnaire has been frequently used to evaluate job satisfaction in literature. The 20-item short form of the questionnaire has been used to calculate the intrinsic, extrinsic and general satisfaction scores, and to examine the relation between selected demographic factors and job satisfaction. 47 usable responses (92.15%) have been collected from a total of 51 managers and white collar workers on the subject seaport. The reliability of the research depending on the Cronbach's Alpha value is rather high (0.915).

The findings suggest that the general (3.87) and intrinsic (3.96) satisfaction scores of the sample are high (>0.75) and the extrinsic (3.73) satisfaction is average being very close to high. The hypothesis tests (t-tests and ANOVA) suggest gender, education on maritime transportation, general education level and the time employed affect job satisfaction. The research contributes to the related literature with its findings related to job satisfaction on Turkish port management companies.

Keywords: *Job Satisfaction, Intrinsic and Extrinsic Satisfaction, Minnesota Satisfaction Questionnaire, Port Management, White Collar Workers and Managers.*

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LİMANLARDA İŞ TATMİNİ ÜZERİNE BİR ARAŞTIRMA

ÖZET

İş tatmini kuramları Maslow, Herzberg, Adams gibi araştırmacıların motivasyon kuramlarından geliştirilmiştir. Özellikle hizmet sektöründe işletmelerin başarısını etkileyen unsurlar arasında, çalışan ve yöneticilerin yaptıkları işten duydukları tatminin önemini ortaya koyan çok sayıda araştırma bulunmaktadır.

Literatürde iş tatminini ölçmek için Minnesota İş Tatmin Ölçeği (Minnesota Satisfaction Questionnaire) sıklıkla kullanılmıştır. Araştırmada bu ölçeğin yirmi maddelik kısa formu kullanılarak iç tatmin, dış tatmin ve genel tatmin puanları bulunmuş ve seçilen demografik özelliklerle iş tatmini arasındaki ilişki incelenmiştir. Bir liman işletmesindeki beyaz yakalı çalışanlar üzerinde gerçekleştirilen araştırmada 51 yönetici ve çalışandan 47 kullanılabilir yanıt alınmıştır (%92,15). Cronbach's Alpha değeri ile ölçülen ölçek güvenilirliği (0,915) oldukça yüksektir.

Araştırma bulguları örneklemin genel (3,87) ve içsel (3,96) doyum puanlarının yüksek (>0,75), dışsal (3,73) doyum puanının ise yükseğe oldukça yakın bir ortalamada olduğunu göstermektedir. Örneklemin iş tatmininde içsel unsurların daha ön planda olduğu görülmektedir. Yapılan hipotez testleri (t-testi ve ANOVA) cinsiyet, sektörle ilgili eğitim almış olma, genel eğitim seviyesi ve örgütte çalışma süresinin iş tatminini anlamlı seviyede etkilediğini ortaya koymaktadır. Araştırma Türk liman işletmelerinde iş tatminine yönelik bulguları ile literatüre katkı sağlamaktadır.

Anahtar Kelimeler: *İş Tatmini, İçsel ve Dışsal Tatmin, Minnesota İş Tatmin Ölçeği, Liman İşletmeleri, Beyaz Yakalı Çalışanlar ve Yöneticiler.*

1. INTRODUCTION

As the managers are working with people, a group of researchers and authors have handled the management thought by focusing on the people of the organization (Robbins and Coulter, 2012: 32). As a consequence, researches regarding the human side of the organizations have found place in the scientific literature. A vast part of the early researches have focused to understand the feelings regarding to work and to explain the factors that motivate people to work. The motivation theories have affected the systematic researches on job satisfaction. Despite being theories of motivation Maslow's theory of human needs (1943; 1948) Herzberg's two factor theory (1959; 1967) and Adam's equity theory (1963) are the preliminary researches to study job

satisfaction (Toker, 2007). These theories are still of importance and used in job satisfaction researches (Yelboğa, 2007: 2).

The subject of this research is job satisfaction of workers at a seaport. There is a common acceptation that businesses cannot have satisfied customers without having satisfied workers (Baran and Arabelen, 2017). In scope of this research, job satisfaction scores and the effects of demographics on job satisfaction have been examined using a survey form developed from the MSQ (Minnesota Satisfaction Questionnaire). The research group is set as the white collar workers and managers. The findings of the of the research suggest the general and intrinsic job satisfaction scores are high whereas the extrinsic job satisfaction is average being very close to high. The results of the t-tests and ANOVA tests suggest gender, education level, specific education on port and maritime business and the duration of employment at the organization have significant effects on job satisfaction.

2. JOB SATISFACTION

Locke (1976) defines job satisfaction as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences". According to Davis (1988), job satisfaction is the satisfaction or dissatisfaction of workers about their jobs (Davis, 1988; Akçadağ and Özdemir, 2005). Job satisfaction, in general, is the positive or negative attitude of a person towards his job. The positive emotional state will create job satisfaction where the negative emotional state will lead to job dissatisfaction (Erdoğan, 1999). It can be argued that the job satisfaction occurs when the job preferences and workers' expectations match, and the negative attitudes related to work can lead to job dissatisfaction (Yelboğa, 2007).

Brown and Hunning (2010) define job satisfaction as the happiness the employees attain by doing their jobs, and emphasis its importance for organizations due the relation between job related stress and turn over. There is a relation between job satisfaction and intention to quit the work, and efficiency (Tütüncü, 2002). Job satisfaction is of a critical value for all organizations as it represents the workers' organizational commitment and is an indicator for personnel turnover rate (Yücel and Bektaş, 2012; Rageb et al, 2013). Psychologists working on organizations imply job satisfaction is a key factor for organizational stability, job loss and employee discontinuity (Akdoğan and Köse, 2012). O'Reilly et al (1991) and Bass (1998) have studied the relation between job satisfaction and organizational culture, discovering a higher level of job satisfaction

through stronger organizational commitment within organizations with a strong culture (Jusoh et al., 2011: 518).

Job satisfaction is not related solely to the internal factors within the organization. Some of the reasons and results of job satisfaction are interrelated to factors outside the organization where the job is actually done. It arises upon the perception of the individual on the capacity of the work and work place to meet his expectations, and comprises the effects of the external factors (Stebbins, 2011); lays the groundwork for the organization to achieve its goals and also contributes to the society by improving the physical and mental welfare of the individuals. In terms of business management employees' job satisfaction improves organizational commitment, decreases the speed of the turnover and helps maintaining job peace (Akçadağ and Özdemir, 2005: 191). Karslı and İskender (2008) argue the existence of a linear and positive relation between motivation and job satisfaction, job satisfaction and organizational commitment, and job satisfaction and high level of efficiency. It is determined that companies with a high level of employee job satisfaction have 38% higher customer satisfaction, 22% higher efficiency and make 27% more profit (Hagemann, 1997; Akçadağ and Özdemir, 2005).

Brown and Hunning (2010) argue individuals with learning orientation may tend to have job satisfaction without internal motivation. The satisfaction arises from orientation to learn rather than interest in the job done. The findings of the research accentuate performance concern might prevent enjoying the job through fear fail even for individuals with high internal motivation. According to the findings of a study on tourism related labor-intensive services, employees with higher educational degree can adopt changes in their work conditions more quickly, and vocational education has positive effects on employees in means of enjoying their jobs (Akçadağ and Özdemir, 2005). The study also suggests employees who had vocational education are more committed to their work and work place and female employees can adopt to changes faster than the males. The study of Akdoğan and Köse (2012) on police organizations apprises the presence of a significant relation between job title and job satisfaction, and an increasing significance level upon participation.

3. CONCEPTUAL FRAMEWORK AND THE DESIGN OF THE STUDY

The subject of this study is job satisfaction of seaport employees and managers. Infrastructure and superstructure components are the most fore coming investments for seaports but the importance of employees and managers cannot be neglected. Human resources management at the seaports has an important role on organizational efficiency and a sound management (Prakash, 2015: 23). Job satisfaction is accepted as an important element to obtain customer satisfaction (Pantouvakis and Bouranta, 2013: 186). A research on maritime transportation in Egypt reveals job satisfaction improves motivation; higher levels of motivation positively effects productivity and performance, and employees' ability to think and act smart (Abd-El-Salam et al., 2013: 44). In the scope of this research the general, intrinsic and extrinsic job satisfaction scores have been measured and the effects of selected demographics (gender, age, education, vocational education and time employed) on job satisfaction have been investigated.

The seaports have a vital role in international trade and handle approximately 80% of the world trade (Prakash, 2015: 23). Traditionally seaports are accepted as interfaces between different transportation modes (Karataş Çetin and Cerit, 2010: 200). Factors like the diversity in vessel and cargo types served, the differences regarding geographical locations, the variety of cargo handling equipment or the administrative and legal issues keep extending the boundaries of this general acceptance. It is not possible to give a common definition to cover the ultimate properties of all the seaports and there are important variations between any two (Çetin, 2011; Esmer and Karataş Çetin, 2013). Therefore, this study is designed to examine a single port management company as a case. Collecting data from a number of port management companies might still lead to meaningful findings, but the differences stated above would complicate to evaluate the findings unless the sample was close to cover the research universe. Problems regarding to running scientific researches on port management companies (as further explained in details at the constraints of the study) makes it rather difficult, if not impossible to work on such a large sample of various port management companies.

3.1. Data Collection Tool

MSQ is the most preferred tool to measure job satisfaction in academic studies (Toker, 2007; Karaman, 2010: 64) and the scale's

validity and reliability have been attained in a vast number of countries (Pınar et al., 2008). The scale was created by Weiss in 1967 in a 100 items long form and a 20 items (see Table 7.) short form (Weiss et al., 1967: 1). The short form has been translated to Turkish by Baycan in 1985 (Karaman, 2010: 64), and validity and reliability (*Cronbach's alpha* = 0.77) studies were held (Yelboğa, 2007: 6). As seen in Table 1., the total of twenty items measure the overall job satisfaction whereas 12 of them measure the intrinsic sub-dimension and 8 items are related to extrinsic job satisfaction (Weiss et al., 1967: 4, Yelboğa, 2007: 7; Karaman, 2010: 66). The answers are collected with a Likert scale from 1 to 5 (1 being minimum, and 5 being maximum). The survey form has been finalized by adding the items to collect demographic information.

Table 1: Sub-Dimensions of the MSQ

Intrinsic Job Satisfaction Items	**Extrinsic Job Satisfaction Items**
1, 2, 3, 4, 7, 8, 9, 10, 11, 15, 16, 20	5, 6, 12, 13, 14, 17, 18, 19

3.2. The Research Group and Data Collection

The research has been held on the white collar workers of a Turkish port management company. Job satisfaction researches on blue collar workers in Turkey show career improvement possibilities and payments are not contained within the factor groups. This consequence possibly is arising from the lack of expectation to be promoted or get paid higher than the minimum wage. The work itself seems to be the most important factor to determine job satisfaction (Pınar et al., 2008). Without the expectation of advancement on the job, or to get paid higher than the set minimum wage, the workers feel satisfied if their perception regarding the working conditions is positive. This gives the foundation of setting the research group and the content of this research limited with the white collar workers. There are some additional factors that led to excluding the blue collar workers. The education level of the blue collar workers is not high, most of them being graduated from the primary school, only. Findings of the prior researches held by the HR department and consultancy companies suggest that the low level of education might lead the participants to misunderstand the items within the surveys. The responses of the blue collar workers also might have bias as they react negatively to feel forced to spend their off time reading and filling surveys.

The subject seaport management company is a private company belonging to a holding of companies. As the management asked to be

kept anonymous, further information that can lead to expose the identity of the company cannot be provided within the study.

Researches are defined under two groups depending on their duration as *cross sectional* and *longitudinal* (Altunışık et al., 2012: 70). This research is designed to be cross sectional. The survey forms were filled at the port management company on 10-11 of March 2016. 47 usable returns (92.15%) were collected from a total of 51 managers and white collar workers.

3.3. Data Analysis and Findings

SPSS for Windows 23 software was used to calculate intrinsic, extrinsic and general job satisfaction scores, t-tests and ANOVA tests. The reliability (*Cronbach's alpha* = 0.915) of the research is found to be high. The demographic information of the research group is summarized in tables 2,3,4,5, and 6.

Table 2: Gender Dispersion

		Frequency	**Percent**	**Valid Percent**
Valid	Female	8	17.0	17.4
	Male	38	80.9	82.6
	Total	46	97.9	100.0
Missing		1	2.1	
Total		47	100.0	

As seen on Table 2., the majority of the group (%82.6) consists of male participants.

Table 3: Age Dispersion

		Frequency	**Percent**	**Valid Percent**
Valid	< 30	1	2.1	2.1
	31-35	11	23.4	23.4
	36-40	15	31.9	31.9
	41+	20	42.6	42.6
	Total	47	100.0	100.0

As seen in Table 3., the largest age group (42.6%) is aged over 41, and the majority of the group (74.5%) is over 35 years old.

Table 4: Employment at the Organization

Years		Frequency	Percent	Valid Percent
Valid	< 1	2	4.3	4.3
	1-3	23	48.9	50.0
	4-6	13	27.7	28.3
	7-9	7	14.9	15.2
	10+	1	2.1	2.2
	Total	46	97.9	100.0
Missing		1	2.1	
Total		47	100.0	

The majority of the group (54.3%) have been employed at the subject port management company for less than four years. The second largest group (28%) being employed 4 to 6 years, sum of employment over 6 years is 17% and only one participant has stated an employment equal to or more than 10 years.

Table 5: Education Degree Attained

Highest degree attained		Frequency	Percent	Valid Percent
Valid	Elementary school*	1	2.1	2.3
	Senior high school**	7	14.9	15.9
	Graduate***	35	74.5	79.5
	Post graduate****	1	2.1	2.3
	Total	44	93.6	100.0
Missing		3	6.4	
Total		47	100.0	

* : Primary education (5 to 8 years)
** : Secondary education (11 to 13 years combined with primary education)
*** : University degree
**** : Masters or PhD Degree

As seen in Table 5., the majority of the group (81.8%) have attended to university but only one (2.3%) participant has a post graduate degree. Findings represented in Table 6 shows that the overall amount of participants with specific vocational education (maritime transportation, maritime trade, port management, etc.) is 40%.

Table 6: Specific Vocational Education

		Frequency	Percent	Valid Percent
Valid	Yes	18	38.3	40.0
	No	27	57.4	60.0
	Total	45	95.7	100.0
Missing		2	4.3	
Total		47	100.0	

Descriptive statistics (the minimum and maximum values scored for each item, the means and the standard deviations) for the items of the MSQ are represented in Table 7.

Table 7: Descriptive Statistics for the Scale Items

	MSQ Items	Min.	Max.	Mean	*sd*
1	**Being able to keep busy all the time***	**1.00**	**5.00**	**3.89**	**1.04**
2	**Chance to work alone on the job***	**1.00**	**5.00**	**3.93**	**1.03**
3	**Chance to do different things ***	**1.00**	**5.00**	**3.80**	**1.24**
4	**Chance to be "somebody" in the community***	2.00	5.00	3.91	0.82
5	The way my boss handles his/her workers	1.00	5.00	4.08	1.02
6	The competence of supervisor in making decisions	1.00	5.00	4.02	1.15
7	**Being able to do things that don't go against my conscience***	**1.00**	**5.00**	**3.84**	**1.09**
8	**The way my job provides for steady employment***	**3.00**	**5.00**	**4.34**	**0.75**
9	**The chance to do things for other people***	**1.00**	**5.00**	**3.93**	**0.96**
10	**The chance to tell people what to do***	**2.00**	**5.00**	**3.95**	**0.87**
11	**The chance to do something that makes use of my abilities***	**1.00**	**5.00**	**3.93**	**1.10**
12	The way company policies are put into practice	2.00	5.00	3.91	0.92
13	My pay and the amount of work I do	1.00	5.00	2.95	1.16
14	The chances for advancement on this job	1.00	5.00	3.41	1.22
15	**The freedom to use my own judgement***	**2.00**	**5.00**	**3.82**	**0.93**
16	**The chance to try my own methods of doing my job***	**2.00**	**5.00**	**4.04**	**0.85**
17	The working conditions	2.00	5.00	4.04	0.93
18	The way my co-workers get along with each other	1.00	5.00	3.74	1.05
19	The praise I get for doing a good job	1.00	5.00	3.65	1.20
20	**The feeling of accomplishment I get from the job***	**2.00**	**5.00**	**4.12**	**0.92**

*****: items evaluating intrinsic job satisfaction

The answers given to items of the MSQ are divided into the number of items (12, 8 and 20 correspondingly for intrinsic, extrinsic and general) to calculate the job satisfaction scores (Yelboğa, 2007:7;

Karaman, 2010: 67). The job satisfaction scores of the sample are represented on Table 8.

Table 8: Intrinsic, Extrinsic and General Satisfaction Scores

	Mean	**Std.Dev.**
Intrinsic Sat.	3.9638	0.14
Extrinsic Sat.	3.7300	0.38
General Sat.	3.8703	0.28

The effect of gender on job satisfaction has been investigated through t-test. Answers given to items 11 and 15 (see Table 9. and 10.) are varying significantly within 95% confidence interval.

Table 9: Effect of Gender on Job Satisfaction

Item	**Gender**	**N**	**Mean**	**Std.dev.**	**Std. Error Mean**
11	Female	7	3.1429	1.21499	0.45922
	Male	38	4.0526	1.03838	0.16845
15	Female	8	3.2500	1.16496	0.41188
	Male	38	3.9737	0.85383	0.13851

Table 10: Effect of Gender on Job Satisfaction: t-test

	Levene's Test for Eq. of Variances		**t-test for Equality of Means**						
								95% C.I. of the Difference	
	F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Diff.**	**Std. Error Diff.**	**Low**	**Upper**
11	0.657	0.422	-2.07	43	**0.044**	-0.90977	0.43795	-1.79	-0.02
			-1.96	7.70	0.101	-0.90977	0.48910	-2.04	0.22
15	2.785	0.102	-2.04	44	0.**047**	-0.72368	0.35416	-1.43	-0.01
			-1.66	8.65	0.132	-0.72368	0.43454	-1.71	0.26

Items 11 (the chance to do something that makes use of abilities) and 15 (the freedom to use own judgement) both belong to the intrinsic job satisfaction sub-dimension, and the responses of the male participants are significantly higher.

The t-test results indicate a significant difference between the means of answers given to items 10 (the chance to tell people what to do), 13 (the payment and the amount of work done), and 20 (the feeling of accomplishment from the job) depending on having been educated on maritime related subjects within 95% confidence interval. The participants with specific vocational education have responses with higher values for items 10 and 20, whereas the groups' response mean for item 13 is lower (Tables 11. and 12.)

Table 11: Effect of Specific Vocational Education on Job satisfaction

Items	S.V.E.*	N	Mean	Std.dev.	Std. Error Mean
10	Yes	18	4.2778	0.89479	0.21090
	No	25	3.7200	0.84261	0.16852
13	Yes	18	2.6111	1.03690	0.24440
	No	27	3.2963	1.13730	0.21887
20	Yes	18	4.5000	0.85749	0.20211
	No	27	3.8889	0.89156	0.17158

*: Specific Vocational Education (maritime transportation, maritime business and administration, port management, etc.)

Table 12: Effect of SVE on Job satisfaction: t-test

	Levene's Test for Eq. of Variances		t-test for Equality of Means						
								95% C.I. of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	Low	Upper
10	0.084	0.773	2.087	41	**0.043**	.55778	.26728	0.02	1.09
			2.066	35.41	**0.046**	.55778	.26996	0.01	1.10
13	0.221	0.641	-2.049	43	**0.047**	-.68519	.33432	-1.35	-0.01
			-2.088	38.86	**0.043**	-.68519	.32808	-1.34	-0.02
20	0.002	0.961	2.287	43	**0.027**	.61111	.26724	0.072	1.15
			2.305	37.57	**0.027**	.61111	.26512	0.074	1.14

One-way ANOVA tests were used to examine the effects of independent variables (department employed, education level, and time employed at the organization) on the answers given to dependent job satisfaction items.

Whilst the presence of a significant relation was not observed depending on the department employed, answers given to four of the MSQ items have varied significantly depending on the education level and time employed (Tables 13., 14., and 15).

Table 13: Education Level and Job Satisfaction

Item		Sum of Squares	df	Mean Square	F	Sig.
1	Between Groups	9.689	3	3.230	3.171	**0.035**
	Within Groups	40.743	40	1.019		
	Total	50.432	43			

While the ANOVA analysis findings suggest a significant variation for the answers given only to the first item (being able to keep busy all the time) depending upon education level (Table 13); answers given to items 5 (the way my boss handles his/her workers), 6 (the competence of supervisor in making decisions), and 16 (the chance to try my own methods of doing my job) varied significantly depending on the duration employed (Table 14., and 15) at 95% confidence interval.

Table 14: Employment Duration and Job Satisfaction

Items		Sum of Squares	df	Mean Square	F	Sig.
5	Between Groups	13.621	4	3.405	4.105	**0.007**
	Within Groups	33.179	40	0.829		
	Total	46.800	44			
6	Between Groups	14.466	4	3.617	3.256	**0.021**
	Within Groups	45.534	41	1.111		
	Total	60.000	45			
16	Between Groups	7.427	4	1.857	3.075	**0.027**
	Within Groups	23.550	39	0.604		
	Total	30.977	43			

Items 5 and 16 had significantly higher responses from the group employed for four or more years, while the opposite is valid for item 6 (see Table 15.).

Table 15: Employment Duration Group Statistics

Items	Years employed	N	Mean	Std. Dev.	Standard Error Mean
5	4+	13	4.4615	0.87706	0.24325
	0-3	22	4.1364	0.88884	0.18950
6	4+	13	4.1538	1.34450	0.37290
	0-3	23	4.2174	0.85048	0.17734
16	4+	11	4.5455	0.68755	0.20730
	0-3	23	3.8696	0.81488	0.16991

4. RESULT

The Kelly Global Workforce Index, a research held by Kelly Services in 28 countries on over 70,000 workers with approximately 1000 from Turkey, suggests the job satisfaction level of Turkish workers are far below the average (Pınar et al., 2008). However, the job satisfaction of the research group investigated was found to be high. The MSQ used in the research suggests job dissatisfaction for a score under 25%, high job satisfaction for scores over 75%, and average job satisfaction in between (Weiss et al., 1967). As seen on Table 8., the general and intrinsic job satisfaction scores of the research group is over

75% (3.75) proving the presence of high job satisfaction level. The extrinsic satisfaction (3.73) is considered to be average satisfaction, but still is very close to 75% level.

The answers for the twenty items of the scale collected from the research group imply a high general job satisfaction (3.87) with 0.28 standard deviations. The sub-dimensions affecting the general job satisfaction are intrinsic and extrinsic job satisfaction. Intrinsic satisfaction items mean is 3.96 with standard deviations 0.14; and extrinsic satisfaction mean is 3.73 with 0.38 standard deviations. While the number of items to evaluate intrinsic job satisfaction is 50% more than the extrinsic satisfaction items, the standard deviations are less suggesting the group has a higher and more focused intrinsic satisfaction.

Table 16: Item Contributions to Job Satisfaction

	Items	***min.***	***max.***	***mean***	***s.d.***
8	The way my job provides for steady employment *	3.00	5.00	4.34	0.75
20	The feeling of accomplishment I get from the job*	2.00	5.00	4.12	0.92
5	The way my boss handles his/her workers	1.00	5.00	4.08	1.02
16	The chance to try my own methods of doing my job*	2.00	5.00	4.04	0.85
17	The working conditions	2.00	5.00	4.04	0.93
6	The competence of supervisor in making decisions	1.00	5.00	4.02	1.15
10	The chance to tell people what to do*	2.00	5.00	3.95	0.87
9	The chance to do things for other people*	1.00	5.00	3.93	0.96
2	Chance to work alone on the job*	1.00	5.00	3.93	1.03
11	The chance to do something that makes use of my abilities*	1.00	5.00	3.93	1.10
12	The way company policies are put into practice	2.00	5.00	3.91	0.92
1	Being able to keep busy all the time*	1.00	5.00	3.89	1.04
General Job Satisfaction Score of the Research Group = 3.87					
3	Chance to do different things *	1.00	5.00	3.80	1.24
4	Chance to be “somebody” in the community*	2.00	5.00	3.91	0.82
7	Being able to do things that don’t go against my conscience*	1.00	5.00	3.84	1.09
15	The freedom to use my own judgement*	2.00	5.00	3.82	0.93
18	The way my co-workers get along with each other	1.00	5.00	3.74	1.05
19	The praise I get for doing a good job	1.00	5.00	3.65	1.20
14	The chances for advancement on this job	1.00	5.00	3.41	1.22
13	My pay and the amount of work I do	1.00	5.00	2.95	1.16

*: intrinsic job satisfaction items

The items that positively affected the job satisfaction are t*he way my job provides for steady employment, the feeling of accomplishment I get from the job, the way my boss handles his/her workers, the chance to try my own methods of doing my job, the working conditions, the competence of supervisor in making decisions, the chance to tell people what to do, the chance to do things for other people, chance to work alone on the job, the chance to do something that makes use of my abilities, the way company policies are put into practice,* and *being able to keep busy all the time.*

The items *chance to do different things, chance to be "somebody" in the community, being able to do things that don't go against my conscience, the freedom to use my own judgement* have scores lower than the general satisfaction level (3.87) and the items t*he way my co-workers get along with each other, the praise I get for doing a good job, the chances for advancement on this job* and *my pay and the amount of work I do* have scores less than 3.75 which suggest only average satisfaction. None of the items were scored under 1.25 (lower than 25%), so none of the items worked towards job dissatisfaction (Table 16).

