RESEARCH & REVIEWS IN SOCIAL, HUMAN AND ADMINISTRATIVE SCIENCES

Volume 1

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gece kitaplığı

İmtiyaz Sahibi / Publisher • Yaşar Hız

Genel Yayın Yönetmeni / Editor in Chief • Eda Altunel

Kapak & İç Tasarım / Cover & Interior Design • Gece Kitaplığı

Editörler / Edıtors • Dr. Öğretim Üyesi Mustafa Batuhan KURT

Doç. Dr. Ayşe Çatalcalı CEYLAN

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Birinci Basım / First Edition • © Şubat 2021

ISBN •978-625-7342-83-4

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Baskı & Cilt / Printing & Volume

Sertifika / Certificate No: 