Depending on the research findings a great majority (>83%) of the white collar workers of the subject port management company have a university degree but the post graduate ratio is rather low (2%) and the amount of degrees on specific vocational subjects such as maritime transportation, maritime business and administration, port management is 40%. The subjects with specific vocational education obtain higher job satisfaction from *the chance to tell people what to do* and *the feeling of accomplishment from the job.* The job satisfaction obtained from *the payment and the amount of work done* is low for the two groups and the group with a specific vocational degree is significantly more dissatisfied.

The amount of females is comparably lower and the females believe that their jobs does not give the *chance to do something that makes use of abilities* and *the freedom to use own judgement* is low. While the male subjects are satisfied (>75%) with the two items, they show signs of being job dissatisfaction reasons for the females.

A large amount of the subject group is over 40 years old, and only a few are under 35 but there was no evidence of a relation between age and job satisfaction.

A great majority of the study subject group (>54%) has been employed in the organization for three or less years, but the management

informs the reason for the high turnover is due to a re-organization of the human resources four years before the study was held. The employees working for four or more years are more satisfied with the *way their boss handles his/her workers* and *the chance to try my own methods of doing my job* while the employees working for three years or less stated a higher job satisfaction due to *the competence of supervisors in making decisions.* Both groups are highly satisfied with the three items.

The recommendations below can be stated upon the research findings:

- The item with the highest score is *the way my job provides for steady employment* while the item with the lowest score is *the amount of pay and the work I do.* This proves the theories of Maslow (1943; 1948) and Herzberg (1959) are still valid and shows the need for further research on job satisfaction and motivation for Turkish maritime companies.
- The intrinsic job satisfaction items are proven to have a higher importance. The managers should spend extra effort to understand and improve the intrinsic satisfaction of the employees. Psychological and emotional items such as being praised for doing a good job, being able to do things that do not go beyond conscience seem to be in effect to improve job satisfaction so the managers may try to find the ways to use this information to improve efficiency.
- The managers are affecting the job satisfaction of the employees highly. They need to make sound decisions and they need to put them into practice in a good way.
- The white collar workers want their opinions to be considered on decision making process.
- The employees with specific vocational education are more pleasant to be managing. While assigning managers the candidates with specific education might be preferred.
- The employees with specific vocational education are also more committed to the organization. Preferring managers from this group might help keeping the turnover rate at managerial level low.
- The number of female employees might be increased and special effort might be put to give them a chance to do a work that makes use of their abilities and the freedom to use their own judgement.
- The Turkish maritime organizations may invest in future human resource by increasing the number of white collar workers and

managers with lower age and taking precautions to keep the turnover rate low.

- The subjects with lower employment duration declared higher satisfaction on their managers' decision making abilities. The managers can improve job satisfaction simply by making good decisions and putting them into practice.
- Larger scaled research on Turkish maritime companies can be designed to compare and contrast the job satisfaction within sub-industries.
- This study was held on a privatized port. Such researches should be done on public ports as well to investigate job satisfaction and to see possibilities for improvement.
- Maritime education can be developed to graduate people with a better understanding of human and human groups.

5. CONSTRAINTS OF THE RESEARCH

Going beyond the common difficulties of survey based field studies, making researches on seaports have their own challenges. Cross sectional researches might be distorted as the seaports are open to external effects highly. Entering the port area depends on special permissions. The work is intense and there are shifts, and it is a common thing to find a number of managers are outside the organization for business meetings so it is difficult to reach to the sample within a single call. The managements have a tendency to keep their sensitive information as a secret. The relatively low amount of employees limits the sample size or the research groups making it difficult to obtain strong and meaningful results from statistical analysis.

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THE EFFECTS OF FAST DECLINE IN CRUDE OIL PRICES ON THE TANKER MARKET IN THE SHORT RUN*

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ABSTRACT

Oil prices have been steadily declining to around $27 since early 2016, while it was at around $120 in early 2013. This decline will surely have an effect on countries' petroleum demands. Oil transport by sea, one of the most important instruments of international oil trade, has also been directly influenced by these developments. The supply curve is inelastic in the short term and sudden demand increase in the tanker market has also caused sudden rise in freight rates. Since the entrance of the new transport capacity into the market lasted for approximately 3 years, this study examines a period of about 3 years and tries to examine the effects of oil prices on the tanker market in the short run. The purpose of this study is to contribute to the existing theory by examining the effects of this extraordinary decline in the recent era. In this study, the tanker market is divided into freight, new construction, second hand and scrap market, and each sub-market is examined separately. Correlation analysis has been used as the method of study. According to the findings, freight market and second hand market have been affected positively by the decrease of oil prices. However, the impact of the fall in oil prices on the new construction market has not been at the expected level. When the effects on the scrap market were examined, a relationship has been found in the positive direction as the opposite of the theory and the hypothesis.

Keywords: *Tanker industry, oil price, short run effect, four shipping markets, correlation analysis.*

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HAM PETROL FİYATLARINDAKİ HIZLI DÜŞÜŞÜN TANKER PİYASASINA KISA DÖNEMDE ETKİLERİ

ÖZET

Petrol fiyatları, 2013 yılının başlarında yaklaşık 120$ seviyelerinde seyretmekte iken, 2016 yılının başlarına gelindiğinde 27$ seviyelerine kadar istikrarlı bir şekilde düşüş göstermiştir. Bu düşüşün, ülkelerin petrol taleplerini arttırıcı bir etkisinin olacağı muhakkaktır. Uluslararası petrol ticaretinin en önemli araçlarından biri olan denizyoluyla petrol taşımacılığı da, bu gelişmelerden doğrudan etkilenmiştir. Tanker piyasasında kısa dönemde arz eğrisi inelastiktir ve ani talep artışları navlunlarda da ani yükselmelere neden olmaktadır. Piyasaya yeni taşıma kapasitesinin girmesi yaklaşık 3 yıl sürdüğü için, bu çalışmada yaklaşık 3 yıllık bir süreç incelenmiş ve kısa dönemde petrol fiyatlarının tanker piyasasına etkileri incelenmeye çalışılmıştır. Bu çalışmanın amacı mevcut teoriye, yakın dönemdeki bu olağanüstü düşüşün etkilerini inceleyerek katkıda bulunmaktır. Çalışmada tanker piyasası, navlun, yeni inşa, ikinci el ve hurda piyasası olarak bölümlendirilmiş ve her alt piyasa ayrı olarak incelenmiştir. Çalışmanın yöntemi olarak korelasyon analizi yöntemi kullanılmıştır. Bulunan bulgulara göre navlun piyasası ve ikinci el piyasası petrol fiyatlarının düşüşünden çok olumlu yönde etkilenmişlerdir. Ancak petrol fiyatlarının düşüşünün yeni inşa piyasasına etkileri beklenen düzeyde olmamıştır. Hurda piyasasına olan etkileri incelendiğinde ise, teorinin ve hipotezin tersi bir durum olarak pozitif yönde bir ilişki saptanmıştır.

Anahtar Kelimeler: *Tanker piyasası, petrol fiyatı, kısa dönem etki, dört denizcilik piyasası, korelasyon analizi.*

1. INTRODUCTION

Oil has a vital role in our lives. There is an extreme need for oil in many sectors as well as in the service sector. So dependence on oil has reached the highest levels in the history especially recent years. Researches for alternative energy resources have been carried out against this extra dependence. A lot of hopeful new developments have been occurred, but it is a key fact that dependence on oil will not be terminated in the near future.

Transportation of oil is mainly carried out in two ways: by seaborne and by pipeline. Pipeline transportation needs geographical and political harmonies and can be used as a trump by creating a dependency. But seaborne transportation is flexible and optional. Thus, international seaborne oil transportation keeps it weight in the oil market.

Seaborne oil transportation is derived demand as maritime industry. So it is affected by fluctuations in the oil market. These fluctuations may be caused by political crisis, economic crisis and commodity prices. Therefore, there are many cycles in the tanker market in the history, and the last one is triggered by extra ordinary fall of oil prices. This possible cycle is the subject of this study.

Short run supply curve in the tanker market is inelastic because of leading time in shipbuilding industry. So, instant increase on demand causes instant rise in freight levels. Therefore, expected increase on oil commodity because of its decreasing trend will cause positive effects on the tanker market.

This study examined a period of about 3 years and tried to examine the effects of oil prices on the tanker market in the short run, because entrance of new capacity to the market takes 2 or 3 years. The purpose of this study is to contribute to the existing theory by examining the effects of this extraordinary decline in the recent era. In this study, the tanker market is divided into freight, new construction, second hand and scrap market, and each sub-market is examined separately.

The next section examines the theoretical background of the investigation that also includes hypothesis of the study. Then similar studies in the literature are mentioned. After methodological activities are implemented, contribution of the study is presented in the conclusion and discussion section.

2. THEORETICAL BACKGROUND

The freight market provides freight revenue as known. So it is the main source of cash for shipping companies like other companies. In fact, there are three sectors to this market which consist of voyage market, time charter market and freight derivatives market. The voyage market trades transport for a single voyage. The time-charter market hires out the ship for a limited time. The freight derivatives market deals in forward contracts settled against an index. The primary motivating force driving the activities of shipping investors are freight rates earned in these markets (Stopford, 2009: 178). Freight levels are the main determinants of conditions in other maritime markets.

Freight rates are determined by interaction of supply and demand in maritime market (Stopford, 2009: 160). The short run supply schedule is shaped as revers “L” for tanker shipping market. When there is a low

demand for tanker services, it is very elastic. But it becomes very inelastic as demand closes to full capacity of the existing fleet. When trading conditions are poor, and freight earnings are low, the "flat" range of the supply curve is created by the ability to "mothball" tanker tonnage by placing the vessel in layup. As demand closes to the potential maximum productive capacity of the current fleet, all lay ups are brought into use, and the ability to further expand supply becomes very limited. This explains the vertical section of the short run supply curve (Grammenos, 2010: 379). As seen at the Figure 1, approximately 20% of the world tanker fleet consists of old and obsolete ships. Their operational activities depend on the market conditions. The curve also represents the average total costs of the ships.

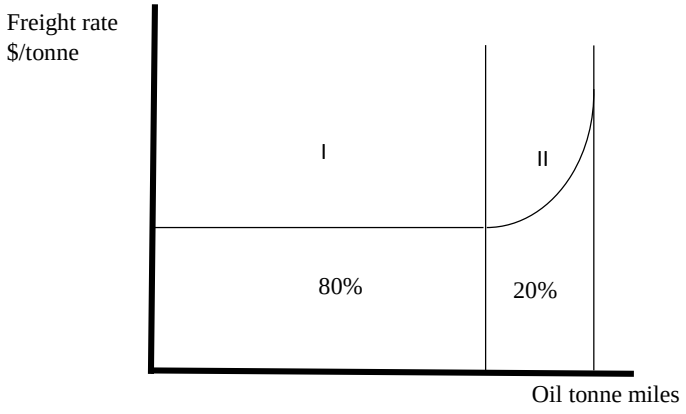

Figure 1: Short Run Supply Curve for Tanker Services
Source: Grammenos, 2010: 379

High profits in the tanker market increases orders, as a result tanker deliveries in the near future also increase. But if the demand growth declines or hesitates, spot rates will decline because of the increased level of deliveries in the future. Also older vessels which might have been scrapped are traded longer at the high level of demand. This situation causes a raise in the scrap price because of the reduction in the supply of tankers for scrap (H_4). In the meanwhile, demand for shipbuilding increases which causes a pressure on yards. So newbuilding prices apt to rise (H_3). Thus freight rates, second hand prices, scrap prices and newbuilding prices will tend to move together in a cyclical trend (H_2). They affect each other with a limited effect. This process is driven by the interaction of many owners, charterers, shipbuilders and ship brokers. But none of them have any significant control over their environment in the shipping cycle (Grammenos, 2010: 384).

Putting the very inelastic demand schedule together with the varying elasticity supply schedule generates a model of the equilibrium spot freight rate for tanker services. This is shown in Figure 2. There is an important point about this figure which is irregular response of freight rates to shifts in the position of the demand curve. When demand increases from DO to Dl, there is a large shift in demand. But there is little effect on the market freight rate. Because there are unemployed or underemployed vessels. The tanker supply elastic between these points. The balance freight rate moves from PI to P2 meantime tonne miles increase from Q1 to Q2. When demand shifts again, from Dl to D2, the freight rates increase more than previous scenario. That demand shift is smaller than previous one but spare capacity is less readily available. As a result, the freight rate rises from P2 to P3, and tonne miles increase from Q2 to Q3. Finally, when demand shifts from D2 to D3, small shifts in demand generate large increases in rates (H_1). Because tanker supply is perfectly inelastic. In this scenario, the freight rate rises rapidly from P3 to P4 but tonne miles performed rise only awhile from Q3 to Q4 (Grammenos, 2010: 380).

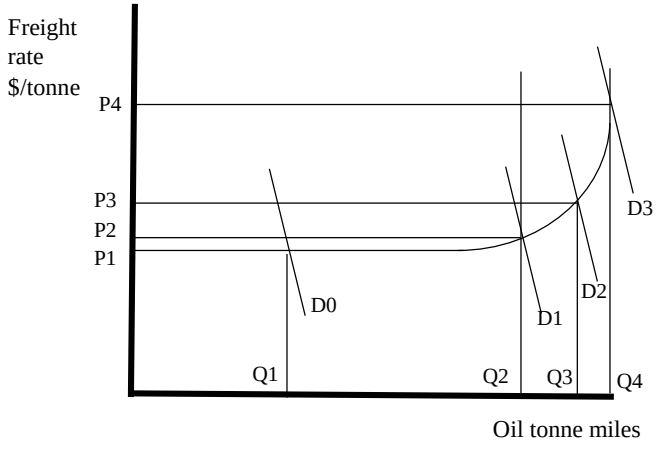

Figure 2: Modelling Tanker Demand and Supply in the Short Run
Source: Grammenos, 2010: 381

There is a positive relationship between newbuilding market and freight market. Shipping firms decide to order new ships to expand their fleet sizes when the freights are high. Demand for new vessels reflects the need for shipping capacity in the tanker shipping industry. It may take one to 3 years from placing an order of a new vessel till the delivery of ship to carry cargo in the freight market. The order of new ships from tanker

shipping firms indicates that they have positive expectation of the growth of seaborne trade and increase in future freight rates (Lun et al, 2013: 16).

The activity in scrapping market has strong relationship with the second-hand market. At the time when freight rates are very high, ship owners may keep the used ships to carry cargoes. Or they sell these ships to other ship owners. On the contrary, if the profitability of the vessel is negative in the near future and demand for secondhand ships in the sale and purchase market is weak, ship owners are disposed to send their ships to the demolition market (Lun et al, 2013: 17).

These dynamics in the market causes shipping cycles in the history. Duration, size and intensity of these cycles vary by their eras. Analysis of short cycles over the period 1741–2007 illustrates the 'work pattern' of the shipping cycle. There were 22 cycles, averaging 10.4 years each (Stopford, 2009: 134). The Figure 3 shows these cycle stages.

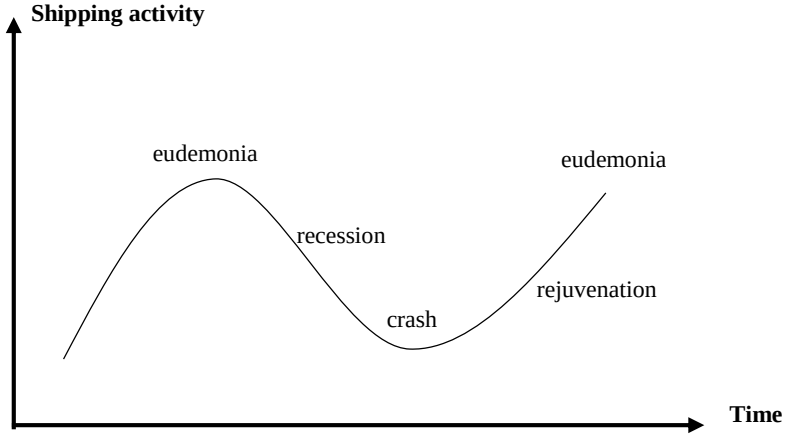

Figure 3: The Stage of the Shipping Cycles
Source: Talley, 2012: 213

Eudemonia stage is the peak of shipping activities where freight earnings, secondhand values and newbuilding prices are high. Economic activities are buoyant, demand for shipping services is also high. But high earnings may attract new investors and extra fleet capacity enters to the market. Or demand for shipping activities decreases because of some macroeconomic events. Then earnings start to decrease and this fall continues until an acceptable level for market. This declining period is called as recession, and deep of this fall is called crash stage. In this stage freight levels fall below of the operation costs of the many ships, then they

become uneconomic to operate. If owner's future expected earnings tend to increase, they keep their vessels and wait for opportunities. But if their expected earnings are low, they sell them to the scrapping market. After a while, growth rate of demand passes the growth rate of supply and earnings start to increase again. Current shipowners take advantage of their transport capacity because of leading time in the shipbuilding activities (Beenstock and Vergottis, 1989). Then shipping activities reach the eudemonia stage and these cycles become perpetual activities in the maritime industry. Catching opportunities that are derived from these cycle stages presents more benefit than classical transportation activities.

3. LITERATURE REVIEW

There is limited number of study about this topic. Shi et al. (2013) examines the impact of crude oil price on the tanker market. They use three variables; Baltic Dirty Tanker Index, Oil production and Oil price. Then they use SVAR model and impulse response analysis and analyze impact of different shocks on the tanker market. They find out that crude oil production has insignificant effect on crude oil price and supply shocks have significant effect on tanker market. Finally, they find out that there is no evidence about relationships between tanker freight rates and crude oil prices.

Poulakidas and Joutz (2009) also make a study about exploring the link between oil price and tanker rates. They use 5 variables; Baltic Dirty Tanker Index, Crude Oil Future Contracts, West Texas Intermediate Spot Prices, US Weekly Ending Crude Oil Stocks and Spread between WTI Spot Price and Future Contracts. They make Granger causality test and cointegration analysis. They find that when day's supply of crude oil increases, the spot tanker rates declines.

Sun et al. (2014) make an analysis about identifying dynamic relationship between tanker freight rates and oil prices. They use 2 variables Baltic Dirty Tanker Index and WTI Spot Price and they implement Ensamble Empirical Mode Decomposition model. They find out that freight rates and oil prices are significantly correlated in the medium and long term.

Jin (2006) makes a study about supply and demand of new oil tankers. He finds out that oil price and second-hand tanker price are predominant factors influencing future newbuilding demand.

As seen from literature there is a little study about this topic and there is no directly related study about the same topic. So this study is

expected to be one of the first studies about short term relationship between oil price and tanker market.

4. METHODOLOGY

In this study, correlation analysis will be implemented to determine relationship between variables. Basically two methods are used for correlation calculations. These are Pearson's correlation and Spearman's correlation.

Pearson's correlation coefficient R is a measure of the strength and direction of the linear relationship between two variables. The absolute value of Pearson correlation coefficients is no larger than 1. Correlations equal to 1 or -1 correspond to data points lying exactly on a straight line. The Pearson correlation coefficient is symmetric, i.e., the correlation between X and Y is the same as that between Y and X (Chang, 2014: 78).

Pearson correlation coefficient is computed by (1) or a statistical software easily. Scores on the rating scale can be continuous in nature in Pearson correlation which provides a beneficial feature. However, a potential limitation of the Pearson correlation coefficient is that it assumes that the data are normally distributed (Osborne, 2008: 39). Pearson's correlation coefficient is calculated as follows:

$$r_p = \frac{n(\sum XY) - (\sum X)(\sum Y)}{\sqrt{[n(\sum X^2) - (\sum X)^2][n(\sum Y^2) - (\sum Y)^2]}} \quad (1)$$

$$t = \frac{r_p\sqrt{n-2}}{\sqrt{1-r_p^2}} \quad (2)$$

Spearman correlation is calculated based on rank coefficient. It is approximation of the Pearson correlation. But it is also used in circumstances where data investigation is not normally distributed (Osborne, 2008: 39). Correlation coefficient is formed between -1 and 1 as it is Pearson correlation. It is computed as follows:

$$r_s = 1 - 6\left[\frac{\sum d_i^2}{n(n^2-1)}\right] \quad (3)$$

(4)

$$t = \frac{r_s\sqrt{n-2}}{\sqrt{1-r_s^2}}$$

Evaluation of the correlation analysis depends on the degree and direction of the correlation coefficient. General classification of degree of the correlation analysis is presented at Table 1. The closer the absolute value of the correlation coefficient is to 1, the stronger the relationship (Soh, 2016: 40).

Table 1: Evaluation of Correlation Coefficients

Correlation Coefficient	Description
0.90 – 1.00	Very strong and very high
0.70 – 0.90	Strong or high
0.40 – 0.70	Moderate or medium
0.20 – 0.40	Weak or low
0.00 – 0.20	Very weak or very low

Source: Soh, 2016: 40

After correlation coefficients are calculated, t statistics of them are also calculated by (2) and (4). Then t statistics obtained are compared with corresponding table values. If the obtained value is greater than table value, it means that the correlation coefficient is statistically significant. Interpretation of the results starts after this stage.

4.1. Hypothesis

The tanker market is divided to four markets that are freight market, sale and purchase market, newbuilding market and demolition market. So research topics are hypothesized into four suppositions. They and their theoretical foundations are explained below. Also their theoretical foundations were emphasized in the theoretical background section.

H_1: When oil price decrease, time charter earnings of the tankers increase in the short run.

As mentioned above, fleet supply in maritime market is inelastic in the short run because of the lead-time on shipbuilding. So instant increase on demand causes increase on freight levels in the short run. Demand for tanker transportation is supposed to increase instantly because of decreasing trend of oil prices in the examined range.

H_2: When oil price decrease, secondhand values of the tankers increase in the short run.

There is a strong relationship between freight rates and second hand values of the ships. Ship investors evaluate the current earnings and expected future earnings when they appraise their assets. So, increasing freight rates that is caused by increasing demand for oil will cause increase on second hand values of the taker ships in the short run.

H_3: When oil price decrease, newbuilding values of the tankers increase in the short run.

High earnings in the sector caused by instant demand for oil attracts new investors into the sector. Also existing players will want to increase their fleet capacity to gain more benefit from the transportation activities. So newbuilding values of tankers will increase in the short run since demand for new ships and second hand values of existing ships increase.

H_4: When oil price decrease, demolition values of the tankers increase in the short run.

Main customers of the demolition market are old and obsolete ships. They cannot be traded because of high operation costs if the shipowners' expected future earnings are not enough to cover their accumulated losses. When oil price decrease, freight earnings will increase in the short run as mentioned above. Even old and obsolete ships can be operated profitably in buoyant market conditions. So the inefficient ships will be operated and the number of ships that are sent to the demolition market decreases. This situation is supposed to cause an increase on demolition prices because steel recyclers will have to pay more for scrapped steel.

4.2. Data

The dataset of the research includes time charter earnings, secondhand values, newbuilding values and demolition prices of different kind of tanker ships. The data and their descriptive statistics are examined in this section.

The Brent Oil Price is selected as representative of oil prices. The dates of the variables are between the range of 02.01.2013 and 08.03.2016. As seen at Table 2, oil price reached weekly average of $118 levels and decreased to $27 weekly average levels. This fall of oil price is expected to cause inevitable effects to tanker markets. The data is not distributed normally according to the Jarque-Bera probability which is smaller than

critical value. This will affect selection of correlation analysis type in the study.

Table 2: Descriptive Statistics of Oil Price

	OIL
Observation	164
Mean	83.61738
Median	101.0350
Maximum	118.1000
Minimum	27.76000
Std. Dev.	28.81242
Skewness	-0.467319
Kurtosis	1.562930
Jarque-Bera	20.08124
Probability	0.000044

Source: EIA, 2016

Weekly average of daily 1-year time charter earnings of different types of the tankers are listed below. The data covers the dates between 02.01.2013 and 16.12.2015. As seen below the minimum value of the earnings were $17500 for VLCC and it reached to $55000 levels after decrease in the oil price. All of the data are not distributed normally according to Jarque-Bera statistics.

Table 3: Descriptive Statistics of 1 Year Time Charter Rates ($)

	VLCC	**SUEZMAX**	**AFRAMAX**	**PRO_40K**	**PRO_80K**	**LR2**
Obs.	153	153	153	153	153	153
Mean	30620.92	23587.91	18439.22	15093.14	17607.84	19580.07
Med.	25500.00	20000.00	15500.00	14500.00	15500.00	16250.00
Max.	55000.00	39000.00	29500.00	18750.00	28500.00	29750.00
Min.	17500.00	14750.00	12250.00	13000.00	13750.00	14500.00
Std.D.	12379.52	8219.909	5786.924	1506.260	4060.780	5043.940
Skew.	0.584129	0.563396	0.626941	1.192789	1.302274	0.898294
Kurt.	1.811118	1.704510	1.897101	3.047235	3.382711	2.229389
J-B	17.71146	18.79320	17.77738	36.29426	44.17964	24.36252
Prob.	0.000143	0.000083	0.000138	0.000000	0.000000	0.000005

Source: Fearnleys, 2016

Secondhand values of the different types of ships are listed below. The dates of the variables are between the range of 02.01.2013 and 08.03.2016. There are big differences between minimum and maximum values of the ships. For instance, secondhand value of a VLCC tanker was level of $55 million at the start of the dataset and it reached the level of $84 million in three years period that oil price had decreasing trend. The

data of each ship are not distributed normally according to Jarque-Bera statistics.

Table 4: Descriptive Statistics of Second Hand Values ($ million)

	VLCC	SUEZMAX	AFRAMAX	LR1	MR
Obs.	166	166	166	166	166
Mean	70.60964	50.42831	37.95000	32.39096	26.96265
Med.	74.00000	50.00000	38.00000	32.60000	26.95000
Max.	84.00000	61.00000	46.50000	39.00000	30.50000
Min.	55.00000	38.20000	27.00000	25.00000	24.30000
Std.D.	10.62707	8.246151	6.995104	3.796902	1.767601
Skew.	-0.488212	-0.140942	-0.295085	-0.547389	0.275851
Kurt.	1.550544	1.447566	1.491823	2.328788	1.734255
J-B	21.12575	17.21911	18.14172	11.40604	13.18652
Prob.	0.000026	0.000182	0.000115	0.003336	0.001370

Source: Intermodal, 2016

Newbuilding values of tankers and their descriptive statistics are listed below. The difference between minimum and maximum values of the newbuilding prices are not much as differences in secondhand values. For instance, minimum newbuilding price of VLCC tanker is $89 million and maximum price of it is $101 million. Also price range of product tankers are lower than others. The all of the values of the data are not distributed normal according to normality test results.

Table 5: Descriptive Statistics of Newbuilding Values ($ million)

	VLCC	SUEZMAX	AFRAMAX	LR1	MR
Obs.	164	164	164	164	164
Mean	94.63110	61.68963	51.63354	44.13780	35.44146
Med.	94.75000	64.25000	53.00000	45.50000	35.50000
Max.	101.0000	66.00000	55.00000	47.00000	37.30000
Min.	89.00000	55.30000	46.50000	40.00000	33.00000
Std.D.	3.654505	4.218955	2.887997	2.503403	1.551445
Skew.	-0.077908	-0.670696	-0.714384	-0.690788	-0.499516
Kurt.	1.894127	1.612394	2.013317	1.755162	1.656630
J-B	8.522769	25.45267	20.60197	23.63223	19.15186
Prob.	0.014103	0.000003	0.000034	0.000007	0.000069

Source: Intermodal, 2016

The dataset below consists of demolition prices in different demolition regions for tanker ships. The range between minimum and maximum values of the demolition prices are relatively high. For example, demolition prices in China was $125 per ltd at minimum level and $405 per ltd at maximum level. There are wide fluctuations in the prices. The all of the dataset are not normally distributed in respect to Jarque-Bera statistics.

Table 6: Descriptive Statistics of Demolition Prices per Ltd ($)

	TURKEY	PAKISTAN	INDIA	CHINA	BANGLADESH
Obs.	165	165	165	165	165
Mean	278.8788	402.6364	403.0303	275.1818	399.0000
Med.	305.0000	415.0000	415.0000	305.0000	415.0000
Max.	350.0000	490.0000	485.0000	405.0000	485.0000
Min.	160.0000	250.0000	250.0000	125.0000	245.0000
Std.D.	57.74300	58.80560	59.23727	84.17623	58.44843
Skew.	-0.838688	-0.789882	-0.811333	-0.430291	-0.831446
Kurt.	2.293318	2.944689	2.860147	1.845203	3.012823
J-B	22.77679	17.17866	18.23665	14.25984	19.01197
Prob.	0.000011	0.000186	0.000110	0.000801	0.000074

Source: Athenian Shipbrokers, 2016

It is generally seen that, there are big fluctuations in variables except newbuilding prices and all of the data are not normally distributed. As mentioned methodology part, Spearman's correlation is more feasible in non-normal distributions. The next section continues by analyzing the directional relationship between oil price and tanker market indicators.

5. RESULTS

Spearman's correlation analysis is implemented to determine directional relationship between tanker market factors. First analysis is developed for H_1 which hypothesizes that when oil price decreases, 1-year time charter earnings of tanker ships increase in the short run. According to the results that are listed below, there are negative strong correlations between oil price and earnings. All of the significance levels of the tests are at 99% significance level.

Table 7: Correlation Analysis Results of Oil Price and Time Charter Earnings

	VLCC	SUEZ MAX	AFRA MAX	PRODUCT 80K	PRODUCT 40K	LR2
OIL	-0.789 (-15.8) 0.00***	-0.824 (-17.8) 0.00***	-0.810 (-16.9) 0.00***	-0.826 (-18.01) 0.00***	-0.641 (-10.2) 0.00***	-0.902 (-25.7) 0.00***

Significance levels: *** 99%, ** 95%, * 90%, t statistics in parenthesis ()

Second analysis is implemented for H_2 which asserts that when oil price decreases, secondhand values of the tankers increase in the short run. Results show that except value of MR tanker type, values of all tankers have negative strong correlation with oil price and they are significant at 99% level.

Table 8: Correlation Analysis Results of Oil Price and Second Hand Values of Tanker Ships

	VLCC	SUEZMAX	AFRAMAX	LR1	MR
OIL	-0.751 (-14.5) 0.00***	-0.835 (-19.5) 0.00***	-0.828 (-18.9) 0.00***	-0.770 (-15.4) 0.00***	-0.079 (-1.0) 0.30

Significance levels: *** 99%, ** 95%, * 90%, t statistics in parenthesis ()

Third analysis of the study is related to newbuilding prices of tanker values and tests H_3 which supposes when oil price decreases newbuilding prices of the tankers increases in the short run. According to the results, value of Suezmax and LR1 tanker ships have negative weak correlation with oil price. Bu their t statistics are high and they are significant at 99% level. MR and Aframax tanker ships have very weak negative correlation with oil price. They are significant at 95% and 90% levels respectively. The coefficient of VLCC tanker value is very weak and insignificant.

Table 9: Correlation Analysis Results of Oil Price and Newbuilding Values of Tanker Ships

	VLCC	SUEZMAX	AFRAMAX	LR1	MR
OIL	-0.109 (-1.40) 0.16	-0.250 (-3.29) 0.00***	-0.139 (-1.78) 0.07*	-0.340 (-4.61) 0.00***	-0.154 (-1.99) 0.04**

Significance levels: *** 99%, ** 95%, * 90%, t statistics in parenthesis ()

The last analysis of the study is related to demolition prices. H_4 asserts that when oil prices decrease, demolition prices increase. The results at Table 10 show that all of the correlations are positive direction. Demolition prices in Turkey, Pakistan, India and Bangladesh have moderate degree of positive correlation while price in China has strong positive correlation. Also all of the correlations are significant at 99% level.

Table 10: Correlation Analysis Results of Oil and Demolition Prices of Tanker Ships in Different Regions

	TURKEY	PAKISTAN	INDIA	CHINA	BANGLADESH
OIL	0.691 (12.22) 0.00***	0.529 (7.97) 0.00***	0.561 (8.66) 0.00***	0.888 (24.71) 0.00***	0.545 (8.31) 0.00***

Significance levels: *** 99%, ** 95%, * 90%, t statistics in parenthesis ()

The visual relationship among all variables that touched upon in this section also can be seen at Appendices.

6. CONCLUSION AND DISCUSSION

Possible effects of the oil price on the tanker market in the short run hypothesized into four sub hypothesis which represent the four shipping markets. Effect of decrease in oil price to the freight market is assumed to be in the positive direction based on the theoretical background. The sudden increase in demand for oil prices would cause an increase in freight rates in the short term. Secondhand and newbuilding values of the tankers would also increase depending upon increase in freight earnings. And lastly, demolition prices would move inverse direction at the price of oil according to theory and hypothesis.

Time charter earnings in the tanker market reflected significant very strong negative correlation with oil price as mentioned in the theory. Inelasticity of the supply curve caused a brief cyclical burst in freight. The time charter earnings were about $19000 and it reached about $55000 after falling oil prices trend.

Secondhand ships become cash cows in buoyant market conditions, so their values move together with freight rates according to the theory. The results showed that, secondhand market was affected by oil prices as much as freight market. Correlation coefficients were negatively significant and strong.

The reflection of newbuilding prices in the tanker market to change in oil price was not at the expected level. Correlation coefficients were negatively significant but very low. This may arise from learning from the past, recently occurred economic crisis may have caused them not to be hasty in their investment decisions. Or since the shipyards have sufficient facilities to meet orders, the demand point at the shipbuilding market may have remained elastic points at the curve. Thus price volatility in the newbuilding market remained relatively stable.

Except demolition market, the other markets moved in parallel with theoretical base. The study expected to investigate a negative correlation between demolition prices and oil prices. But results showed that there was a positive significant moderate correlation. According to the theory, it was hoped that the demolition prices would increase due to the decrease in ship numbers sent to scrapping by the effect of increasing income. The other factors such as demand for steel, steel prices and amount of other types of ships sent to the demolition may result this situation.

This study contributes existing theory by analyzing short run effects of a commodity price to its transport activities. Extraordinary fall of oil price facilitates the analysis. It is seen that newbuilding and demolition markets may be affected less than other markets or opposite of the theory in the short run.

This study contributes to practice by analyzing recent cycle in the tanker market. For instance, the difference between minimum and maximum values of a secondhand VLCC tanker is $29 million, and the difference between time charter earnings is $37500 at the examined 3 years period. So timing on commercial decision making and investing an asset in the shipping market is essential for shipowners.

7. LIMITATIONS OF THE STUDY AND SUGGESTIONS

The study has some limitations as well. The dataset consists of time series data. So before regression analysis, they could be tested for unit roots to obtain better results. But the dataset consists of maritime indicators and they do not change continuously in the short run. Due to this slow change, it is difficult to find positive results after clearing the unit roots. Also the dataset is collected from free publications one by one as weekly averaged values.

Further researches may model these relationships by different and complicated econometric models with more workable datasets. Also supply is assumed to be constant in this study, because the study examines the relationship in the short run. Time for new entrance to the market needs to be 2 or 3 years because of lead time on shipbuilding. Next studies my cover long run relationship adding changing supply into the model. Another suggestion for further research is adding voyage costs to the model, because decrease of oil price causes a decrease on voyage costs of the tankers. Bunker cost forms majority of the voyage cost. This study does not take bunker costs into consideration.

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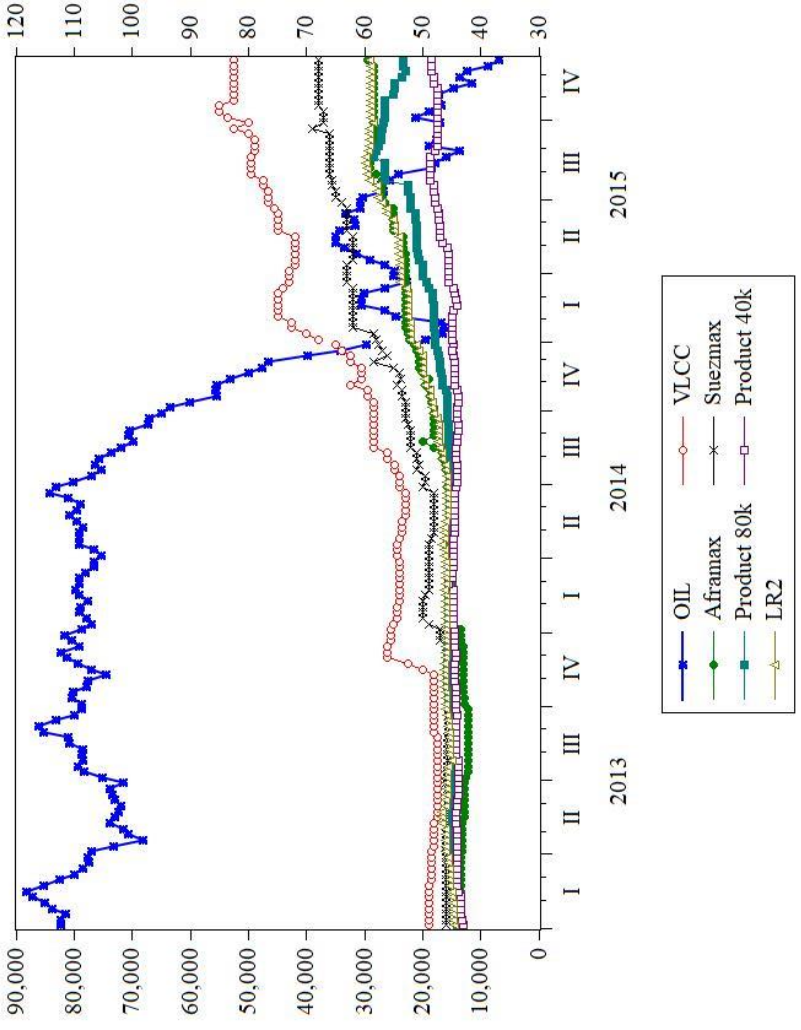
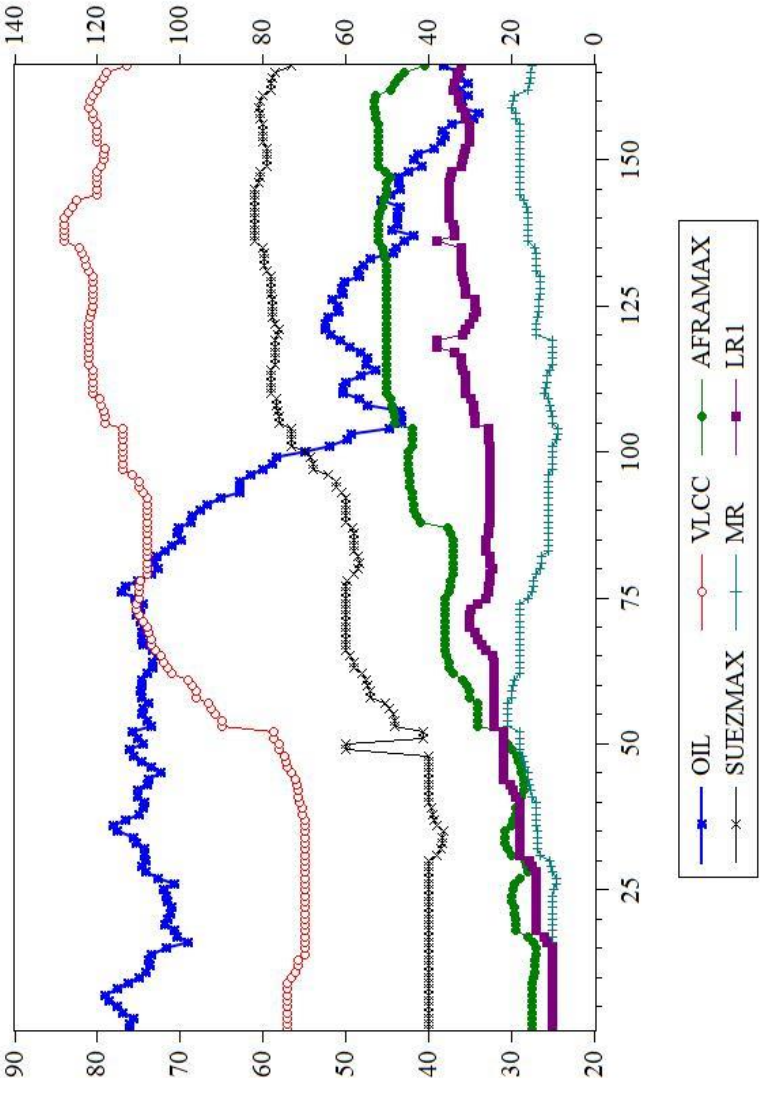
APPENDICES

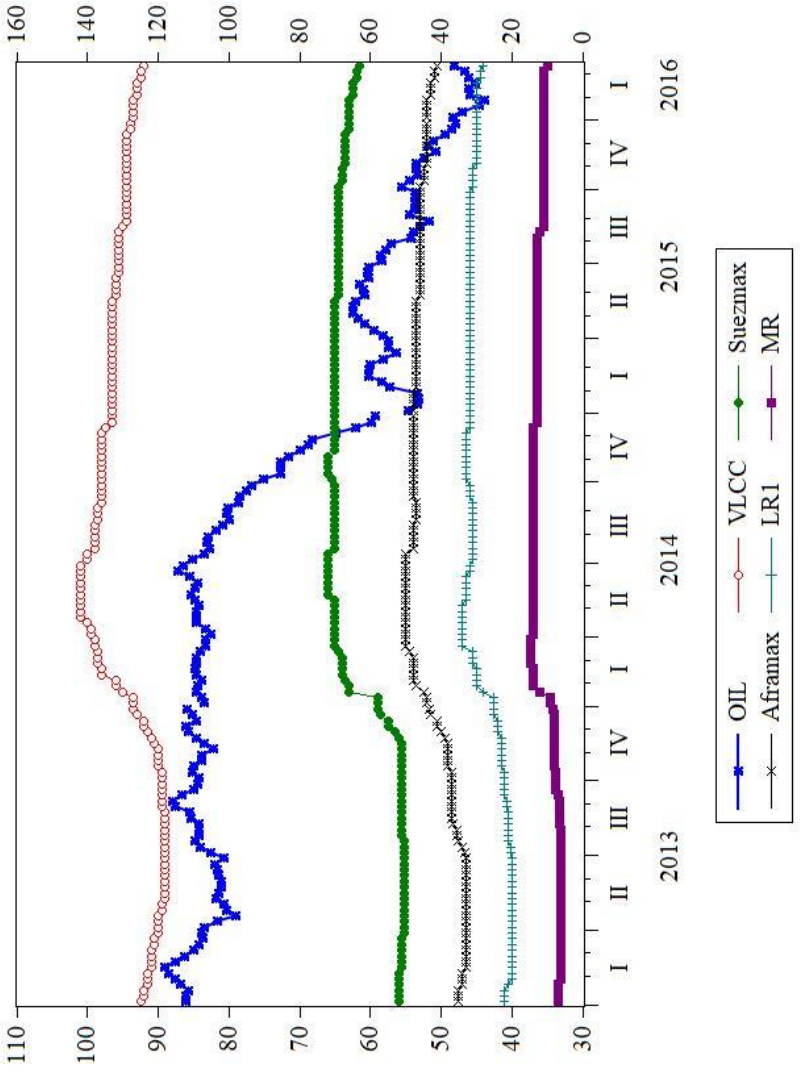
APPENDIX 1- TIME CHARTER EARNINGS AND OIL PRICE ($)



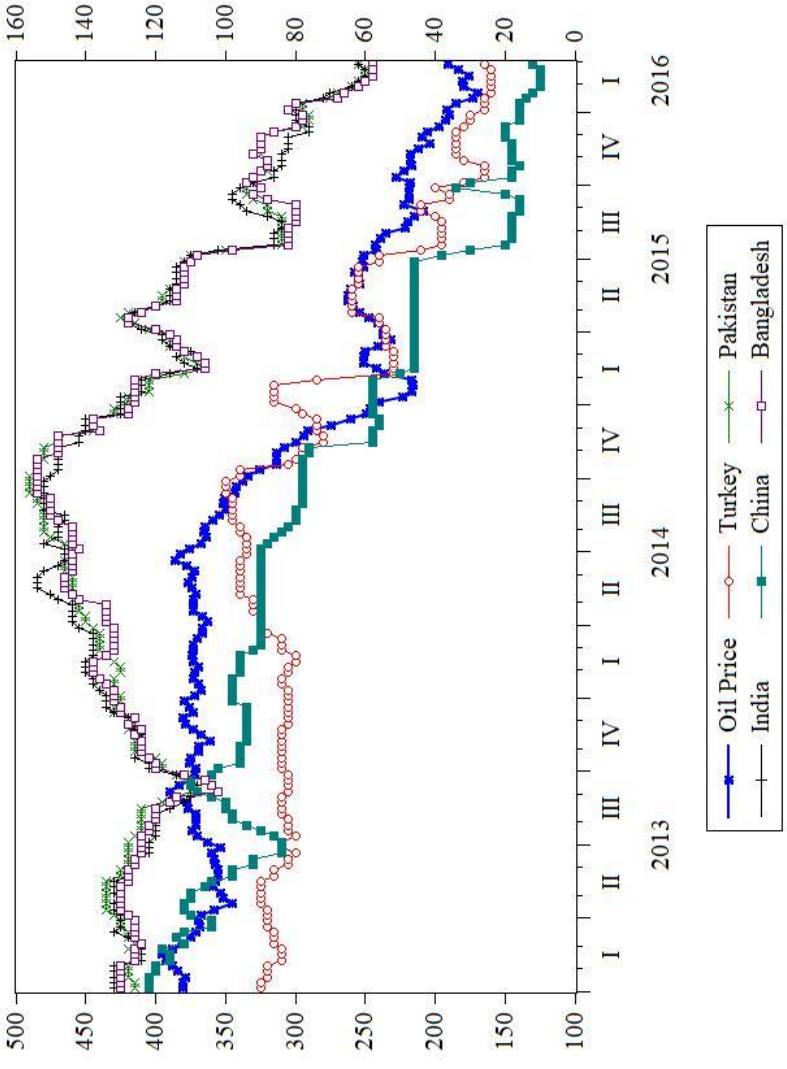
APPENDIX 2 – SECONDHAND TANKER VALUES ($M) AND OIL PRICE ($)



APPENDIX 3 – NEWBUILDING TANKER PRICES ($M) AND OIL PRICE ($)



APPENDIX 4 – DEMOLITION AND OIL PRICES ($)



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AN ANALYSIS OF SEABORNE TRADE THROUGH ISKENDERUN BAY

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ABSTRACT

Increasing trade volume and globalisation of supply chains have increased the importance of ports in international trade. Due to these developments, ports need to analyse the commodities in their hinterland to be able to meet their customer requirements. Iskenderun Bay, which is considered as a gateway to the Mediterranean Sea, has sufficient infrastructure to serve several commodity groups. The share of the total cargo handling of Iskenderun Bay is 9.34 % in Turkey. This study aims to analyze the frequency distributions of shipments, to determine the prominent cargo groups as well as exporting/importing regions of the ports located in Iskenderun Bay. The total amount of import-export cargoes and cargo groups have been analysed by the loading/discharging tonnages of the vessels, exporting/importing regions and the handling ports in Iskenderun. Calculation of the total amount of cargo on ton basis and shipment frequency has been found by using RStudio software to determine prominent cargo groups and main export/import regions. Assan Port, Yazıcı Port, Isdemir Port, MMK Metalurji Port, Orhan Ekinci Pier, Limak Port, Gübretaş Port, Sasa Terminal, and Petrol Ofisi Pier Port have been selected for the analysis.

Keywords: *Seaborne Trade, Cargo Analysis, Iskenderun Bay, Data Analysis, Frequency Distribution*

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İSKENDERUN KÖRFEZİ DENİZYOLU TİCARETİ ANALİZİ

ÖZET

Ticaret hacminin artması ve tedarik zincirinin küreselleşmesi limanların uluslararası ticaretteki önemini artırmıştır. Bu gelişmeler sebebiyle limanlar, müşterilerinin ihtiyaçlarını karşılayabilmek için hinterlandlarında bulunan ürünlerin analizini yapmaya ihtiyaç duymaktadırlar. Akdeniz'e açılan kapılar olarak nitelendirilen İskenderun Körfezi, birçok ürün grubuna hizmet verebilecek yeterli altyapıya sahiptir. Türkiye'de toplam yük elleçlemede İskenderun Körfezi'nin payı %9,34'tür. Bu çalışmanın amacı, İskenderun Körfezi'nde bulunan limanlara ait yükleme sıklıklarını analiz etmek ve öne çıkan yük gruplarını ve ihracat/ithalat bölgelerini belirlemektir. İthalat ve ihracat yüklerinin toplam miktarları ve yük grupları; gemilerin yükleme ve boşaltma tonajları, ithalat ve ihracat yapılan bölgeler ve İskenderun'daki elleçleme limanları bazında analiz edilmiştir. Ön plana çıkan yük gruplarının ve başlıca ithalat/ihracat bölgelerinin belirlenmesi için Rstudio yazılımı kullanılmış, toplam yük miktarları ton bazında hesaplanmış ve yükleme sıklıkları bulunmuştur. Analiz için Assan Limanı, Yazıcı Limanı, Isdemir Limanı, MMK Metalurji Limanı, Orhan Ekinci İskelesi, Limak, Gübretaş Limanı, Sasa Terminali ve Petrol Ofisi İskelesi belirlenmiştir.

Anahtar Kelimeler: *Denizyolu Ticareti, Yük Analizi, İskenderun Körfezi, Veri Analizi, Frekans Dağılımı.*

1. INTRODUCTION

On a global scale, businesses need to perform their transportation activities on a competitive basis. In line with the requirements, logistics, and logistics nodal points have become increasingly important, and competition in the international area has become more intense (Song and Jung, 2009:117). Becoming a global dimension beyond the nation's borders of supply chains has transformed the ports into maritime logistics hubs. Increasing in maritime transport volume has been increased the importance of ports in the competitive environment (Esmer, 2008:114; Ateş et al. 2013; 2-3; Monie, 1987: 1).

Nowadays, maritime transportation shows a significant increase compared to previous years In Turkey. Foreign trade volume of Turkey reached from 82.2 billion dollars (2000) to 341.1 billion dollars (2016) (TSI, 2018). According to Republic of Turkey Ministry of Transport, Maritime Affairs, and Communication, total handling volume at Turkish ports had been reached from 178,061,018 tons in 2014 to 376,900,946

tons at the end of the year 2016 (TR Ministry of Transport, Maritime Affairs, and Communication, 2017). The increase in trade and cargo volume makes it necessary for ports to analyse the commodities in its hinterland.

There are five main port regions in Turkey as Iskenderun Bay, Nemrut-Aliağa Bay, Gemlik Bay, Ambarlı Port Region and İzmit Bay. More than half of the ports located in these regions in Turkey (Esmer and Duru, 2017:216). Iskenderun Bay, located in Eastern Mediterranean region, has public and private ports and terminals (IMEAK DTO, 2015:115). Iskenderun Bay, considered as a gateway to Middle East countries due to its geographical proximity, has dry bulk cargo, container, LPG, LNG and crude oil terminals. Port activities in Iskenderun Bay are mainly based on iron-steel and its supporting industries. Because some iron steel companies - Tosyalı Iron and Steel Ind. Co., Ekinciler Iron and Steel Industries Inc., Yazıcı Iron & Steel Industry Inc., Iskenderun Iron and Steel Works Co.- which are ranked among the Top 500 companies according to ISO Top 500 Companies in Turkey, located in Iskenderun region and uses Iskenderun Ports (ISO, 2016; TR Ministry of Public Works and Settlement, 2007:37).

Iskenderun is the district of Hatay Province. When examining the industrial profile of the Iskenderun region in more detail, there are seven Organised Industrial Zones (OIZ) entirely within the boundaries of Hatay Province. These industrial zones are Iskenderun OIZ, Iskenderun OIZ (II.) Antakya OIZ, Payas OIZ, Erzin OIZ, Hassa OIZ, Kırıkhan OIZ (TR Ministry of Science, Industry and Technology, 2017). According to TR Eastern Mediterranean Development Agency (2013), there are 807 companies in the food, metal commodity, petrochemical, coal, rubber and plastic, textile and leather, forest product and furniture, ore, stone and soil-based industry, metal industry, paper products and printing industry (Doğaka, 2013). In addition to the trade characteristics of the region, attracting the investments to the region will increase the potential of the Iskenderun in terms of becoming a substantial industrial base TR Ministry of Public Works and Settlement, 2007:28). Accordingly, the total amount of cargo handling in the area where is under the responsibility of Harbour Master of Iskenderun basis reached from 13,089,929 tons in 2014 to 40,188,126 tons at the end of 2016 TR Ministry of Transport, Maritime Affairs, and Communication, 2017).

Many writers conducted systematics research into analysing the cargoes regarding ports and hinterlands. Generally, these studies performed regional basis. Idrus et al. (2015) analyzed connectivity level

of the maritime transport system in Sulawesi corridor by hinterland analysis, Klassen Typology analysis and connectivity analysis to find the potential of the region. Itoh (2013) examined the market area of Japanese ports by clustering analysis. Authors determined that there was a significant structural change in market areas of ports in export and import cargoes between the period of 1988 and 2008. Pardali and Stathopoulou (2005) port competition based on the dry bulk, container, liquid bulk and Ro-Ro cargoes by traffic volume and market shares of 12 Port Authority S.A. between the period of 1990 and 2003. Seoane et al. (2013) examined the maritime cargo routes and its changing trends between 2007 and 2011 years. The study implied the correlation between the cargo types and dynamics of transport flows. Notteboom (2008) studied relationships between the seaports and hinterland from the viewpoint of global supply chains. The study pointed out that choice of the distribution network is based on the commodity types and delivery frequencies. Esmer (2008:113-125) analysed the cargoes and hinterland of Port of İzmir. In the study, the author examined cargo and the vessel statistics in detail, and import and export cargoes were classified according to origin and destination regions and specific cargo groups. Results of that study showed that North Europe was the most preferred region regarding import shipments to Port of İzmir and American Continent was the top importing region. Bayraktutan and Özbilgin, (2013:81-92) analysed the distribution of road freight transport by the city in Turkey. The study pointed that cargo volume was higher in developed regions, while the cargo volume was lower in less developed regions. Elliott (1968:153-170) examined the range of commodity in the hinterland of Port of Tyne and trading areas. Apart from the academic studies, sectoral reports analysed the cargoes, ports and the cities by and the total quantity of handling. TR Ministry of Transport, Maritime Affairs, and Communication (2014; 2015a) reported the current situation of Turkish merchant marine fleet and seaborne trade in the world rankings. The reports placed the vessels, maritime transport, incentives to industry and ship industry statistics. Another report of TR Ministry of Transport, Maritime Affairs, and Communication examined the commodity flows in hinterlands and the factors to affect the development of the port hinterlands which have up to 1,000,000 tons or 100,000 TEU handling capacity. The report also found that freight corridors, the commodity dispersion matrix and distribution of the modes of transport in specified hinterlands (TR Ministry of Transport, Maritime Affairs, and Communication, 2015b:1-251). 2. Interim Report of Transportation Coastal Structure Master Plan Study stated the export and import volume of the ports and current situation and developments of seaborne trade (General Directorate of Railways Harbours and Port Construction, 2017).

Most reports in the field of commodity and cargo analysis of the port hinterland have focused on statistics of the current situation of the ports, vessels fleet, seaborne trade, cargo volume and handling capacities of the ports. Also, the previous academic studies have dealt with the specific port hinterland. These studies provide useful information to understand commercial trends of the ports in the region and well-coordinated statistical data of the ports.

The study aims to analyse the frequency distributions of shipments and amount of cargo groups which were mostly imported-exported in Iskenderun Bay. Furthermore mostly exported or imported regions were determined within the study. It is also aimed to take advantage of transforming the mass export and import data into meaningful indicators to understand the export and import tendencies and profiles of the ports located in Iskenderun Bay. Assan Port, Yazıcı Port, Isdemir Port, MMK Metalurji Port, Orhan Ekinci Pier, Limak Port, Gübretaş Port, Sasa Terminal, and Petrol Ofisi Pier Port were selected for the analysis. Prominent cargo groups and export/import countries were analysed based on the 2016 and 2017 statistics.

2. STRUCTURE OF THE PORTS AND HINTERLAND OF THE ISKENDERUN BAY

Iskenderun region has an extensive hinterland covering many countries such as Syria, Iraq, Iran, and cities such as Gaziantep, Southeastern Anatolia Region (GAP Region), Osmaniye, Ankara, Niğde, Adana, Adıyaman, Kilis, Kayseri, Malatya, Elazığ, and Hatay (Ateş, 2014:448, Isdemir, 2017). Also, Yozgat, Kayseri, Sivas, cities of Southeastern Anatolia Region, and Eastern Anatolia Region are located in the common hinterland of the ports in Mersin and Iskenderun (TR Ministry of Transport, Maritime Affairs, and Communication, 2015b). The total amount of cargo handling in Turkish ports including transit and cabotage shipments was 430,201,162 tons. The total amount of cargo handling was 40,188,126 tons including transit and cabotage shipments in Iskenderun region. The share of total cargo handling of Iskenderun region was 9.34% across the country (TR Ministry of Transport, Maritime Affairs, and Communication, 2017).

The ports located in Iskenderun Bay are Limak Port, Milangaz LPG Terminal, Sasa Terminal, Petrol Ofisi Pier Port, Yazıcı Port, Orhan Ekinci Port, Assan Port, Isdemir Port, MMK Metalurji Port, Delta Terminal, Aygaz Terminal, Port of Toros, Ceyhan Marine Export

Terminal, Botaş Terminal, İsken Port, and Denbirport Terminal. While the ports in the north of the region perform mostly in liquid cargo handling activities, the ports mostly in bulk, general cargo and container are located in the south of the region (TR Ministry of Transport, Maritime Affairs, and Communication, 2015a).

The geographical position of the ports determined within the scope of the study is shown in Figure 1.

Figure 1: Location of the Specified Ports in Iskenderun Bay
Source: Created by Authors

Limak Port: The port which previously operated as a subsidiary of TCDD (Turkish State Railway) was transferred to Limak Group for 36 years in 2011 with concession agreement (IMEAK DTO, 2015:170). After the transfer, piers, warehouses, buildings, port gates were reconstructed, and new equipment was bought. Additionally, the seabed was dredged, and the draft was deepened to 14.5-15 meters (Limakport, 2017).

Assan Port: Assan Port Operator Inc. was established by Kibar Holding in 2010 to serve Panamax, Super Post-Panamax and Post-Panamax container ships. The port has 16-19 meters draft and 250,000 TEU container per year and 1,700,000 tons per year general cargo capacity. It is expected that the capacity will reach to 400,000 TEU per year with the new investments (Assan Port, 2017a; Assan Port, 2017b).

Yazıcı Port: Yazıcı Port established by Diler Holding has 7,500,000 tons capacity and 6.5-19.5 draft level. Yazıcı 1 and Yazıcı 2 ports have ten

piers, customs warehouses, customs area and equipment (Diler Holding, 2017).

Isdemir Port: The port which is referred to the most prominent bulk and general cargo port in Mediterranean region meets not only its own plant's requirements but also services to its customers. Isdemir Port has five piers and 13.5-19 meters draft level which can serve the ships which are between the 60,000 to180,000 DWT (Isdemir, 2017).

MMK Metalurji Port: General cargo commodities, scrap, iron-steel intermediate goods, container, bulk commodities, cargoes of Ro-Ro ships, fresh produce commodities are being handled in the ports. The port has 14 meters draft level and 400,000 m^2 area (Port Operators Association of Turkey, 2017).

Orhan Ekinci Pier: The port has 13-19 meters draft level and proper infrastructure to berthing vessels up to 70,000 DWT. Nonbonded warehouse, outdoor storage and warehouse services are being given in the ports (Ekinciler, 2017).

Gübretaş Port: the port has the 0-20 meters draft level, and services to vessels up to 60,000 DWT pier length of the port is 812,68 meters and services are being provided to general cargo and bulk cargoes except for scrap commodities (Gübretaş, 2017).

Petrol Ofisi Terminal: Annual handling capacity of the port is 650,000 tons, and liquid petroleum products are being handled in the terminal.

Sasa Terminal: The terminal provides services to chemical tankers and liquid petroleum products. The draft level is up to 35,000 DWT. The terminal is owned and operated by Sasa Polyester Industry Inc. Sasa has 380 m^3 storage tank capacity and 300,000 ton handling capacity per year. Five buoys are ranging between 9 meters and 12.5 meters. The total length of the pipeline is 460 meters approximately.

3. METHODOLOGY

Statistics are evaluated under the descriptive and inferential statistics. Descriptive statistics involves a series of numbers that summarise the facts occurrences within the sample. Conversely, the scope of the inferential statistics enables researchers to determine whether there are differences between two or more samples (Thompson, 1998: 57). Descriptive analysis enables utilising the historical data to analyse and

interpret the past (Jatain and Ranjan, 2017: 10). In addition to being an easy method for statistical analysis, it allows the interpretation of large numbers of data in a controllable and organised manner. With the analysis, percentages and frequencies can be turned into an outcome of the decision making and gaining insight into the situation (Kaushik et al. 2014: 1189). The method necessitates frequency analysis of the data (King and He, 2005:667). Frequency analysis is commonly used to describe data which are collected by experimental and survey researchers (Büyüköztürk, 2012: 21). Distribution of frequency illustrates values or distribution of variables falling into the categories (Lewis-Beck et al. 2004:405). By the aim of the study, the data of 2016-2017 export-import data were analysed to summarise and to describe the condition of the export and import tendencies of the specified ports. Frequency analysis was used to examine the frequency distribution of the 2016-2017 export and import shipments to make a large amount of the data into meaningful for the analysis. Shipments frequencies were cross-tabulated to see an overall view of the shipments performed at the specified ports. Additionally, total cargo amounts were calculated, and shipment frequencies were found out according to cargo groups, regions, and ports to determine the prominent cargo groups and export/import regions for Iskenderun Bay.

The data were received from IMEAK Chamber of Shipping Iskenderun Branch as raw data in MS Excel format. The period covers the shipments between 2016 and 2017. The data were analysed by tons without regard to any distinction between the container, dry bulk and general cargo. The data of all ports located in Iskenderun Bay have not been reached. For this reason, the data of 9 ports in Iskenderun Bay were included in the study.

IMEAK Chamber of Shipping Iskenderun Branch classified the raw data based on transit shipments, country of loading, year of arrival and departure, loading tonnage, discharging tonnage, port of loading and port of discharge. Four data files involved 4,418 rows in total. The files covered not only export and import data but also cabotage and transit shipments. Besides, there were missing values in the port of loading/discharging, shipments tonnages and cargo types columns. Due to the existence of a large amount of data, and difficulties in eliminating of missing values, "Rstudio" software tool was used to analyse and categorise the data. "R" is a kind of software language that commonly used for data analysis, statistical calculation, data manipulation and graphical view (R Project, 2018; Özkan and Özkan, 2017: 16). It can be added many features to the tool for enhancing productivity in statistical

data interpretation (Horton and Kleinman, 2015:211). R tools present a vast variability of new statistical developments instantly comparing to the other statistical tools (Kolaczyk and Csardi, 2014: 8). With the tool, the user can develop new programming languages to gain more flexibility in analysing big data (Özkan and Özkan, 2017: 16). One of the advantages of R tools is that all data files can be seen simultaneously. In comparison, the other statistics tools, "R" console provides to coder eliminating missing values and manipulating the data in line with the individual needs (Hillebrand and Nierhoff, 2015: 14-102). This tool is widely used in transport studies. Çavdar and Ferhatosmanoğlu (2018: 19-33) estimated the airline customer lifetime value by using R tool. de Lima et al. (2016) found out the dynamics of fertiliser transport in Brazil which cause the different freight rates, and RStudio were used to forecast regression parameters. Gokasar et al. (2015) used RStudio to analyse the data of automated fare collection system obtained from BRT-Bus Rapid Transit line. Maksood and Achuthan (2017) estimated the energy consumption of Oman by using R. Moncayo-Martinez, and Ramirez-Nafarrate (2016) visualised the mobility modelling in the bike-sharing in Mexico City to foresee the reactions of the stations based on the data analysed by using RStudio.

The data in MS Excel format imported to RStudio tool, then the data transformed into the data frame. Name of commodities and countries were changed and reclassified under the specified categories. Hence, calculations and frequency distributions were displayed. In line with the first classification by the chamber, the data were inductively reclassified by region (Asia, Europe, Africa, American Continent, the Middle East, and the Black Sea), cargo groups (iron, mineral, coal, fertilizer, cement, petroleum product, chemical product and "other") and the ports (Assan Port, Yazıcı Port, Isdemir Port, MMK Metalurji Port, Orhan Ekinci Pier, Limak Port, Gübretaş Port, Sasa Terminal, and Petrol Ofisi Pier Port).

4. ANALYSIS OF THE DATA

4.1. The Analysis of 2016-2017 Export-Import Cargo Groups Handled at Ports

Table 1 shows the classified commodities included in the analysis. This classification shows the difference in export and import shipments. Import cargo analysis involves the chemical products; export cargo analysis includes the cement products. There are no data on cement

products in import shipments and no data on chemical products in export shipments.

Table 1: Classification of the Commodities by Cargo Groups

Cargo Groups	**Commodities**
Iron Products	iron and steel products, pig iron, slab, processed iron, steel roll, iron pipes, iron wire rod, sheet metal, slag, iron wire rod, iron ore, iron ore concentrate
Mineral Product	aluminum, florspat, barium, calcite, aluminum ore, bauxite, manganese ore, calcite, chromium, chromium ore
Coal Product	coking coal, pit coal, goudron
Fertilizer Product	urea fertilizer, phosphatic fertilizer, compound fertilizer, compost fertilizer
Cement Product	white cement, cement
Petroleum Product	benzole, natural bitumen, gas oil, diesel oil, petroleum coke
Chemical Product	coustic soda, paraxylene
Other Products	pumice stone, tufa, gypsum, ingot, gypsoplast, wheat, plant equipment, wind turbine tower, tank truck, tanker truck bed, miscellaneous materials, cossette, corn, pallet, plastic tank, prefabricated materials, trailer, fodder and pasture, soy-beans, flour, floating platform

In the light of the classifications mentioned above, Figure 2 shows the 2016-2017 export data analysis in iron, mineral, coal, fertilizer, petroleum, cement, and other product groups.

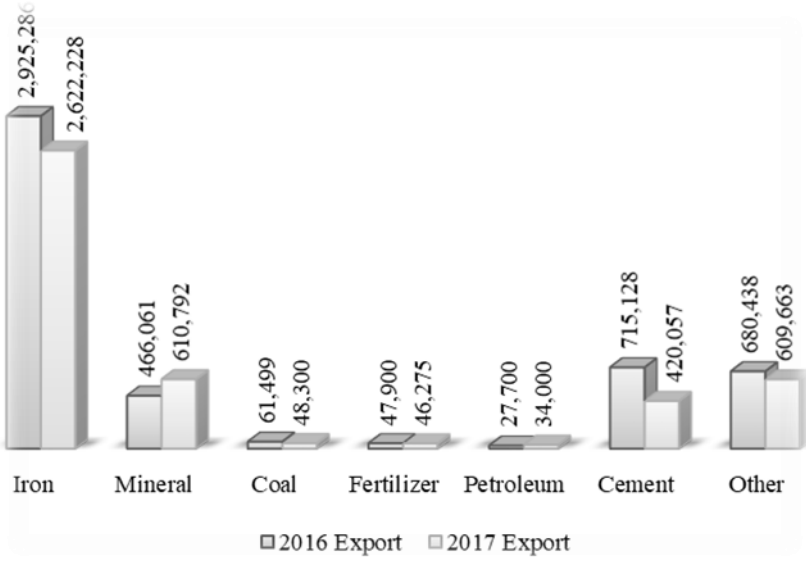

Figure 2: The Analysis of the 2016-2017 Export Cargo Groups Handled at Specified Ports Groups (Ton Basis)

As it is shown in the Figure 2, total export volume was 4,924,012 tons in 2016 whereas this volume reached to 4,391,315 tons in 2017. It is seen that there is a decrease in the export volume of all cargo groups except mineral and petroleum products cargo groups. The export volume of the iron products group had the largest share among the other groups in both 2016 and 2017. The total volume of the iron products group decreased to 2,622,228 tons in 2017 tons from 2,925,286 tons in 2016. The total volume of the mineral group increased 144,731 tons; petroleum product increased to 34,000 tons and. Table 2 indicates the frequencies of the export shipments in 2016-2017.

Table 2: Frequencies of 2016-2017 Export Shipments

Cargo Groups	**Iron**	**Mineral**	**Coal**	**Fertilizer**	**Cement**	**Petroleum**	**Other**	**Total**
Frequencies of the export shipments (2016)	420	83	8	6	69	5	124	715
Frequencies of the export shipments (2017)	403	96	6	10	62	5	119	701
Total	823	179	14	16	131	10	243	1,416

The downtrend in export cargo volume can be deduced from Table 2. However, shipment frequencies of coal and fertiliser cargoes increased. It stemmed from small quantity shipments at one time as such in petroleum cargo group.

In addition to import cargo volumes, the import volumes of 2016-2017 are shown in Figure 3.

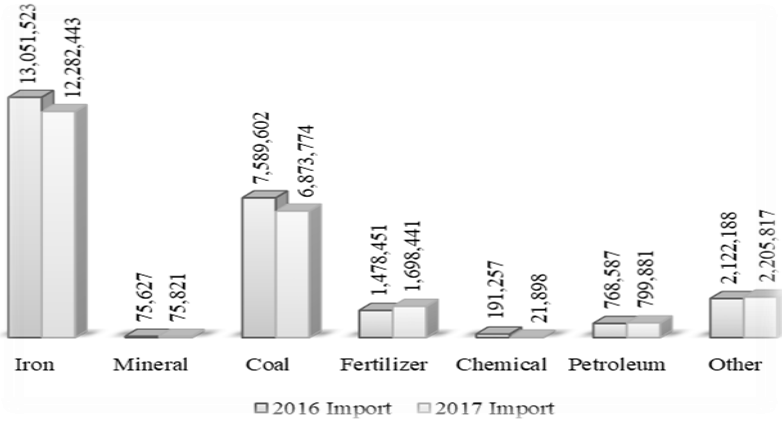

Figure 3: The Analysis of the 2016-2017 Import Cargo Groups Handled at Specified Ports

In the Figure 3, iron had the highest share among the cargo groups in 2016 and 2017 as well export. However, it can be seen that there was a significant decrease in iron cargo volume in 2017. The cargo groups that showed a decrease in import cargo groups are coal and chemical product (Coal dropped 715,828 tons, and chemical dropped 169,359 tons). Whereas, mineral, fertiliser, petroleum product and other group increased in 2017. The highest increase was recorded in fertiliser with a rise of 219,990 tons among the four cargo groups.

Table 3: Frequencies of 2016-2017 Import Shipments

	Iron	**Mineral**	**Coal**	**Fertilizer**	**Chemical**	**Petroleum**	**Other**	**Total**
Import (2016)	562	35	108	132	46	35	184	1102
Import (2017)	479	28	114	110	4	35	208	979
Total	1,041	63	222	242	50	70	392	2,081

According to Table 3, some shipment frequencies do not show similarity according to their increase. For instance, fertiliser cargo group showed an increase 219,990 tons in 2017, yet the frequency of fertiliser shipments decreased due to increase in the amount of cargo carried in a single voyage as such in petroleum product carriage.

4.2. Analysis of 2016 and 2017 Export Shipments of the Specified Ports by Region and Cargo Groups

Regarding 2016-2017 export/import data of Iskenderun Bay, all cargo groups were categorised under the six regions. Regional analysis of the cargo groups is shown in Table 4 and Table 6. Table 5 and Table 7 indicate frequencies of the export shipments (2016-2017).

Table 4: Cargo Groups and Region-Based Analysis of the Export Shipments in 2016 (Ton Basis)

Export (2016)	Asia	Africa	Europe	American Continent	Black Sea	Middle East	Total
Iron	192,653	781,568	459,575	16,050	757,663	717,777	2,925,286
Mineral	1,036	51,101	106,600	68,500	159,234	79,590	466,061
Coal	17,500	-	43,999	-	-	-	61,499
Fertilizer	3,150	27,750	-	-	-	17,000	47,900
Petroleum	7,600	-	11,200	-		8,900	27,700
Cement	25,800	416,469	5,352	112,499	35,110	119,898	715,128
Others	89,380	366,894	13,326	7,066	46,234	157,538	680,438
Total	337,119	1,643,782	640,052	204,115	998,241	1,100,703	4,924,012

It is clear that the top seaborne trade partner was Africa with the 1,643,782 tons whereas the least exported region was American Continent in 2016. Africa was the mostly imported iron products, mineral, fertiliser, cement and the "other" group shipments. Black Sea region was placed on the top of the mineral group exports.

Table 5: Frequencies of the 2016 Export Shipments by Region and Cargo Groups

Export 2016	Asia	Africa	Europe	American Continent	Black Sea	Middle East	Total
Iron	55	135	81	1	35	113	420
Mineral	1	11	13	3	45	10	83
Coal	2	-	6	-	-	-	8
Fertilizer	2	2	-	-	-	2	6
Petroleum	1	-	2	-	-	2	5
Cement	12	26	2	6	11	12	69
Other	49	25	7	2	8	33	124
Total	122	199	111	12	99	172	1,416

According to the Table 5, the highest number of shipments were performed in Africa in parallel with the total tonnage. The second highest shipment belonged to the Middle East.

Table 6: Cargo Groups and Region-Based Analysis of the Export Shipments in 2017 (Ton Basis)

Export (2017)	Asia	Africa	Europe	American Continent	Black Sea	Middle East	Total
Iron	355,832	388,880	785,918	72,360	178,527	840,711	2,622,228
Mineral	5,700	28,492	204,050	91,900	174,850	105,800	610,792
Coal	31,900	-	16,400	-	-	-	48,300
Fertilizer	8,550	34,800	-	-		2,925	46,275
Petroleum	-	-	34,000	-	-	-	34,000
Cement	45,340	100,737	-	225,780	-	48,200	420,057
Other	84,119	25,549	97,424	88,651	28,905	285,015	609,663
Total	531,441	578,458	1,137,792	478,691	382,282	1,282,651	4,391,315

According to the Table 6, the most significant amount of the exports were bought by the Middle East with the 1,282,651 tons, the Black Sea bought the smallest amount of the exports with the 382,282 tons in 2017. Among these regions, the iron products are mostly exported from the Middle East countries. The top seaborne trade partner was Europe in the mineral group export shipments. Europe was the only region where petroleum product group was exported. The region where the fertiliser mostly delivered to Africa and the "other" group was mostly delivered to the Middle East in 2017. Table 7 shows the frequencies of shipments by regions.

Table 7: Frequencies of 2017 Export Shipments by Regions

Export 2017	Asia	Africa	Europe	American Continent	Black Sea	Middle East	Total
Iron	81	59	107	6	37	113	403
Mineral	4	8	15	5	55	9	96
Coal	4	-	2	-	-	-	6
Fertilizer	5	3	-	-	-	2	10
Petroleum	-	-	5	-	-	-	5
Cement	22	9	-	8	18	5	62
Other	48	10	14	4	7	36	119
Total	164	89	143	23	117	165	701

701 shipment was performed to these regions in 2017. The Middle East had the highest proportion of the shipments whereas American Continent had the lowest proportion in 2017 export shipment frequencies. However, Black Sea region bought the lowest amount of cargoes in ton basis.

4.3. Analysis of 2016 and 2017 Import Shipments of the Ports in Iskenderun Bay by Region and Cargo Groups

Unlike export shipments, import shipments were evaluated under the eight main groups as iron, mineral, coal, fertiliser, chemical product, petroleum product, cement, and "other" cargoes. The analysis of the 2016 import cargo group on a regional basis is shown in Table 8.

Table 8: Cargo Groups and Region-Based Analysis of the Import Shipments in 2016 (Ton basis)

Import 2016	Asia	Africa	Europe	American Continent	Black Sea	Middle East	Total
Iron	248,622	502,248	4,969,102	4,879,360	1,983,445	468,746	13,051,523
Mineral	-	6,600	15,215	2,608	46,170	5,034	75,627
Coal	875,824	304,944	917,541	4,648,422	842,871	-	7,589,602
Fertilizer	46,500	680,017	292,169	-	273,480	186,285	1,478,451
Chemical	-	13,619	69,363	-	22,933	85,342	191,257
Petroleum	-	125,641	228,552	74,970	88,749	250,675	768,587
Other	19,800	126,242	953,713	425,001	528,712	68,720	2,122,188
Total	1,190,176	1,759,31	7,445,655	10,030,361	3,786,360	1,064,802	25,277,235

According to Table 8, Middle East was the top trading partner in import shipment with the 10,648,802 tons while the smallest trading partner was Asia with the 1,190,746 tons in 2016. Europe took place on the top in iron, coal, and other cargo groups. The Black Sea was the region where the most significant number of mineral groups were bought by Turkey whereas Africa was in fertiliser group. Finally the Middle East had the biggest share in petroleum and chemical cargo groups in 2016. Table 9 illustrates the frequencies of the import shipments (2016).

Table 9: Frequencies of 2016 Import Shipments

Import 2016	Asia	Africa	Europe	American Continent	Black Sea	Middle East	Total
Iron	32	44	188	59	121	118	562
Mineral	-	3	9	1	19	2	34
Coal	8	5	21	41	33	-	108
Fertilizer	2	68	19	-	26	17	132
Chemical	-	3	14	-	10	20	47
Petroleum	0	10	7	2	3	13	35
Other	7	33	50	9	75	10	184
Total	49	166	308	112	287	180	1,102

Although the Middle East was the top trading partner in 2016 imports, the region had the second highest frequency. Europe had the most significant share in iron shipments and total import shipments

whereas the lowest shipment frequency belonged to Asia region. The analysis of the 2017 import cargo group on a regional basis is shown in Table 10.

Table 10: Cargo Groups and Region-Based Analysis of the Import Shipments in 2017 (Ton basis)

Import 2017	Asia	Africa	Europe	American Continent	Black Sea	Middle East	Total
Iron	46,399	732,433	5,533,510	3,550,322	2,184,008	235,771	12,282,443
Mineral	5,273	6,016	28,921	3,601	23,310	8,700	75,821
Coal	759,019	340,751	551,598	4,261,484	960,922	-	6,873,774
Fertilizer	151,605	858,368	175,153	32,100	87,851	39,364	1,344,441
Chemical	-	10,040	-	-	-	11,858	21,898
Petroleum	-	44,544	460,153	25,000	146,679	123,505	799,881
Other	50,639	169,387	392,158	341,913	1,219,430	32,290	2,205,817
Total	1,012,935	2,161,539	7,141,493	8,214,420	4,622,200	451,488	23,604,075

The top import trading partner was American Continent with the 8,214,420 tons import shipment while the smallest import trading partner was the Middle East with 805,488 tons in 2017. Europe placed on the top in iron and mineral cargo groups. Black Sea region had the biggest share of petroleum products and other cargo groups. While Africa placed on the top in fertiliser cargo group, Middle East had the most significant share in chemical cargo group. Table 11 shows the frequencies of 2017 import cargo shipments.

Table 11: Frequencies of 2017 Import Cargo Shipments

Import (2017)	Asia	Africa	Europe	American Continent	Black Sea	Middle East	Total
Iron	17	49	200	41	105	67	479
Mineral	1	2	14	1	8	2	28
Coal	8	4	14	37	51	-	114
Fertilizer	5	70	12	1	6	16	110
Cement	1	-	-	-	-	-	1
Chemical	-	2	-	-	-	2	4
Petroleum	-	9	14	1	5	6	35
Other	6	23	28	11	132	8	208
Total	38	159	282	92	307	101	979

Contrary to what is expected, Black Sea is the region where the cargoes were most frequently shipped. The Black Sea also has the highest import frequency in coal, and other cargo groups. The second highest shipment frequency belonged to Europe. Europe placed on the top in iron, mineral, and petroleum products cargo groups.

4.4. Analysis of Export Shipments at Specified Ports Located in Iskenderun Bay in 2016 and 2017

Figure 4 and Table 12 analyse the export shipments of specified ports within the Iskenderun Bay in 2016 and 2017.

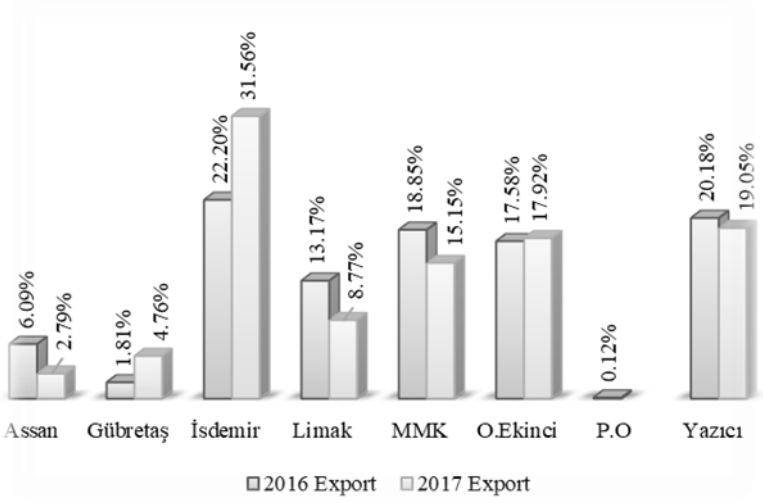

Figure 4: Analysis of Export Shipments of the Ports in 2016 and 2017

Percentages were calculated by considering only the amount of shipments of eight ports. The highest percentage of export shipment belongs to Isdemir Port both in 2016 and 2017. Petrol Ofisi Pier Port had the lowest percentage in 2016 shipments. The underlying reason for lowest percentage might stem from that Petrol Ofisi only serves to petroleum products. While the export volume of Assan Port, Limak Port, MMK Metalurji, and Yazıcı Port decreased, the rest of the ports increased in 2017.

Table 12: Frequencies of the Export Shipments by Ports in 2016-2017

Years	Assan	Gübretaş	Isdemir	Limak	MMK	O.Ekinci	P.O	Yazıcı	Total
2016	68	7	142	88	114	93	1	202	715
2017	39	24	174	93	84	76	-	211	701
Total	107	31	316	181	198	169	1	413	1,416

Yazıcı Port has the highest shipment frequency both in 2016-2017. It means that the shipments were performed in the low amount of cargo but the more frequent shipments in comparison with the Isdemir Port.

4.5. Analysis of Export Shipments at Specified Ports Located in Iskenderun Bay in 2016 and 2017

Figure 5 and Table 13 analyse the import shipments of specified ports within the Iskenderun Bay in 2016 and 2017.

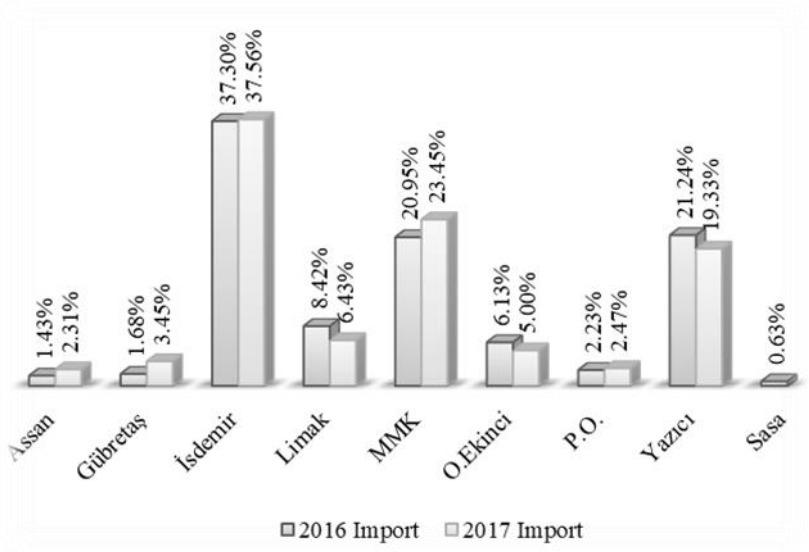

Figure 5: Analysis of Import Shipments of the Ports in 2016 and 2017

According to the Figure 5, Isdemir Port is the leader among the other ports in the 2016 and 2017. Ports showed a decrease in 2017 were Limak Port, Orhan Ekinci Pier, Yazıcı Port. Assan Port, Gübretaş Port, Isdemir Port, MMK Metalurji Port, and Petrol Ofisi Pier Port recorded increase in 2017 import shipments.

Table 13: Frequencies of Import Shipments by ports in 2016-2017.

Years	Assan	Gübretaş	Isdemir	Limak	MMK	O.Ekinci	P.O	Yazıcı	Sasa	Total
2016	56	46	188	135	303	119	20	201	34	1,102
2017	54	63	158	137	295	77	20	175	-	979
Total	110	109	346	272	598	196	40	376	34	2,081

MMK Metalurji Port had the highest shipment frequency in 2016 and 2017. The second highest shipment frequency belonged to Yazıcı Port. Alike in the 2016-2017 export shipment frequency, shipments of MMK Metalurji Port were performed in low quantity and more frequently. No 2017 data were recorded for Sasa Terminal. Therefore, it is impossible to make comments about Sasa Terminal.

5. CONCLUSION

Classification of mass data is necessary for further studies. Analyzing the seaborne trade data for the objective of classifying and transforming into a meaningful number provide an understanding of the export and import trends of the ports for both academicians and practitioners. With this study, it was classified and interpreted the mass statistical seaborne trade data of the Iskenderun region from the inductive viewpoint to understand the export and import tendencies.

Iskenderun region appeals to a wide area with its location and industry. Due to the presence of some ports and terminals, the region also has sufficient infrastructure to provide services to cargoes that may come from different regions. In the study, import and export cargoes were analysed by ports, regions and cargo groups. As a result of the analysis, iron products group was placed on the top in both 2016 and 2017. According to the data, export shipments of iron products group decreased from 2,925,286 in 2016 to 2,622,228 ton in 2017. Export shipments recorded a decrease of 532,697 tons in 2017. The import shipments were mostly in iron products group as in export shipments in 2016-2017. Cargo groups and region based analysis of the export shipments in 2016 showed that Africa took the first place with the 1,643,782 tons and iron products were the most exported group. The second highest amount of cargo belonged to the Middle East with the 1,100,703 tons. Iron products were the most imported cargo group of Middle East region in 2016. American Continent was the leader region in 2016 import cargo amount with the 10,030,361 tons. The lowest level of import shipments was recorded in Asia with the 1,190,746 tons. In 2017, regional import shipments showed that the most imported region was American Continent with the 8,214,420 tons whereas the least imported region was Asia. American Continent took the first place in 2017 import shipments with 8,214,420 tons. Turkey mostly imported coal group products from American Continent. Middle East region has the biggest share in 2017 export shipments. Isdemir Port has the biggest share in both export and import shipments. Compared to 2016, Isdemir Port has recorded an increase in export and import shipments in 2017. Generally, total cargo amount did not show the similarity with the shipment frequencies.

6. LIMITATIONS AND RECOMMENDATIONS FOR FURTHER STUDIES

Only port of loading and port of discharging information have been stated in the data of the ports. Especially in export shipments, it could not be determined the final discharging port of the vessels which goes to another port within the boundaries of Turkey. These data were disregarded. Additionally, there were too many missing values of import and export data received from IMEAK Chamber of Shipping Iskenderun Branch. These data were not included in the analysis. 2017 data of Sasa Terminal were not reached. The situation created a series of limitation to determine the final results of the export and import cargo shipments in specified ports. In future studies, this research can be developed with data from the other ports located in Iskenderun Bay. Hinterland analysis of all the ports in Turkey can be performed to determine the regional volume of the cargo groups and strategy formation for the regions. With this analysis, the efficiency of the new port investments can be made according to the cargo volumes of the region.

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ANALYSING THE TRADE BETWEEN TURKEY AND THE AEGEAN ISLANDS: THE HIDDEN OPPORTUNITIES

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ABSTRACT

Aegean Islands and Turkey have strict historical and geographical ties. These ties make social, cultural and commercial interaction inevitable. The trade between Aegean Islands and Turkey has great potential. Despite high demands from the Aegean Islands, according to the relevant statistics no sufficient trade interaction has been established. The aim of this paper is to analyze the trade potential and reveal the barriers of trade between Aegean Islands and Turkey. To reach this aim, trade statistics have been compiled from various sources and interviews have been carried out with the relevant professionals. The findings supported by the related literature indicate that as trade barriers range from infrastructural and procedural process at port and port-centric areas, and underdevelopment of small-sized ports, to lack of a collaborative culture among the various service providers involved in the trade and transportation interactions. The solutions proposed for the related problems are listed in the recommendation section of this study.

Keywords*: Aegean Islands, Turkey, trade, trade barriers.*

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TÜRKİYE İLE EGE ADALARI ARASINDAKİ TİCARETİN ANALİZİ: DEĞERLENDİRİLMEYİ BEKLEYEN FIRSATLAR

ÖZET

Ege Adaları ve Türkiye sıkı tarihî ve coğrafî bağlara sahiptir. Bu bağlar, sosyal, kültürel ve ticari etkileşimi kaçınılmaz kılar. Ege Adaları ve Türkiye arasındaki ticaret büyük potansiyele sahiptir. Ancak, Ege Adaları'ndan gelen yüksek talebe rağmen, istatistiklerden de anlaşıldığı üzere yeterli ticaret etkileşimi henüz kurulmamıştır. Bu çalışmanın amacı, Ege Adaları ile Türkiye arasındaki ticaret potansiyelini analiz etmek ve ticaret engellerini ortaya koymaktır. Belirtilen amaca ulaşmak için ticaret istatistikleri çeşitli kaynaklardan derlenmiş ve profesyonellerle görüşmeler yapılmıştır. Çalışmanın bulgularına göre ticari engeller; ticaret limanlarındaki altyapı ve operasyonlara, limanlardaki az gelişmişliğe, ticaret ve ulaşımda yer alan işletmeler arasında işbirliğine dayalı bir kültür birliğinin olmamasına dayanmaktadır. Bu bulgular literatürce de desteklenmektedir. İlgili sorunlar için önerilen çözümler öneriler başlığı altında listelenmiştir.

Anahtar Kelimeler*: Ege Adaları, Türkiye, ticaret, ticaret engelleri.*

1. INTRODUCTION

Maritime transport has historically been a major triggering effect on the development of trade and exchange of different cultures. For instance, Polónia (2016) investigated the maritime expansion of Villa de Conde, a Portuguese maritime town, between the years of 1500 and 1640. Polónia (2016) found that the expansion of town through maritime activities had significant effects on political, economic, social, and demographic development of the town. The current literature also well explains how shipping positively influences the trade and economic development of regions (Clark et al., 2004; Radelet and Sachs, 1998). Since maritime transportation does not only contribute to economic development, but also produce less Co2 per ton transported, governments promote policies such as short sea shipping.

Islands in Aegean Sea have been considered to be important for economic activities for centuries (Sherratt and Sherratt, 1993; Gertwagen, 2014). In recent years, tourism and cultural activities have increased a lot between Turkey and Aegean Islands that are close to Turkey. The increase has been achieved thanks to the initiatives of governmental and civil organizations such as bilateral cultural events and easiness in travel visa requirements. Accordingly, many tour operators carry out ferry services

between the Aegean Islands such as Chios, Lesbos, and Kos and Turkish Towns such as Çeşme, Kuşadası, and Ayvalık. Besides passenger transportation and tourism, the trade opportunities between the islands and Turkey have also risen. Yet, the trade activity has not reached to its potential or at least expected level. Turkey and Greece have considerable amount of trade, but only few amount of cargo is directly carried from Turkey to Aegean Islands. The cargoes are usually transported to Piraeus and Thessaloniki ports first, and then distributed to the islands by Greek companies.

Considering the rising tourism and trade activities between Turkey and Aegean Islands and the importance of Aegean Islands as a potential export market, Özer et al. (2011) analyzed the short sea shipping potential of the region and made significant implications regarding the cargo transport between Turkey and Aegean Islands. The purpose of this study is to investigate Aegean Islands as a potential direct export market and re-examine the current situation. The paper analyses the barriers of direct transport between Turkey and Aegean Islands and trade statistics between Turkey and Greece.

2. SHORT SEA SHIPPING

Short sea shipping is defined in the European Comissionion paper as *"Short sea shipping means the movement of cargo and passengers by sea between ports situated in geographical Europe or between those ports and ports situated in non-European countries having a coastline on the enclosed seas bordering Europe. Short sea shipping includes domestic and international maritime transport, including feeder services, along the coast and to and from the islands, rivers and lakes. The concept of short sea shipping also extends to maritime transport between the Member States of the Union and Norway and Iceland and other States on the Baltic Sea, the Black Sea and the Mediterranean"* (EC, 1999). Therefore, short sea shipping includes national and international traffic all along the coast and to and from the islands, rivers and lakes. In another definition Beškovnik (2006) puts another dimension to the short sea shipping terms by adding *"door-to-door intermodal movement"* to the definition as strategic element.

Besides definitions, the benefits of using short sea shipping should be noted here. Medda and Trujillo (2010) stated that short sea shipping is more environmentally friendly than the roadway and produces less congestion and risk of accident. Especially for two and a half decades European Union accelerates the support of short sea shipping with the motivation of environmentally sensitive point of view. Projects like Marco

Polo I and II, Trans-European Transport Network (TEN-T) and Pilot Action for Combined Transport (PACT) have issued and designed by the result of this wiewpoint. Suárez-Alemán (2016) states that "External costs to the society" generated by the other modes of transports is the main motivation of supporting short sea shipping. He also underlined that geographical allocation of Europe population is another reason of supporting short sea shipping since around 205 million people live in the EU coastal regions.

As can be understood from above mentioned definitions and benefits, the trade between Aegean Islands and Turkey should be be evaluated within the context and dynamics of short sea shipping which are very intensively discussed by the researchers. Venkatesh et. al. (2017) keynoted that short sea shipping has prominent barriers such as legislation (especially cabotage rules), infrastructure and procedures at port and port-centric areas, underdevelopment of small ports, and lack of a collaborative culture among the various service providers involved in the logistics supply chain. All these barriers especially the last one can be regarded as one of the main barriers of short sea shipping between the Greek Aegean Islands and Turkey.

3. TRADE RELATIONSHIP BETWEEN TURKEY-GREECE

Commercial relationships between Turkey and Greece have increased approximately 15 times over the past decade. The trade volume between the two countries was $ 273 million in 1994 and it reached $ 2 billion in 2005. Trade relations between Turkey and Greece have shown a significant increase since 2000. The trade volume between the two countries was 868 million dollars in 2000, which was 2 billion 640 million dollars in 2006. In 2012, trade volume between the two countries rose by $ 5 billion ($ 4.92 billion). Greece's imports to Turkey amounted to $ 3.5 billion, while Turkey's exports to Greece amounted to $ 1.4 billion. In 2017, Turkey exported $1.7 billion to Greece and imported $ 1.8 billion which accumulated as $3.5 billion and %6 of foreign trade volume of Greece (TÜİK, 2018). According to the data of 2012, Turkey became the second import partner of Greece after Italy. In 2013 and 2014, Turkey became Greece's number one import partner. Table 1 and Table 2 show the main export and import countries of Greece in 2017 respectively (Karayılanoğlu, 2017).

Table 1: Main Export Countries of Greece in 2017

Country	Share
Italy	11.2%
Germany	7.3%
Turkey	6.6%
South Cypriot	5.9%
Bulgaria	5.2%
US	4.8%

Source: Compiled from Karayılanoğlu, 2017 & Ministry of Economy, 2018

Table 2: Main Import Countries of Greece in 2017

Country	Share
Germany	10,7%
Italy	8.4%
Russia	7.9%
China	5.9%
Netherlands	5.5%
France	4.5%

Source: Compiled from Karayılanoğlu, 2017 Ministry of Economy, 2018

Major export commodities of Greece in 2016 are as follows; fresh and processed fruits and vegetables, tobacco, cotton, refined petroleum products, vegetable oils, textile yarns, textile products, clothing articles and accessories, aluminum, iron and steel products and cement. Greece is a country that especially imports some 80% of the total demand because of the limited production capacity in industrial products major import commodities of Greece are food (mostly protein products), transportation equipment and electrical equipments (Karayılanoğlu, 2017). Automotive spare parts and ship spare parts are the main items of Greece import that those total amount almost reach $2.5 biilion (www.ekonomi.gov.tr, 2018) Compared with the import and export figures, it is observed that the import export ratio has increased from 34% to 38% in 2016 (Karayılanoğlu, 2017).

Turkey's Exports Products to Greece in 2017 can be counted as follows**;** Iron and Steel Boiler, Machinery and equipment, tools and parts, Electrical Machinery and Equipment, Parts and Accessories, Articles made of iron or steel, Motor vehicles, parts and accessories, Unclassified clothing accessories and accessories, Furniture; Lighting, advertising lamps, prefabricated structures, Cotton, Ceramic products, Floor coverings for carpets and other textiles (Karayılanoğlu, 2017; TÜİK, 2018).

Turkey's Import Products from Greece in 2017 can be countred as follows; Mineral fuels, mineral oils and preparations, candles, Cotton, Articles made of plastic and plastic, Boilers, machinery and equipment,

tools and parts, Iron and steel, Aluminum and aluminum articles, Paper and cardboard; Paper pulp, paper and articles made of cardboard, Wood and wood products, charcoal, Organic chemical products, Electrical machinery and equipment, parts and accessories, Oilseeds and fruits, industrial plants, straw, animal feed (Karayılanoğlu, 2017; TÜİK, 2018).

In 2014, while 88 million dollars were exported from Izmir to Greece, an import of 114 million dollars was made from Greece to Izmir. In 2016, İzmir exports to Greece amounted to 103 million dollars and imports amounted to 173 million dollars (Karayılanoğlu, 2017; TÜİK, 2018).

3.1. Turkey and Greece Mutual Investments

Turkey and Greece has geographical ties in deep. Some academic studies investigated the mutual investments of each country. Papadopoulos (2008) declared that Greek-Turkish economic activities and future development of the bilateral economic relationships between two countries.

Greek direct investments in Turkey were being a main subject of the study on Chatzoudes et al. (2009). Empirical evidence from 17 Greek investors is provided through a questionnaire survey carried in summer 2004. Bastian (2004) also analyzed the reasons of possible trade barriers between Turkey and Greece. In short, academic researches are limitedly analyzing the trade potential of both country and they are not updated.

Turkish Chamber of Commerce prepared a country report for Greece and this report includes key statistics about the mutual investments of Turkey and Greece. In recent years, businessmen from both countries have made great strides in mutual investment and cooperation. However, the number of Greek investments and companies in Turkey is much higher. As of 30.06.2017, there are 745 companies with Greek capital in Turkey. 87 of these companies are in Izmir (Karayılanoğlu, 2017; TÜİK, 2018).

At the beginning of the recent investments in Greece, The Doğuş Group is a 50% partner in Flisvos Marina, operated by Greece's Lamda Development. Another important investment in Greece is Pak Holding's acquisition of 99.92% of the Greek cardboard company MEL (Macedonian Paper Mills) S.A. and the operation of the factory in Thessaloniki (Karayılanoğlu, 2017; TÜİK, 2018).

Another important investment that took place in 2013 is the Greek aluminum company ALUMIL, which took place in Turkey, reached an agreement with Has Metal to establish a company on aluminum processing in Turkey. Significant increases are recorded in the number of Greek companies investing in Turkey and investments made by them. Today, there are 600 Greek companies and 5 liaison offices in Turkey. The total investment amount is close to 6 billion Euros. Greek investors in Turkey are usually interested in the field of information technology (IT). They also operate in agricultural applications, packaging, plastics, pharmaceuticals, cosmetics, fishing, tourism and construction (Karayılanoğlu, 2017; TÜİK, 2018).

On the other hand, there are 20 Turkish companies and businesses operating in Greece. Among the large Turkish investors operating in Greece are T.C. Ziraat Bank, Koton Giyim, Tümel Elektronik, Murat Metal, Setur Servis Turistik A.Ş., Arkas Denizcilik (Karayılanoğlu, 2017).

3.2. Aegean Islands Trade Potential

There are numerous routes between Turkey and Greek Islands. These are Çeşme-Chios, Ayvalık-Mitilini (Lesvos), Kuşadası-Samos, Bodrum-Kos, Turgutreis-Kos, Marmaris-Rhodes, Bodrum-Rhodes, Fethiye-Rhodes Bodrum-Symi, Bodrum-Kalymnos, Bodrum-Leros. Mainly Çeşme-Chios route is about the subject of commodity trade but the other routes can be classified as touristics.

Therefore, the shiptypes appointed for the commodity trade between Turkey and Greek Islands are containerships and ferry boats. The flag and ownership of these ships can vary by operator of the ship. Nevertheless, the ones allocated for the touristic tours are mainly have Turkish registry in order to take advantages of incentives given by Turkish Government. For instance, Ulusoy Sea Lines who carries out regular voyages from Çeşme to Chios has four Ro-ro cargo ships and all of them have been registered in Turkish ship registry and have Turkish flag. These cargo ships have carrying capacity ranging from 19.689 Gross tones to 31.540 Gross tones (Ulusoy Çeşme Port, 2018).

The trade statistics are compiled from a number of different sources since there is not unique and reliable statistic source for Greece. Table 3 shows the number of Twenty-foot equivilant Container Transportation from Izmir to Piraeus and Thessaloniki from 2011 to 2016.

Table 3: Number of Twenty-foot equivilant Container Transportation from Izmir to Piraeus and Thessaloniki

Port Name	2016	2015	2014	2013	2012	2011
Piraeus	2347	2614	2947	3750	3838	2340
Thessaloniki	425	643	836	777	482	531
Total	2772	3257	3783	4527	4320	2871

Source: Compiled from the Deniz Nakliyecileri Derneği, 2018; TÜİK, 2018 and Ministry of Transport Maritime Affairs and Communication, 2018.

Table 4 shows three years (2014, 2015, 2016) average cargo discharge of Aegean Islands by cargo type (tons). These cargoes are mainly departed from the countries in European Union with regard to easiness of customs procedures. Aegean Islands do not prefer to import from Turkey directly. Instead of importing from Turkey directly, Italy and Greece have been used as a transit ways of importing (Karayılanoğlu, 2017).

Table 4: Three years (2014, 2015, 2016) Average Cargo Discharge of Aegean Islands by Cargo Type (tons)

Liquid Bulk	Dry Bulk	Container	Ro-ro	Other General Cargo	Total
1.240.271	570.178	0	2.141.998	131.148	4.082.135

Source: Drawn by authors based on statistics from various sources

Table 5 shows the population of some Aegean Islands therefore the islands which have great trade potential.

Table 5: The Population of Some Aegean Islands in 2016

ISLAND	POPULATION
Rhodes	115.490
Samos	32.977
Cretan	622.913
Chios	52.674
Lesbos	97.000
Corfu	102.071
Amorgos	1.973
Astypalaia	1.334
Ios	2.024
Kalymnos	16.179
Karpathos	6.226
Kea	2.455
Cos	33.388
Kythnos	1.456
Milos	4.977
Mykonos	10.134
Naxos	18.904
Paros	13.715
Samothraki	2.859
Skyros	2.994
Thassos	13.770
Tinos	8.636

Source: Drawn by authors based on statistics from various sources

Figure 1 shows the top ten Aegean Islands in terms of cargo discharge. Since Cretan and Samos statistics are not available the figure does not include these islands' statistics.

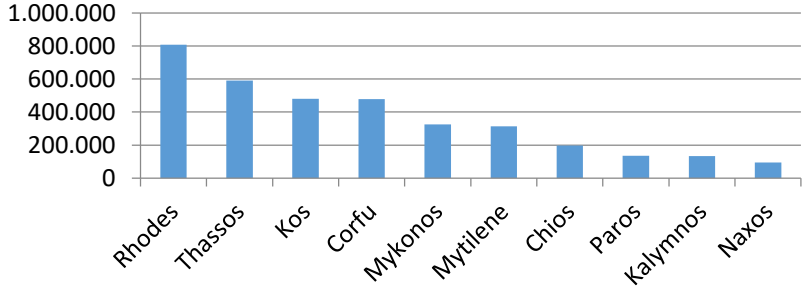

Figure 1: Top Ten Aegean Islands in terms of Cargo Discharge in Tons
Source: Drawn by authors based on statistics from various sources

Figure 2 shows the total cargo discharge of Greek Ports by years in tons. information of Samos and Crete and some minor islands are not included due to lack of statistics.

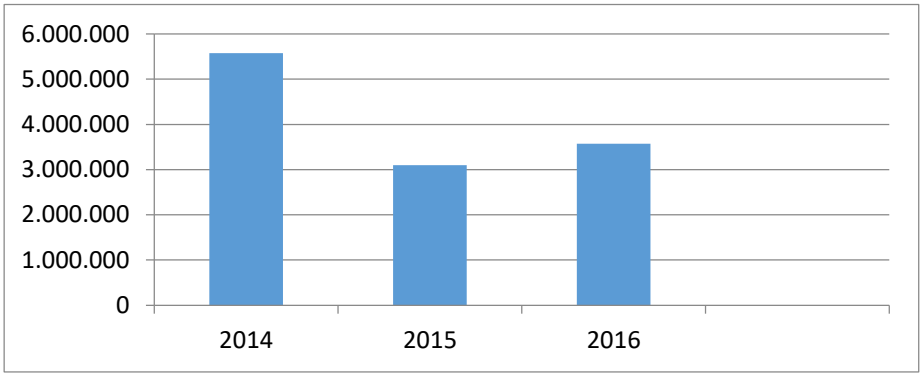

Figure 2: Total Cargo Discharge of Greek Ports by Years in Tons
Source: Hellenic Statistical Authority, 2017

Table 6 shows the number of voyages, vehicles and passenger arrived and departed from Chios to Çeşme, from Çeşme to Chios. Table 7 and Table 8 shows the trade from Turkey and Aegean Region of Turkey and Greece respectively.

In 2016, 945.568 TEU have been carried to/from Greece which 416.534 TEU were export and 529.035 TEU were import. Greece was the second largest foreign trade partner of Turkey in TEU following Egypt. The transit transportation was 88.776 TEU in 2006 so the total TEU handled to/from Greece was 1.034.345 TEU (DTO, 2017).

Table 6: Arrived and Departed Number of Vehicles and Passengers to and from Chios

Year	Number of voyages	Arrival passengers	Departing passengers	Arrival vehicles	Departing vehicles
2013	1.484	92.859	98.405	2.236	1.928
2014	1.456	111.858	114.813	2.241	2.411
2015	1.391	117.767	129.194	2.287	2.277
2016	1.222	87.143	90.197	1.863	1.767

Source: Drawn by authors based on Ulusoy Port statistics

Table 7: Trade between Turkey and Greece (million USD)

Year	Turkey's Export	Turkey's Import	Balance	Volume
1994	168,7	105,1	63,6	273,8
1995	209,9	200,7	9,2	410,6
1996	236,5	285	-48,5	521,5
1997	298,2	430,8	-1326	729
1998	369,2	319,7	49,5	688,9
1999	406,8	303	108,8	709,8
2000	573,8	323,6	250,2	897,4
2001	476,1	266,2	209,9	742,3
2002	573,8	323,6	250,2	897,4
2003	910,6	424,3	486,3	1.334,9
2004	1.116	592	574	1.758
2005	1.122	721	401	1.843
2006	1.600,7	1.040,9	559,8	2.641,6
2007	2.262	950	1.312	3.212
2008	2.430	1.151	1.279	3.581
2009	1.634	1.131	503	2.765
2010	1.456	1.542	-86	2.998
2011	1.553	2.568,8	-1.015	4.122
2012	1.402	3.539	-2.137	4.942
2013	1.108	3.210	-2.101	4.318
2014	1.536,7	4.043	-2.507	5.580
2015	1.400	1.860	-459	3.260
2016	1.427	1.187	240	2.614

Source: Drawn by authors based on statistics from various sources

Table 8: Trade between Aegean Region of Turkey and Greece (million USD)

Year	Export	Import	Balance	Volume
2005	126,3	47,5	78,7	173,7
2006	179,2	69,8	109,3	249
2007	234,3	88,8	145,5	323,2
2008	278,7	86,5	192,2	365,2
2009	187,1	60,4	126,7	247,6
2010	208,5	158,4	50,1	366,9
2011	211,3	272,1	-60,7	483,5
2012	186,2	208,9	-22.7	395,1
2013	17733	155,9	21,9	333,3
2014	155,5	141,8	13,7	297,3
2015	162,728	127,8	34,8	290,5
2016	167	187,9	-20,9	355

Source: Drawn by authors based on statistics from various sources

4. AIM OF THE STUDY

The aim of the study is to assess the trade potential and barriers between Turkey and Aegean Islands. As stated in the Introduction, the paper is to generate possible solutions to cope up with the trade barriers between Turkey and Aegean Islands by showing and underlying the hidden trade potential between Aegean Islands and Turkey.

5. METHODOLOGY

In order to reach the stated aim, 7 interviews (2 port authorities at Aegean region of Turkey, 2 chambers of commerce in Aegean region of Turkey, 2 ferry operating companies, 1 with Greek manager of trade firm which are located in Chios) were carried out with the shareholders involved in the related trade activities. The names are kept hidden due to the interviewed parties requests. Table 9 shows the details of the interviews.

Table 9: Interviews Carried out with Professionals

Duty/position	**Date of Interview**	**Way of Interview**
Ferry Operator Public Relations Department	23.08.2017	E-mail and phone
Harbor Master	23.08.2017	E-mail and phone
Ferry Operator Public Relations Department	23.08.2017	E-mail and phone
Commercial Representative Chamber of Commerce	24.08.2017	Face-to-face
Commercial Representative of Chamber of Commerce	24.08.2017	Phone
Manager of Trade Firm in Chios	24.08.2017	Phone
Harbor Master	23.08.2017	Phone

Source: Drawn by authors based on interviews held with professionals

The above mentioned interviews indicate that cargo transportation between Turkey and Aegean Islands is not very satisfactory. Despite the high demand from the Aegean Islands, no sufficient trade interaction has been established yet as it has been assumpted from the statistics given in Table 7.

6. FINDINGS

The underlined subjects in the interviews can be summarized as follows:

- There is a great potential of trade between Turkey and Greece. Professionals and state authorities declared the potential trade volume can reach 10 billion USD.
- Furniture, construction materials, hotel accommodation consumables, fresh food and water are the products most requested or most needed from Turkey.
- The Aegean Islands have limited port facilities to handle the cargo transportation from Turkey. Economies of scale principles can not be applied to the transportation activities between Turkey and Islands since the demand is distributed and depends on seasonality.
- No bonded warehouses are available in Aegean Islands.
- For the biological control of the food commodities, no labratory is available. In Rhodos there is one laboratory but no one has been employed.
- Despite the efforts of politicians, no sufficient business enterprenurship activities are created in order to accelerate the trade between Turkey and Aegean Islands. In 2016, prime ministers of both countries met in İzmir and signed an agreement for trade activities between İzmir and Theseloniki. Even this agreement, shipowners are not very willing to take part due to the high port prices and double taxation.
- No special custom regulation is adopted for short sea shipping activities.
- High port charges for the ships calling from Turkey.
- Even selling real estates in Aegean Islands to the foreign citizensis forbidden by law.
- Just one type of food –fish- could be exported directly to the Chios from Turkey. But it is not allowed to be allocated to the other Islands (The reason of this permission is that one of the biggest fish aquaculture company in Turkey is a Greek Company).
- Due to the high transportation costs for the route Izmir-Pireus-Chios, Turkish exporters are not able to sell their product since high transportation costs repress the cost effectiveness and competitive power.
- Disputes on continental shelf and FIR (Flight Information Region) line problems restrain the business relations of the countries.

- Greece government gives state incentives for the Greek producers those selling the goods to the Aegean Islands. It directly harms the competitive power of Turkish exporters.
- Effective marketing strategies should be implemented in order to take the attention of Greek importers even they are located in Islands or not.
- Historical and cultural ties are very strong. The social interactions are needed.
- Passengers are carrying their own shopping nearby. Thats the almost all direct trade made between Islands and Turkey. Bilateral political, international and intranational conditions are not very appropriate for trade.
- Decrease in the tourism in Turkey led the tourism to the Aegean Island increase.
- The trade interactions between Turkey and Islands first started in Ayvalık-Lesbos route. Bazaar of Ayvalık was visited by the Greek from Lesbos for daily consumption shopping.
- The prejudice -be rooted in history- between Greek and Turkish citizens is not strong comparing the previous years.
- The summits have been organized in cooperation with the Izmir Chamber of Commerce and the Greek Chambers of Commerce for the aim of the development of political, economic and social relations between Turkey and Greece since 1998. In 2018 tenth of the summits is planned accompanying with the cultural event.
- The Cyprus problem is not causing a weakness in commercial relations. This problem is not reflected to the public. It is used only by media tools as a daily means of politics.

7. CONCLUSIONS

The trade and tourism opportunities between Turkey and the Aegean Islands in Aegean Sea have shown a dramatic increase in the last two decades. The passenger transportation has risen significantly due to mostly Turkish tourists visiting the islands; however, the bilateral trade has not made such progress although government and civil bodies have made several attempts to increase the trade. Özer et al. (2011) highlighted the importance of potential trade and cargo flow. This study aims to re-examine the current situation by investigating the cargo amount of the islands, revealing the trade statistics between the two countries, and conducting interviews with related bodies.

The cargo statistics of islands reveal that the islands are dependent on the import cargo and potential of some islands such as Rhodes, Kos, and Mytilene cannot be underestimated. Yet, the interviews suggest that the trade has not reached to a desired level in last ten years. The barriers that existed 10 years ago still exist according to interviews. This paper reveals the problems that hinder the trade towards islands. One of the most important problems seems to be economies of scale, which is required for a regular transportation and trade to be more economic. This problem can be overcome by increasing the demand of Aegean Islands towards products in Turkey. One of the most important options to increase the demand is marketing facilities.

The barriers can also be evaluated under short sea shipping perspective. The barriers that hinder the trade between Turkey and the Islands seem to be very similar to barriers of short sea shipping in the literature. The literature indicates the barriers as legislation (cabotage), infrastructure and superstructure problems, underdevelopment of small ports, and lack of collaborative culture. These are important problems that the interviewees in our study also underlined.

8. RECOMMENDATIONS

- Mutual transportation investments should be carried out to handle the potential trade between Turkey and Aegean Islands.
- Bonded warehouses and controlling labrotaries should be established in order to accelerate the food trade.
- The regional trade agreements should be signed between governmental bodies.
- Regulatory barriers should be omitted both by two countries.
- Watersport interactions should be established such as sailing races, surfing races and yatching clubs.
- Marketing activities and investments can be held in both countries.
- Collaborative academic studies should be prepared in both countries.
- Center of gravity methods should be used in order to assess the hub port of the Islands in order to shape the trade interactions between Turkey and Aegean Islands.

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AUGMENTED REALITY AS BLUE OCEAN STRATEGY IN PORT INDUSTRY

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ABSTRACT

Augmented Reality as one of the components of Industry 4.0 is defined as a technology which layers digital improvements, geared to develop an existing real life setting by appealing to the senses. Augmented Reality applications will have possible uses in logistics industry in the near future and ports as the critical components of supply chain mechanisms will have no choice but to integrate such technologies to their services. Moreover, the seaports integrating their systems and strategies to such developments are expected to open up a new competitive field for rival ports. "Blue ocean marketing strategy" (BOMS) asserts that businesses should formulate new value for products and services to customers from different segments and place themselves in an uncontested market environment. The main aim of this paper is to provide an insight regarding the Augmented Reality concept in port business and discuss how such applications can serve in building blue ocean marketing strategies. Following a literature review of the port industry from Industry 4.0 perspective, possible applications of Augmented Reality will be considered by focusing on the marketing strategies of the port businesses.

Keywords: *Augmented reality, blue ocean strategy, marketing strategy, seaports.*

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LİMANCILIK SEKTÖRÜNDE MAVİ OKYANUS STRATEJİSİ OLARAK ARTTIRILMIŞ GERÇEKLİK

ÖZET

Endüstri 4.0 bileşenlerinden biri olan Artırılmış Gerçeklik, duyuları cazip hale getirerek var olan bir gerçek ortam ayarını geliştirmek üzere geliştirilmiş dijital iyileştirmeler sağlayan bir teknoloji olarak tanımlanmaktadır. Artırılmış gerçeklik uygulamalarının yakın gelecekte lojistik sektöründe olası kullanımlara sahip olacağı ve tedarik zinciri mekanizmalarının kritik bileşenleri olarak bu teknolojileri hizmetlere entegre etmekten başka bir alternatifin bulunmayacağı tahmin edilmektedir. Sistemlerini ve stratejilerini bu gibi gelişmelere entegre eden limanların rakip limanlar içinde yeni bir rekabet alanı açması beklenmektedir. ¨Mavi okyanus pazarlama stratejisi¨ adı verilen strateji, işletmelerin farklı bölümlerden müşterilere ürün ve hizmetler için yeni bir değer yaratması ve kendisini tartışmasız Pazar ortamına yerleştirmesi gerektiğini savunmaktadır. Bu çalışmanın amacı, limanlarda Artırılmış Gerçeklik kavramının nasıl kullanılabileceğine dair fikir vermek ve bu uygulamaların mavi okyanus pazarlama stratejileri oluşturmada ne gibi yardımları olabileceği tartışılmaktadır. Endüstri 4.0 bakış açısıyla yapılan liman literatür taramasından sonra, olası Artırılmış Gerçeklik uygulamalarının limanların pazarlama stratejilerine etkileri incelenmiştir.

Anahtar Kelimeler: *Arttırılmış gerçeklik, liman, mavi okyanus stratejisi, pazarlama stratejisi.*

1. INTRODUCTION

In today's global world, firms notice the importance of designing and coordinating supply chains and distribution networks; while competing and surviving in harsh market conditions (Sengupta et al. 2006: 4). This competition increased the importance of maritime transportation while ports are considered as an important ingredient in linking the global trade with maritime transport while they are taking part in both of end point within maritime transport and the link with other modes of transport in the supply chain (Heaver, 1995; Notteboom and Winkelmans, 2001; Jacobs and Hall, 2007; Cahoon et al. 2013). This situation caused to intense competition between ports.

To survive this intense competition, firms can choose blue ocean strategy. Blue ocean strategy mainly refers to creation of a new, uncontested market space -with the help of innovation- that makes competitors irrelevant and creates new customer value while generally decreasing costs (Kim and Mauborgne, 2005a: 6). Ports must have a

route that will differentiate themselves in order to adopt blue ocean strategy. Moreover, ports should use this tool in operations to differentiate themselves. One of the concepts that Industry 4.0 adds to our lives is Augmented Reality (AR) and it can act as a differentiating tool for port businesses in terms of services, processes, marketing communications, service delivery systems and pricing as well. Although there are various studies focusing on the use of information technologies in the port industry as well as the increasing interest on components of Industry 4.0, the studies discussing the applicability of Augmented Reality in port businesses are in their infancy. Thus, the main aim of this paper is to provide an insight regarding the Augmented Reality concept in port business and discuss how such applications can serve in building blue ocean marketing strategies.

The paper proceeds as follows. In the first part, a literature review was conducted in two sections. In the first part the relationship between Industry 4.0 and innovation on ports was investigated and then blue ocean marketing strategy was discussed. After the literature review, the expected effects of AR on ports were examined in terms of service, price, place, promotion and internal marketing reflections. Later, the study continues with a framework for determining which factors should be eliminated, raised, reduced and created to form the blue ocean marketing strategy with AR. Study ends with the future research ideas and limitations.

2. INDUSTRY 4.0 AND INNOVATION AT PORTS

The emergence of Information and Communication Technologies (ICT) has brought fundamental changes in businesses. Computers are getting smaller while things can communicate across world-thanks to Internet. These improvements also affected manufacturing systems. In Germany, this trend is called the 4th Industrial Revolution or Industry 4.0 (Kagermann et al. 2013: 5). Driven by ICT, Industry 4.0 is a network approach that components and machines are becoming smart and part of a standardized network depending on the well proven internet standards (Kolberg and Zühlke, 2015: 1870). Industry 4.0 aims to optimize the value chains with implementing an autonomously controlled and dynamic production (Kolberg and Zühlke, 2015: 1871). During this process, new technological advancements are the biggest auxiliaries.

The discovery of new technologies has accompanied industry development from early adoption of mechanical systems to support production process, to today's highly automated assembly lines, in order

to be responsive and adaptive current dynamic market requirements and demands (Lee et al. 2014: 4). The incredible growth in the development and adoption of information technology and social media networks has increasingly affected consumer perceptions of product innovation, quality, variety and delivery speed. This requires creating the factory with self-awareness, self-guessing, self-comparison, self-restructuring and self-care facilities. Two innovative developments that bring this new technology together are highlighted by academia and industry: service innovation and industrial big data (Lee et al. 2014: 4).

Ports as one of the main actors of service industry within the scope of maritime transport and logistics, need to meet the requirements of such changing environment by focusing on both the technological and service innovation. International competitive dynamics, economies of scale and globalization have emphasized the key role of technological innovation, supply chain integration and knowledge for ports in order to achieve competitive advantage (Priemus, 2001; Yang et al. 2009). Since port activities are known as complex in the supply chain activities, implementing new digital industrial technology will be useful which eventually lead to increased productivity in port activity and lead in change the profile of port workers (Popa et al. 2017: 50). Main advance of new technologies will force the ports to be more technology-oriented and to be able to stay competitive and attract employees, even in the context of employee shortage. In the ports, innovations in equipment and information technologies are adapted to the port system to operate unmanned terminals based on automation, optimize operational processes to implement process innovations, and provide service innovations by providing integrated value-added logistics services as well as basic port services (Karataş Çetin and Sait, 2014: 82). Moreover, literature review showed that studies related to port innovation has increased dramatically over the years (Blanco et al. 2010, Van den Bosch et al. 2011; Keçeli, 2011; Arduino et al. 2013; Cahoon et al. 2013; De Martino et al. 2013; Hall et al. 2013; Acciaro et al. 2014; Karataş Çetin and Sait, 2014; Vanelslander et al. 2016; Quintana et al. 2016).

Main port innovations can be grouped under eight groups as; port service innovations, process innovations, ecological innovations, information technologies innovations, social innovations, infrastructure innovations, organizational innovations and marketing innovations (Karataş Çetin and Sait, 2014: 84-85). Port service innovations are new or developed port services such as waste management, value added logistics services, electric supply to ships (De Martino et al. 2013; Blanco et al. 2010). Process innovations can be changing equipment assignments

during terminal operation processes, sharing railway services, licensing land transportation vehicles at port entrances (Hall et al. 2013). Ecological innovations can be cold ironing, electric handling equipment and land vehicles used to reduce carbon dioxide emissions, tariff reductions to vessels using low-sulfur fuels, green harbor and green technology programs and use of renewable energy sources such as wind, wave and solar energy (Arduino et al. 2013; Hall et al. 2013; Acciaro et al. 2013; Cahoon et al. 2013). Information technology innovations can be identified as terminal operation and port management systems (Arduino et al. 2013; Keçeli, 2011). Social innovations in ports can be occurred in training and development of port staff and development of external relations with the business and academic environment (Arduino et al. 2013; Blanco et al. 2010). Infrastructure innovations can be identified as indented berths, unmanned terminals based on automation, advanced crane and load elevator designs, as well as many other examples such as propelled cranes and self-propelled unmanned vehicles (Arduino et al. 2013; Acciaro et al. 2013; Vanelslander et al. 2016). Organizational innovations include changes in port organization structure, putting new business procedures into action and facilitating intra-organizational information sharing (Blanco et al. 2010; Quintana et al. 2016). Marketing innovation includes port promotions and development of marketing strategies (Blanco et al. 2010; Quintana et al. 2016).

In the era of Industry 4.0, ports are expected to face some challenges in order to meet the needs of such various innovations in their mechanisms. For instance, while information technology innovations will necessitate the application of complex systems to the various levels of operations and port services, marketing innovations will require more innovative ways to contact with the customers and stakeholders in order to remain competitive. In this sense, emerging areas that the ports have not entered before with regards to various innovation types (ecological, information technology, etc.) can be considered as an important opportunity for port industries. Hence, blue ocean strategy for port industries can be considered as a valuable strategy where ports can achieve success not by competing with their competitors but rather from creating blue oceans of untapped new market spaces ripe for growth. Rather than involving in head-to-head competition for achieving sustainable competitive advantage, which is a typical characteristic of red ocean of rivals fighting over a shrinking profit pool, ports may look for new ways of developing new areas for blue ocean strategy. Next section provides an overview of blue ocean marketing strategy by focusing on the main components and the assumptions.

3. STATE ART OF THE BLUE OCEAN MARKETING STRATEGY

Metaphor of ¨red oceans¨ and ¨blue oceans¨ represents the market universe. Red oceans are industries that exist today, in other words, the known market space. In red oceans, industry boundaries are designated and accepted, and the competitive rules of the game are well understood (Kim and Mauborgne, 2004: 72) while firms try to perform better than their competitors to get greater share of existing demand. As the market gets more crowded, profits and growths are declined (Kim and Mauborgne, 2005a: 4). The Blue Ocean Strategy is *¨a consistent pattern of strategic thinking behind the creation of new markets and industries where demand is created rather than fought for and the rule of competition is irrelevant¨* (Kim and Mauborgne, 2005b: 106). Blue oceans symbolize industries don't exist today (Kim and Mauborgne, 2005a: 4). In blue oceans, demand is created instead of fighting for existing demand and blue oceans are areas free of competitors. They offer the possibility of profits and success and great customer satisfaction and thus create new demands by changing the basis of competition. To do so, they must be innovative and the heart of the Blue Ocean approach as in marketing and product development is customer knowledge. Thus, the key to avoiding disastrous competition is to leapfrog over the competition to serve customers in new ways (Chakrabarti, 2014: 69).

One of the most important features of blue ocean strategy is that it refuses the principal presumptions about conventional strategy which is a trade-off exists between value and cost. Considering this presumption, a firm can either create value with higher costs or create reasonable value with lower cost. To put in other way, in red oceans, the strategy has to be determined either by low cost or by differentiation. However, both the differentiation and the low cost can be offered together in blue ocean strategy (Kim and Mauborgne, 2004:76). Red ocean strategy assumes that industry conditions are set and firms have to compete within these boundaries. This assumption is called as structuralist view or environmental determinism by the academics (Kim and Mauborgne, 2004: 77). On the contrary, blue ocean strategy is based on a view that market boundaries and industries can be reconstructed by the actions and beliefs of industry players, which is called as reconstructionist view (Kim and Mauborgne, 2005b: 108). Reconstructionist view of strategy is built on the theory of endogenous growth. Endogenous growth theory traces back to Joseph A. Schumpeter's observations that pressures that change economic structure and industry landscapes can be caused by the system.

However, Schumpeter focuses on the essential characteristics of actors behind innovations that convince structural change. Schumpeter sees entrepreneurs as the main source of innovation and disputes that big firms, which have resources and capital to invest in research and development, are the main drivers for innovation (Sledzik, 2013: 93).

Competition was not used as a benchmark in blue ocean strategy instead value innovation was the main force (Kim and Mauborgne, 2005c: 22). The cornerstone of blue ocean strategy is value innovation (Kim and Mauborgne, 2005a: 12). According to Blue Ocean Strategy value and innovation are inseparable (Leavy, 2005: 13). Value innovation happens only when firms coordinate innovation with utility, price and cost positions (Kim and Mauborgne, 2005a: 13). Value innovation is created in the region where a company's actions favorably affect both its cost structure and its value proposition to buyers. Cost savings are made by eliminating and reducing the factors an industry competes on. Buyer value is lifted by raising and creating elements the industry has never offered. Over time, costs are reduced further as scale economies kick in due to the high sales volumes that superior value generates (Kim and Mauborgne, 2005a: 17).

The creation of blue oceans is concerned with driving costs down while simultaneously driving value up for buyers. This is how an increase in value for both the company and its buyers is achieved. Since the buyer value comes from the utility and price that the company offers to buyers and the value to the company is generated from price and its cost structure, value innovation is achieved only when the whole system of the company's utility, price, and cost activities is arranged properly. It is this whole-system approach that makes the creation of blue oceans a sustainable strategy. Value innovation requires companies to orient the whole system toward achieving a leap in value for both buyers and themselves (Kim and Mauborgne, 2005a: 17; Chang, 2010; Chakrabarti, 2014). In terms of achieving value innovation, blue ocean strategy calls for new areas and/or markets for companies and in the case of ports, recent developments in information and communication technologies in accordance with Industry 4.0 provide new areas for differentiation as well as for creating blue oceans such as augmented reality, virtual reality (VR) applications etc. Next section firstly provides an overview of augmented reality concept and then discusses this concept within the view of ports and blue ocean marketing strategy.

4. AUGMENTED REALITY IN THE PORT INDUSTRY

Digital Transformation describes *"the use of technology to radically improve performance of enterprises"* (Westerman, 2011). The meaning of "digital" as an economic term stands for *"based on digital technologies or digital techniques"* compared to different meanings in other fields (Hartel, 2016). The so-called SMACT-technologies – Social, Mobile, Analytics, Cloud and Internet-of-Things (Van Manen et al. 2014: 6) shape the future of the businesses by mirroring the new fields of gaining competitive advantage.

Industries and companies are motivated to digitally transform their businesses leading to changes in strategies, processes, structures, products and cultures in order to deal with more stringent requirements of the business environment (Westerman, 2011). Ports worldwide have to face a various number of challenges and meet them by taking measures of digitalization. Various technologies have been adopted in various industries and finally to complex industries, namely ports and commercial aviation that entail a high degree of risk and safety (Rushmore, 2016).

Augmented reality (AR) refers to the perception of the real world and an extension of this perception by the integration of virtual aspects. Images of the real world are displayed on smartphones or data glasses and texts or other images will be inserted (Augment, 2016). Main AR items currently available can be listed as: handheld devices, stationary AR systems, spatial AR systems, head-mounted displays, smart glasses, smart lenses (DHL, 2014). Some of the well-known examples of AR technologies are Hololens, Meta2 and DAQRI Smart Helmet. Microsoft HoloLens is the most advanced AR device available on the market. As a standalone computer that can display images that look like they are in the real world, HoloLens is the first example of a model. With a collection of sensors and cameras, HoloLens continually scans the area around the user and updates the 3D mesh of that area to a so-called spatial map (Odom, 2017). Another example is Meta 2 which is a connected device. This means that a conventional PC needs a connection to work and is designed to be used in a fixed place without the ability to navigate in your real-world environment. Meta 2, built around the idea that will replace your 2D screen, is plugged into the video port of your computer, sensor input and image processing are performed by the processors of connected PCs (Odom, 2017). The DAQRI Smart Helmet is an AR instrument with a stereoscopic (binoculars) and wireless headset placed in a helmet. The device is focused on industrial uses and contains a large number of

sensors inside and around the industrial machines to assist the operator in freehand interaction (Gaydhani, 2017).

AR can be considered a variation of the Virtual Environment (VE) concept (Azuma, 1997). VE technologies put a user in a completely synthetic environment. When using this technology, the user cannot see the real world around him. Conversely, the AR allows the user to see the real world, with virtual objects superimposed or brought together in the real world. For this reason, the AR completes the reality instead of replacing reality (Augment, 2016; Azuma, 1997). AR technologies allow the user to see the real world mixed with virtual objects superimposed to or composed with it (Rubio et al. 2004: 243). AR increases user experiences, permitting extra information be augmented onto the real world meaning that creates selling opportunities (Olsson et al. 2013). AR technologies are implemented on smart mobile devices that combining touch-and-feel information in the physical world with online content in the digital world. AR tools manage real time interactivities between products, physical spaces, brands and consumers. It coordinates the digital environment on smart devices with the real time surrounding in a special way that boundaries between them disappears (Javornik, 2014). AR can be seen in different forms such as touch-screen recommenders, virtual mirrors, Google Glass, in-store product videos, virtual screen and aisles. In the field of Augmented Reality (AR), virtual objects are integrated interactively in real environments (Azuma, 1997). Augmented reality is relatively similar to other digital technologies in the sense that it is mainly used through smartphones (at the moment) and it is highly interactive for consumers (Augment, 2016).

As shipping industry is gradually being more involved in digital applications, more awareness regarding the various applications is gained in different fields of maritime industry. SAFETY4SEA conducted 'Share your Smart Shipping Insights' survey during Q4 2016 and assessed how maritime stakeholders have realized the current and future smart shipping challenges and have established the nature of ECDIS & e-Navigation, Cyber Safety/ Cyber Security, Autonomous Shipping and Future Trends within shipping. According to the findings of the survey, the five top rated smart shipping challenges are: Cyber Security (40,6%), Crew Training using new technologies and software i.e. Virtual Reality & Augmented Reality (33,0%), Energy Management & Emissions Monitoring (32,1%), E-Navigation (31,1%) and ECDIS (29,2%). This shows that the maritime stakeholders consider Virtual and Augmented Reality technologies critical in their activities related to maritime transport.

Port industry has been hesitant to apply the AR applications. One of the reasons for such hesitation is that AR technology is generally not well understood in the industry and also there is a lack of application provider focusing on the specific uses of AR in the port industry. Since the services provided at especially container ports may be considered complex, experienced consultants and technology providers are needed to integrate the AR applications with the port-specific services. The high degree of risk, safety, the environment, complexity and costs are considered as the main reasons for the slow acceptance among ports (Rushmore, 2016). Cargo movements at ports require maintaining reliable real-time information, where a glitch in the system can lead to costly and dangerous consequences. For instance, the trucks moving around can block sensors and the effective application of the system may not be possible (Rushmore, 2016). Although the applications regarding AR in the port industry are quite rare, new areas and opportunities for development can be suggested. Based on detailed scan of various port industry news, a categorization of possible uses of AR in the port industry is suggested by discussing the possibilities for gaining competitive advantage and generating blue ocean marketing strategies. Such categorization is mainly based on marketing mix components as; service (product), price, promotion and place (4Ps of marketing). As Baker (2007) points out, marketing mix offers a simplification to make a clear structure as a whole for marketing managers and guide them to achieve a certain task. As Kotler and Armstrong (2008) defined; marketing mix is the *"set of controllable, tactical marketing tools in order to get feedback of the certain markets".* Based on marketing mix reflections, possible AR applications of ports are provided. In addition to marketing mix components, internal marketing reflections are also added since AR applications considerably affect the working habits, hours and techniques of the employees at the ports. The next section discusses possible AR applications at ports based on service-based, price-based, promotion-based, place-based reflections and lastly internal marketing reflections.

4.1. Service-Based Reflections

Cargo Handling and Warehousing Services: Since ports' core business is basically focused on the cargo handling and warehousing of cargo for a certain period of time**,** any activity that can minimize the time spent and errors during operations can be considered as an efficient move for the port industry. AR technologies such as head-mounted display, cameras, a wearable PC and battery packs can provide energy for at least one work

shift. Through the use of vision picking software, ports can achieve real-time object recognition, barcode reading, and indoor navigation as well. One of the most important benefits of vision picking system is its provision of hands-free digital supports to workers during manual picking operations. Through the use of such system, workers can see the digital picking list in their field vision and see the best route, reducing their travel time by efficient planning (DHL, 2014). Ports similarly can adapt such systems in order to track and trace the containers, find the most suitable way for the storage of containers by finding the best route and minimize the time spent for each operation at the terminal area. In this case, wearable AR devices should be used and integrated to the current port operations system and daily operational activities of the workers.

Another application of AR in cargo handling operations at ports can be the use of AR smart glasses in handling operations as in the case of airport service operator SATS. SATS's ramp operators are expected to provide important information such as real-time loading instructions for smart goggles to be used at Singapore's Changi Airport (Today Online, 2017). Using AR technology, operators are expected to scan visual markers in baggage, cargo, containers and trunk to give details such as weight, unit number, loading order, and position assigned to the aircraft (Today Online, 2017). As a result, this hands-free technology enhances safety and improves the accuracy and efficiency of luggage and cargo operations. (Today Online, 2017).

SATS's smart glasses are equipped with an integrated processor with video recording and wireless capabilities to enhance the visibility of ramp processing operations in the airport area by providing real-time land use processes (Today Online, 2017). In this case, it is also possible to better observe the loading process which provides more flexibility in human power management. (Today Online, 2017). A similar approach can also be used at the ports that terminal area visibility with real-time data options can be collected through such devices in order to monitor the ship handling operations.

Terminal Area Planning and Port Expansion: In today's port environment, ports are not only considered as the nodes that provide handling services to the ships, but also, they house a growing number of value-added services such as packaging, repair, labeling, product assembly etc. As DHL (2014) mentioned, AR can be used to visualize any planned rearrangements, making it possible to place interactive digital representations of proposed future modifications in the present. Hence planners in the port administration can test whether or not

measurements of planned modification will fit in place and model new work flows. For instance, a port organization can plan a dedicated area for the product assembly or packaging operations within the port area and check whether or not such planned area will fit within the concept of the port area and the current demand by the port customers to have such a service from the port.

AR may provide opportunities for users to visualize, and talk about, objects that are not present based on a three-dimensional (3D) overlay. Within product visualization this could be new buildings not built yet in the port area (Rushmore, 2016). Hamburg Port Authority (HPA) declared that the port has started to apply new visualization forms for better data analysis and infrastructure planning with the further development of virtual and augmented reality (Port technology, 2016).

Docking/Anchorage Services: Information about navigational dangers and presentation of data about other ships may be some other areas for AR in the port services. While ports may have such support systems for ships in terms of their approach, anchorage etc, ships may also employ such technologies during their arrival to the port. Information about the seabed in the form of three-dimensional bathymetric maps and profiles facilitate anchoring. Information on the current weather and the traffic in specific regions may also help the optimization of the planning of the voyage. Port of Antwerp uses virtual buoys in this case. The crew may generate virtual temporary and preliminary corrections, virtual port approaches, virtual areas such as anchorages and fairways. As in the case of ECDIS, these virtual corrections can appear in the form of layers applied to the actual chart, AR objects would appear on a computer or on a special screen installed on the bridge (Filipowski, 2013: 259).

Salvage and Repair Services: According to a project (US Navy's Divers Augmented Vision Display) conducted by US Navy, there is a high-resolution, see-through head-up display embedded directly inside a diving helmet. AR delivers an image and outline of objects, overlaid on the actual diver's vision. There are ongoing studies where components are being designed to include both helmet and full face masks (Rushmore, 2016). This system can be used for commercial salvage and repair to be used in the service delivery process of the ports.

Geotagging: In Rushmore's (2016) article, few examples were provided in case of the use of AR in port service-related activities. In case of a need to check the hydraulic oil on a crane, the technician may not be experienced enough to know where to look for the particular crane and

AR overlay can provide an exact location functioning as geotags in the ports.

Multimodal Operations: Transport industry makes extensive use of digital data and planning software for optimized load planning and vehicle utilization (DHL, 2014). In the multimodal operations of the ports, the transfer of containers from the terminal area to the trucks or trains or vice versa requires the detailed check of information regarding content, weight, size, destination, etc. As discussed in DHL's report AR devices can support by replacing the need for printed cargo lists and any instructions regarding cargo loading and discharging. For instance, in railway transfer, the operator at the handling equipment can obtain real-time information on their AR device about which container to take next and which wagon to place in the train. The AR device can display loading instructions with arrows or highlights identifying suitable target areas inside the vehicle. In contrast to current paper-based lists, AR-supported cargo lists would also allow for real-time- something that happens quite often during loading process (DHL, 2014).

Port Operations Control: AR applications are provided to offer various solutions to the operators at the port. In the control of the operations conducted at the port, AR can act as the main player in the minimization of the errors as well. For instance, Port of Rotterdam has started to use AR glasses so that experts can remotely observe situations when faults occur on board survey vessels operated by the Port of Rotterdam Authority. These smart glasses improve the deployability of the vessels (Port of Rotterdam, 2017).

Martin Enevoldsen, business developer at Unity Studios pointed out that one of the biggest strengths of AR is that it allows users to study actual surroundings with a 3D overlay through the use of possible tools such as Hololens, Meta2 and DAQRI Smart Helmet. Enevoldsen added that *"In regards to the remote-control tower, the adoption of AR could make the remote control towers a real possibility. While the existing crane operators can adapt to office-based working environments best via the 360-degree vision offered by AR, new joiners can be trained and worked under the same (office) environment. In regards to maintenance, health and safety, of similar capacity, AR could enable remote workers for maintenance, inspection, etc."* (Rushmore, 2016). Through the use of DAQRI Smart Helmet, port organizations may provide their workforce with intuitive augmented instructions so that the workers in the terminal area can understand the processes quickly, spend less time on each step and minimize the errors. Also, such helmets may provide the port

workers distributed information and situational awareness outside of the control tower to improve efficiency by reducing the amount of movement. Moreover, by providing remote expert option, workers at the port area may give and receive needed assistance displayed directly in the team's point of view. Both the expert and the onsite team member can quickly resolve issues and concerns (Daqri, 2017).

In terms of controlling the vessel traffic in Port of Hamburg, the port applied AR in its operations and vessel tracking system by visualizing the vessel traffic. The port achieved new visualization of IT data and physical data with AR (Baldauf, 2016).

Safety and Security: In the field of safety and security, there might be huge fire and emergency personnel could have their vision blocked; an AR overlay may allow the emergency services to get to assets to shut down the equipment (Rushmore, 2016). Hence ports can apply such AR-based mechanisms to minimize such risks and eliminate the possible consequences related to the case.

Another critical use of AR can be related with the content of the container. Considering the cargo type, the workers can find the container correctly identifying located in it. Information collected by sensors of temperature, pressure would facilitate better use of handling equipment and increase control over cargo operations. Information about the ballast and the related data would give the officer in charge a complete review of the current situation and increase the safety of the handling operations (Filipowski, 2013: 259).

4.2. Price-Based Reflections

According to an expert, Cliffton Dawson, in a virtual/augmented reality analytical research firm in San Francisco, "*ports need to consider the cost versus revenue balance before integrating AR to their systems. Although the cost of introducing AR is decreasing dramatically, it may not be worth in some industries such as basic/low cost product assembly which may be the case of small ports"* (Rushmore, 2016). However, big ports especially in container business, can generate new ways of differentiation through the application of AR Technologies.

Microsoft Hololens is a technology with built-in sensors by letting the user to use her/his gaze to move the cursor so that the user can select holograms. Also simple gestures can be used to open applications, select and size items and drag and drop holograms according to the needs of the

industry (Microsoft, 2017). The cost of Microsoft Hololens is $3,000-$5,000 per unit (Microsoft, 2017) while simpler systems are mainly considered as $1,000 a unit. The port industry has to consider the sensors and the cameras needed as well as the software costs. In addition, the amount of such technologies needed (e.g. one for each container stack or each container yard) is a critical and risky decision since minimal coverage could make the system impractical. As one of the experts mentioned, the potential for AR in the port industry is enormous and return on investment (ROI) could be within 12 months in some cases (Rushmore, 2016).

4.3. Promotion-Based Reflections

HPA has established collaborative projects with the students at the University of Hamburg, where students are researching and developing applications for daily use at port operations through the use of AR (Port technology, 2016).

Kao Ming Container Terminal Corp. (KMCT) in Taiwan applied AR as the latest interactive technology that users could see the virtual images on the screen via web camera (KMCT, 2017). The terminal uses AR to demonstrate the terminal infrastructure and cranes by allowing the website visitors to print the special web page by following the instructions. After downloading AR software and turning the web camera on, visitors are asked to remain the AR graph card flat on the camera to see the interactive content. By rotating the AR graph card, the visitors can travel inside the terminal and see the virtual 3D image.

In addition to promotion-based reflections of AR, the ports can achieve success in the enrichment of the promotion materials such as brochures and magazines with AR technology. Nowadays many companies use AR in their catalogs and brochures to achieve a fun gaming experience and introduce their products and services in a better way. For instance, Siemens used AR to make their brochures and displays livelier through augmented reality. In their current AR-aided product demonstrations, users can scan Siemens brochures to simulate a virtual model of their new Acvatix product line with detailed technical specifications (Augment, 2017). Ports may also benefit from such implications by enriching the content of their promotion materials and possible port users and customers may get the advantage of getting to know in detail.

Another field for AR to be utilized in port businesses may be through the possible port visits. Port visits can be used as critical promotional activities both for the current/possible customers and many stakeholders such as universities, municipalities, trade organizations etc. by the ports. AR glasses provided during the port visits can enable better visualization and enriched information regarding the sections of the port visited. Since there are many safety and security related measures taken at the ports, visitors at the port area may not have the chance of experiencing the basic functions, activities and operations at the port during their visits. Hence, such AR-based applications may help the ports to open up themselves to the visitors in an entertaining way.

4.4. Place-Based Reflections

In the port marketing literature, place is discussed from various viewpoints in defining the marketing mix of the seaports. Branch (1998) defines "distribution" as being the marketing environment of the seaport where the sale is conducted. On the other hand, Frankel (1987: 604) argues that distribution refers to the delivery system alongside, sea island, topping off operations, lightering transshipment and impact of technological changes on infrastructure. Mester (1991) by focusing on the role of intermediaries in the distribution function discusses distribution in terms of channels from which customers may purchase the seaport service, that is, via direct customers such as freight forwarders or an organization within seaport, or by active marketing seaport operators. In the distribution of the seaport service to the customers and the intermediaries, AR applications can be used especially in the information-based service exchanges. Freight forwarders mostly prefer to be closer to the port information system in order to monitor the latest changes at the terminal regarding their customers' cargo movements. In this case, detailed real-time information obtained from the operators at the terminal area via AR devices can be transferred to the information system of the freight forwarders or agents. Hence a transparent and detailed flow of cargo-related information can be exchanged between the related parties.

4.5. Internal Marketing Reflections

Use of AR can bring out valuable outcomes in terms of internal marketing activities. As Rob Smith from The Houston Consulting Group mentioned, AR Technologies can open up opportunities for job planning and job safety analysis. People can review the job and the specific areas of a port that they will be in, the location of the equipment and the possible dangers around the equipment such as crane movements. Crane operators may familiarize themselves with the environment that they were going to be working before the actual operation starts. This allows for a thorough safety review and a better-trained crane operator (Rushmore, 2016).

Another application of AR could be the visualization of workflows in order to instruct new employees (especially in the operational level at the port area) as well as virtual information management and sharing that can be used to clarify tasks and provide information to the right people at the right time. According to Fox Chu, managing director of Accenture Ports, ports have adopted virtual reality technology for more than a decade in training; with augmented reality, this can be advanced and the effectiveness could be further improved (Rushmore, 2016).

In addition, vision picking systems discussed in cargo handling and warehousing section can also be applied in internal marketing applications of ports. As mentioned by DHL (2014), such systems can reduce the amount of time required to orientate and train new employees, as well as bridge any language barriers with migrant workers. Since there can be many employees from various nationalities in different ports, such systems may help to increase the motivation of the personnel as well.

5. BLUE OCEAN STRATEGIES IN AR-ORIENTED PORT INDUSTRY

AR applications are mainly considered novel steps in various industries and port industry is one of the industries that only a few applications are experienced in limited number of ports. Since blue ocean strategies mainly focus on the uncontested areas that the organizations may consider in order to be competitive, AR can be considered as an opportunity for port organizations to be active in uncontested areas. When the 20 biggest ports' websites – the list was gathered from UNCTAD's Review of Maritime Transport report- were examined by authors, it was observed that only a very limited number of ports (e.g.

port of Hamburg, port of Rotterdam) applied AR in a very limited scope in their operations. Hence any port that can adapt successful AR applications in terms of various component of marketing mix, may succeed in the new era of industry 4.0. Although AR applications are widely discussed in logistics literature (Cirulis and Ginters, 2013; DHL, 2014; Piotrowicz and Cuthbertson, 2014), port industry mainly lacks an extensive understanding of the possible uses of AR in various port processes.

To form blue ocean, organizations mainly should follow two strategies. Establishing completely new industries is one way of forming blue oceans such as eBay did with the online auction industry. The second strategy, which is generally more common, is formed through a red ocean strategy when a firm changes the boundaries of an existing industry (Kim and Mauborgne, 2004: 72). Kim and Mauborgne (2004: 35) suggested the *Four Actions Framework*, which identifies the components of Blue Ocean Strategy while also ensuring guidelines to create a new strategy profile. The framework forces companies not only ask all four questions according to four actions framework but also to act on all four to create a new value curve. Figure 1 shows the Four Actions Framework (Kim and Mauborge, 2004: 35-36). The framework gives companies four immediate benefits (Kim and Mauborge, 2004: 37):

- It pushes them to simultaneously pursue differentiation and low costs to break the value-cost trade-off.
- It immediately flags companies that are focused only on raising and creating and thereby lifting their cost structure and often over engineering products and services—a common plight in many companies.
- It is easily understood by managers at any level, creating a high level of engagement in its application.
- Because completing the framework is a challenging task, it drives companies to robustly scrutinize every factor the industry competes on, making them discover the range of implicit assumptions they make unconsciously in competing.

Considering the current dynamics of the port industry, such framework can be adapted to the port organizations in the path of applying possible blue ocean strategies within their organizations. Figure 1 shows the AR-oriented version of Four Actions Framework for the port industry.

According to Figure 1, ports can follow the four actions framework to create blue ocean strategy. With AR technology, ports can reduce operational costs even though, there could be an initial investment cost at the beginning. The widespread use of AR technologies in ports will enable more optimal use of tracking and tracing technologies, thus eventually will lead to lower cost in midrange and long term.

Since AR is a new concept especially in port industry, all of factors that are shown (service, price, promotion, place and internal marketing reflections of AR) in Figure 1, which is compiled by authors, must be created for port industry.

The widespread use of AR will help to eliminate manpower-based operations, paper-based port operations, time spent at the port area, possible accidents, infrastructure planning problems and paper-based promotion materials. With use of AR, same work can be done with fewer employees. In addition, AR is expected to reduce the consumption of paper used in operations and make it easier to track works through smart devices and reduce consumption. Integrating container monitoring systems with AR technologies and handheld terminals is expected to eliminate a considerable amount of time. With AR, new simulation methods can be created and used for approaching channel and dock. With these types of simulations, possible accidents in the approach channel and at the dock can be eliminated. Moreover, the use of AR during the construction of port processes can eliminate infrastructural problems. Besides, with the AR potential growth scenarios for ports can be formed and infrastructure problems can be avoided. Since AR is made with smart devices, it can be predicted to reduce paper consumptions when used in marketing activities.

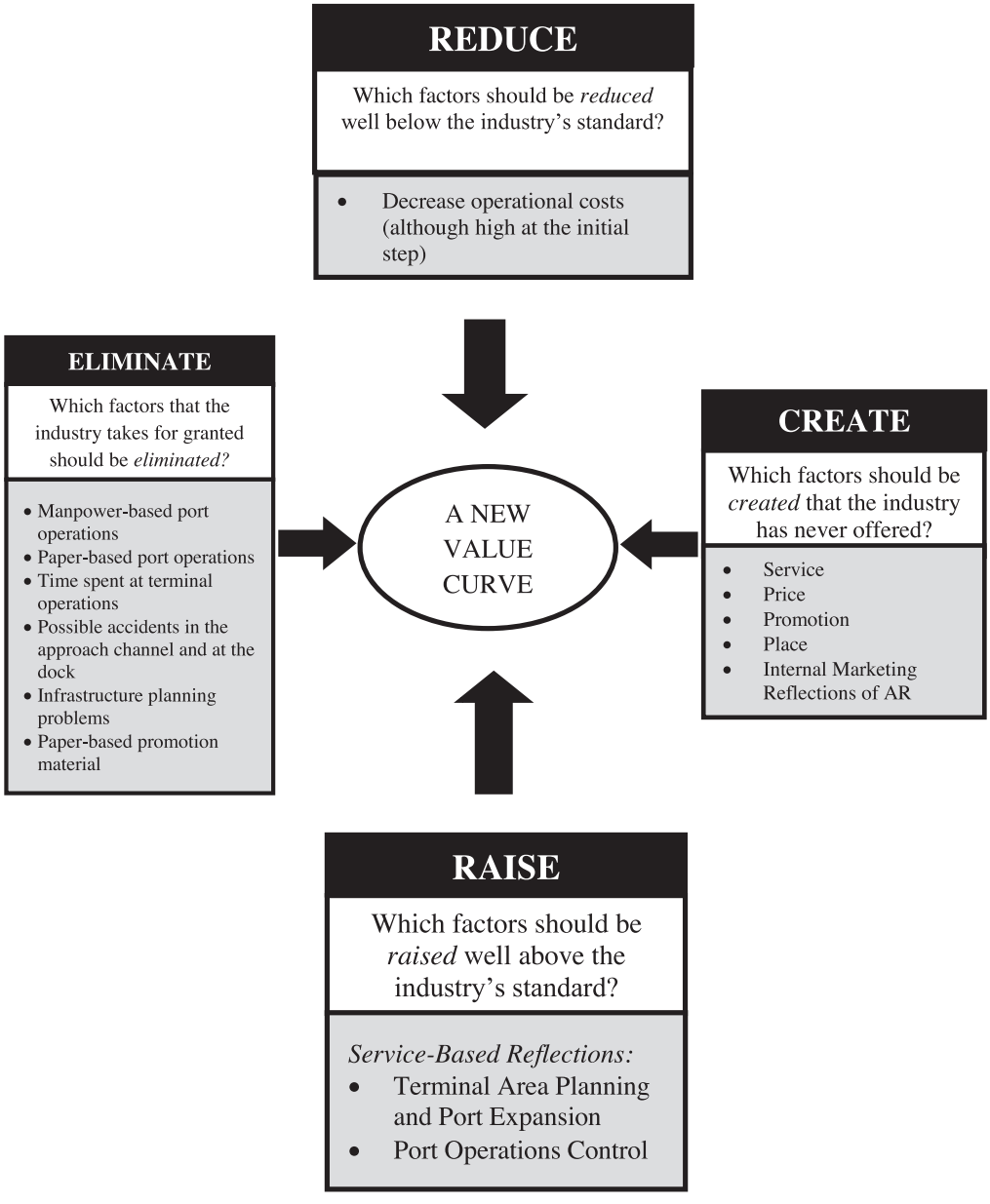

Figure 1: Four Actions Framework Adapted for Port Industry with AR Applications

With the help of AR, service-based reflections such as terminal area planning and port expansion and port operations control can be raised well above the port industry's standards. As seen in the example of Hamburg, AR can be used in terminal planning activities and in future, it can be predicted that the effects of AR can be further increased in port expansion and planning activities. As noted in the Rotterdam example, AR technology plays an important role in pulling down the mistakes to the minimum level especially in improving the deployability of the vessels. To create blue ocean strategy, other ports can take Port of Hamburg and Port of Rotterdam as examples and the number of ports that implement AR can be increased.

6. CONCLUSION

Since the aim of this paper is to provide an insight regarding the Augmented Reality concept in port business and discuss how such applications can serve in building blue ocean marketing strategies, an initial perspective on how Augmented Reality will help ports during the blue ocean marketing strategy creating process is provided. The conceptualization is based on the ¨Four Actions Framework¨. The adapted framework showed that with AR, ports can reduce operational costs; while service, price, promotion, place and internal marketing reflections should be created. Also, AR will help to eliminate manpower-based operations, paper-based port operations, time spent, possible accidents, infrastructure planning problems and paper-based promotion materials; while service-based reflections such as terminal area planning and port expansion and port operations control can be raised well above the port industry's standards.

The limited resources, which are sectoral magazines and reports, are one of the limitations of this study. Another limitation is that the study is based on website search. During this process, except a few ports, it was very difficult to reach the information in terms of the possible AR applications at the ports. Moreover, the basic applications of AR are mainly discussed within the view point of container terminals and ports. Hence the study mainly excludes the possible applications of AR in other terminal types such as dry and liquid bulk, LNG, LPG, cruise etc.

As a future research idea, the framework created for this study can be improved by port specialist via focus group or face-to-face interviews. In the following years, as the AR applications become widespread in ports, the study can be expanded to cover more sophisticated uses of AR. Another research can be conducted with terminal operators, port users

and customers about the AR and its possible usage areas in ports. Last but not least, the same framework can be applied different industries of the shipping industry as well.

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YAZARLARA DUYURU

Dokuz Eylül Üniversitesi, Denizcilik Dergisi'ne gönderilecek yazılar aşağıda belirtilen kurallara uygun olarak hazırlanmalıdır.

Yazı Karakteri ve Sayfa Düzeni

· Denizcilik Fakültesi Dergisi'ne gönderilen yazılar, Microsoft Word ortamında Times New Roman yazı karakteri kullanılarak, ana metin 11 punto ve tek satır aralıklı olarak yazılmalıdır. Söz konusu şekil şartlarına uymayan yazılar, hakemlere gönderilmeden yazarlarına iade edilir.

· Yazılar A4 kağıdına tek taraflı olarak yazılmalı ve üst:5 sol:5 alt:5 sağ:4,5 cm boşluk bırakılmalıdır.

Uzunluk ve Sayfa Numaraları

Yayınlanmak üzere gönderilen çalışmaların uzunluğu, ekler ve kaynakça dahil 30 sayfayı geçmemelidir. Buna karşın, Editör ve/veya Yayın Komisyonunun uygun görmesi durumunda, daha uzun çalışmalar da değerlendirme sürecine alınabilir. Gönderilen çalışmaların en az 10 sayfa uzunluğunda olması beklenmektedir. Çalışmaya sayfa numarası verilmemelidir.

Makale

Yazar bilgilerinin yer almadığı makale dosyası; makale başlığı, özet, anahtar kelimeler, giriş, ana metin, sonuç, kaynakça ve eklerden oluşan bölümdür. Dergiye gönderilen makalelerde aşağıdaki sıra izlenmelidir:

– Başlık,
– Öz, anahtar kelimeler,
– Giriş,
– Ana metin,
– Sonuç,
– Açıklayıcı notlar (eğer varsa),
– Kaynakça
– Ekler (eğer varsa).

Makalenin Başlığı

· Tüm harfler büyük, kalın (bold), Times New Romanyazı tipinde12 punto ortalanmış olarak yazılmalı ve iki satırı aşmamalıdır. Türkçe makaleler için başlığın İngilizcesi ve İngilizce makaleler için de başlığın Türkçesi yazılmalıdır.

· Başlığın altında yazar(lar)ın, Adı Soyadı bulunmalıdır. Birden fazla yazarın bulunması durumunda yazarlar üst bilgi ile numaralandırılmalıdır.

Örnek: ilk yazar adı (1) ve _inci yazar adı (2) vb.

Yazar(lar)ın kimliklerini belli edecek bilgiler (bağlı bulundukları kurum, elektronik posta adresleri) dipnot olarak bulunmalıdır. Yazar sayısının birden fazla olması durumunda, Dergi Editörlüğü ile yazarlar arasındaki iletişimi sağlayacak yazar belirtilmelidir. İletişim kurulacak yazarın belirtilmemesi durumunda, makaleyi dergiye gönderen yazar ile iletişim kurulur.

Öz ve Anahtar Kelimeler

Makalenin başında, en az 150, en fazla 180 kelimeden oluşan Türkçe ve İngilizce özetler yer almalıdır. Özetlerde; amaç, yöntem, bulgular ve sonuç bilgilerinin yer almasına özen gösterilmelidir. Türkçe ve İngilizce özetler içerisinde atıfta bulunulmamalı ve kısaltma kullanılmamalıdır.

· **Öz (abstract) başlığı:** Tüm harfler büyük, kalın (bold), Times New Roman yazı tipinde 10 punto ortalanmış ve italik olmalıdır.

· **Öz (abstract) metni:** Times New Roman yazı tipinde 10 punto ve italik olmalıdır.

· Özetlerin altında bir satır boşluk bırakılarak, Türkçe ve İngilizce olarak, konuyu en iyi şekilde ifade eden beş (5) anahtar kelime yazılmalıdır.

· Yazılar Türkçe ve İngilizce dillerinde yazılmış olabilir. Ancak tüm çalışmalarda Türkçe ve İngilizce başlıkları ile birlikte Özet / Abstract bulunmalıdır.

Ana Metin ve Bölüm Başlıkları

· Ana metin Microsoft Times New Roman yazı karakteri kullanılarak 11 punto ve iki yana yaslı olarak yazılmalıdır. Paragraf öncesi ve sonrası tek paragraf aralığı (0 nk) verilmelidir. Paragrafların ilk satırları 1 cm içerden başlamalıdır. Makalenin ana başlık ve alt başlıkları 1., 1.1., 1.1.1 gibi ondalıklı şekilde, Giriş'ten başlayarak (Kaynakça hariç) numaralandırılmalıdır. Metin içerisinde en fazla üçüncü düzeye (1.2.4. gibi) kadar alt ayrım açılmalı, ihtiyaç duyulması halinde, daha alt düzeydeki başlıklar numara verilmeden italik ve koyu olarak yazılmalıdır.

· Yazıların ana başlığını oluşturan cümlenin tümü **"BÜYÜK HARFLERLE ve KOYU (BOLD)"** yazılmalıdır. İkinci alt başlıklar ise **"İlk Harfleri Büyük ve Koyu (Bold)"** yazılmalıdır. Ana ve alt başlıklar Times New Roman yazı tipinde, 12 punto ile yazılmış olmalıdır.

Tablo ve Şekiller

Tablo ve şekiller sırasıyla numaralandırılmalı (Tablo 1, Tablo 2, Şekil 1 gibi) ve metin içerisinde bulunması gereken yerde olmalıdır. Tablonun ismi tablonun üstünde yer almalıdır. Şekillerin ismi ise şeklin altında yer almalıdır. Tablo ya da şeklin başlığının ilk harfleri büyük olmalıdır. Tablo veya şekle ilişkin kaynakça ise tablo ya da şeklin altına yazılmalıdır. Tablo ve şekiller, başlıklarıyla beraber metin içine ortalanarak yerleştirilmelidir. Tablo ve şekiller ile metin arasında bir satır başlık bırakılmalıdır. Tablo, şekil vs. içindeki metin 9-11 punto aralığında olmalıdır. Akışı bozan tablo veya veriler, çalışmanın sonuna "Ek" olarak konulabilir.

Tablo ve Şekil Başlığı Örnek:
Tablo 1: Limanlarda Performans Ölçümüne Yönelik Yazın Taraması (11 punto)
Şekil 1:Çalışmanın Kavramsal Modeli (11 punto)

Matematiksel Denklemler ve Formüller

Metin içerisinde yer alan matematiksel denklem ve formüller ortalanarak yazılmalıdır. Matematiksel ifadelere sıra numarası verilmeli ve sıra numaraları parantez içerisinde sayfanın sağına yaslı olarak yazılmalıdır. Denklem ile metin arasında (6 nk) boşluk bırakılmalıdır.

Kaynak Gösterme

· Kaynaklara yapılan atıflar dipnotlar ile değil, metin içinde yazar(lar)ın soyadı, kaynağın yıl, sayfa numaraları seklinde yapılmalıdır.

Örnek : …. sonucu elde edilmiştir (Saçaklıoğlu, 2008 : 18–22).

· İki yazarlı çalışmalara atıfta bulunulduğunda her iki yazarın da soyadını yazılmalıdır. Yazar sayısı üç ve üçten fazla olan çalışmalara atıf yapıldığında, sadece ilk yazarın soyadı ve "vd." yazılmalıdır. Yazar(lar)ın aynı yıl birden fazla eser yayınlanmış çalışmalarına atıf yapılmış ise, yayın yılının sonuna (a,b,c, vb.) gibi semboller yazılarak kaynaklar birbirinden ayrılması sağlanmalıdır. Cümle sonunda birden fazla çalışmaya atıfta bulunuluyorsa, bu kaynaklar parantez içerisinde yayın tarihine sıralanmalı ve aralarına noktalı virgül (;) konulmalıdır.

Metin İçinde Atıf Gösterimi

Kitap, makale, konferans bildirisi, editörlü kitap veya editörlü kitapta bölüme yapılacak olan atıflarda;

Tek yazar için:
(Stopford, 1997: 67)

İki yazar için:
(Bryman ve Teevan, 2005: 13)

İkiden fazla yazar için:
(Rodrigue et al. 2006: 54) İngilizce çalışmalar için
(Rodrigue vd. 2006: 54) Türkçe çalışmalar için

Açıklayıcı (Son) Notlar

Metin içindeki açıklayıcı (son) notlar, makalenin sonunda, kaynakçadan önce yer almalı ve metin içindeki sıraya uygun olarak (1, 2, 3, vb.) yazılmalıdır.

Kaynakça

Kaynakça makalenin bittiği sayfadan başlatılmalı ve çalışmalar soyadına göre alfabetik olarak yazılmalıdır. Metin içerisinde atıfta bulunulan bütün kaynaklar, kaynakçada belirtilmeli; atıfta bulunulmayan kaynaklar, kaynakçaya konulmamalıdır. Aynı yazar(lar)ın birden fazla çalışmasına atıfta bulunulmuş ise, yayın tarihi en eski olandan başlanılmalıdır. Yazar(lar)ın aynı tarihli birden fazla çalışmasına atıfta bulunulmuş ise, metin içerisinde olduğu gibi, kaynakça bölümünde de, yayın tarihinden sonra (a, b, c, …) harfleri kullanılarak kaynaklar sıralanmalıdır. Bir yazarın tek ve birden fazla yazarlı çalışmasına atıfta bulunulması durumunda, önce tek yazarlı çalışmalar yazılmalıdır. Dergilerde yayımlanan makalelerin ve derleme niteliğindeki (editörlü) kitaplarda yer alan bölümlerin sayfa numaraları mutlaka yazılmalıdır.

Kaynakçada kullanılan kısaltmalar, referans verilen kaynağın dili gözetilmeksizin, makalenin yazım diline uygun yazılmalıdır. Örneğin yazım dili Türkçe olan bir makalede referans gösterilen kaynak İngilizce ise, yazarlar arasında “and” yerine “ve” kullanılmalıdır.

Metin içinde atıfda bulunulan veya alıntı yapılan eserlerin kaynakçada gösterilmesine ilişkin bazı örnekler aşağıda görülmektedir.

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EDİTÖRLÜ KİTAPTA BÖLÜM

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Cerit, A.G., Deveci, D.A. and Denktaş Şakar, G. (2013). Denizcilik İşletmeleri Yönetimi: Sınıflamalar, İşlevler ve Deniz Ulaştırması. A. G. Cerit, D.A. Deveci & S. Esmer (Ed.), *Denizcilik Işletmeleri Yönetimi* (s.3-21). İstanbul: Beta Yayınları.

TEZ

Atlay Işık, D. (2010). *Yat turizminde holistik pazarlama ve Türkiye için farklılaşma stratejileri,* Doktora Tezi, Dokuz Eylül Üniversitesi, Sosyal Bilimler Enstitüsü, İzmir.

INTERNET

Deniz Ticareti Genel Müdürlüğü. (2012). *Deniz Ticareti Analizleri*.,http://www.ubak.gov.tr/BLSM_WIYS/DTGM/tr/YAYINLAR/20120816_142103_64032_1_64346.pdf, Erişim Tarihi: 04.01.2014.

Metin İçerisinde Kaynak Gösterilmesine İlişkin Örnekler

Deniz taşımacılığında brokerler, gemilerin ve taşımacılık hizmetlerinin alıcı ve satıcılarını biraraya getiren taraflar olarak tanımlanmaktadır (Strandenes, 2000:17).

Collins (2000: 102)'in aktarmasıyla 1993 tarihli Lloyd's List dergisinde gemi brokeri şu şekilde tanımlanmaktadır:……

Christopher vd. (1991: 4), ilişki pazarlamasının müşterileri elde etme ve elde edilen müşterileri koruma gibi çift yönlü bir amacı gerçekleştirmek üzere işletmenin mevcut ve potansiyel müşterileriyle uzun dönemli ilişki kurmayı hedefleyen müşteri odaklı bir pazarlama yaklaşımı olduğunu belirtmişlerdir.

AUTHOR GUIDELINES

The articles to be evaluated by Maritime Faculty Journal should be prepared according to the guidelines listed below:

Submission of Articles

Articles prepared according to the author guidelines should be submitted to dfdergi@deu.edu.tr

Writing Style and Page Layout

Articles submitted to Maritime Faculty Journal should be written in Microsoft Word format with Times New Roman 11 font size and single-spaced. The articles, which are not suitable for the conditions related to the formatting, are returned back to the author(s) without sending to the referees.

Page layout should be A4 format and margins should be:

Top: 5 cm

Bottom: 5 cm

Right: 4,5 cm

Left: 5 cm

Length and Page Numbers

The total length of any article submitted for publication should not exceed 30 pages including appendices and references. However, Editor and/or Editorial Board can consider longer papers upon the approval. The articles are expected to have minimum 10 pages. Page numbers should be avoided.

The Article

The article file includes the parts of the study. No author's details should be provided in this file. A manuscript submitted to the Journal should include the following parts:

– Title,
– Abstract, key words,
– Introduction,
– Main text,
– Conclusions,
– End notes (if there is any),
– References and
– Appendices (if there is any).

Title of the Article

The title of the article should be written in bold (all letters in capital letters) with 12-point size and it should be set centered. English title should be written in Turkish manuscripts.

Full names of the authors should be written under the main title. In the presence of more than one author, the authors should be numbered with headers.

The titles, institutions and e-mail addresses of the authors should be mentioned in the footer. In the presence of more than one author, the corresponding author should be mentioned. In case the corresponding author is not mentioned, the author who sent the article to the journal is contacted.

Abstract and Keywords

The length of the each abstract should be minimum 150 words and maximum 180 words. The article should include an abstract in Turkish and in English at the beginning of the article in Turkish manuscripts. The abstracts should concisely present the aim or the purpose of the study, the methodology, the results, and the conclusion remarks. References are not cited within the structured English or Turkish abstracts and the abstracts must not contain abbreviations.

- **Title of the abstract:** Capital letters, bold, Times New Roman, centered in 10-point size and italic.
- **Manuscript of the abstract:** Times New Roman, 10-point size and italic.

- Five (5) keywords that are important and relevant to your manuscript should be written both in English and in Turkish.
- The articles can be written in English or in Turkish. All articles should have English and Turkish titles and abstract.

Main Text and Section Headings

The main text should be in Microsoft Times New Roman with 11 pt. The whole main text should be justified. Paragraph spacing before and after a single paragraph (0 nk) should be given. The first line of the paragraph is to be shifted by 1 cm from the left margin. Headings and sub-headings of the manuscript should be numbered as 1., 1.1., 1.1.1. in hierarchical numbers (excluding the references). The headings should be partitioned up to 3 levels (ex. 1.2.4.) In case more than 3 levels are needed, the headings should be italic and bold with no numbers.

All letters of primary headings should be **CAPITAL LETTERS and BOLD.** The first letter of the sub-heading should be **Capital Letter and Bold**. All headings should be designed 12 pt and Times New Roman.

Tables and Figures

Tables and figures should be numbered consecutively, as Table 1, Table 2, Figure 1, and Tables and figures should be placed where they are most appropriate in the text. The titles of the tables should be placed at the heading of the table. The titles of the figures should be placed under the figure. References belonging to table or figure should be placed under them. The figures and tables with their names should be centered in the text. First letters of the titles of the tables or figures should be capital. In the tables and figures, the font size may be 9 -11 pt. Figures and tables should be separated from the text by one-line interval. Complex and long tables or data can be put at the end of the study as appendixes.

Example for Table and Figure Titles:

Table 1: Literature Review on Performance Measurement Methods at Seaports (11 pt)

Figure 1: Conceptual Model of the Study (11 pt)

Mathematical Notations and Equations

Mathematical equations in the text should be centred. Equations should be numbered consecutively and equation numbers should appear in parentheses at the right margin. Between an equation and text there should be an interval of (6 nk).

Citation

In-text citations, the author's last name, date of the publication, the number of the quoted pages (if there is a specific quote from a source used) should be mentioned.

Example: …… are mainly considered in the relevant literature (last name of the author, year: page number)

If there are two authors the surnames of both should be given. When there are 3 or more than 3 authors in the cited source, only the surname of the first author followed by "et al." should be written. When an author has published more than one cited document in the same year, these are distinguished by adding lower case letters (a,b,c, etc.) after the year and within the parentheses. For multiple references, the citations should be ordered chronologically and separated them with semicolons.

In-Text Citation

For single author:

(Stopford, 1997: 67)

For two authors:

(Bryman and Teevan, 2005: 13)

For more than two authors:

(Rodrigue et al. 2006: 54)

Footnotes and Endnotes

Explanations in the main text should be given at the end of the article before references section, and they should be written in order.

References

The list of references should be presented in alphabetical order at the end of the manuscript. Each citation in text should be listed in the References section, and references that are not cited in text should not be written in the References section. If the author referred to more than one publication from the same source, the oldest publication should be listed first. If the author referred to more than one publication from the same source published in the same year, the publications should be numbered using the letters a,b,c…, as citation in the text. If one author's several publications, some with one some with two or more authors, are referred to, the publications with one author should be written first. Page numbers of articles published in the journals and chapters in the edited books should be written.

The abbreviations used in the cited sources should be written in terms of the language of the study regardless of the cited sources.

BOOKS:

Stopford, M. (1997). Maritime Economics. New York:*Routledge.*

Bryman, A., & Teevan, J. (2005). *Social Research Methods*. Canada: Oxford University Press. (For studies written in English)

Rodrigue, J. Comtois, C., & Slack, B. (2006). *The Geography of Transport Systems.* New York: Routledge

Alpugan, O., Demir, H., Oktav, M., & Üner, N. (1995).*İşletme Ekonomisi ve Yönetimi*. İstanbul: Beta Yayınları. (For studies written in Turkish)

ARTICLES:

Mangan, J., Lalwani, C., & Gardner, B. (2001). Identifying relevant variables and modelling the choice process in freight transportation. *International Journal of Maritime Economics,* 3 (3), 278-297.

Anderson, E.W., Fornell, C., & Lehmann, D.R. (1994). Customer satisfaction, market share, and profitability: Findings from Sweden. *Journal of Marketing,* 58(3), 53–66.

PAPERS PRESENTED AT CONFERENCE/ WORKSHOP/ SYMPOSIUM

Atik, O. & Cerit, G. (2008). Government support for sustainability of marine salvage services: a case for Turkey. In: *Proceedings of IAME 2008 Conference*. Dalian, China.

REPORTS

DPT (2000). *İklim değişikliği özel ihtisas komisyonu raporu*. Sekizinci Beş Yıllık Kalkınma planı, Ankara.

CHAPTER IN EDITED BOOK

Heaver, T. (2002). Supply Chain and Logistics Management: Implications for Liner Shipping, in C. Grammenos (Ed.), *The Handbook of Maritime Economics and Business*, pp. 375-396. London: LLP Informa Publishing.

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THESIS

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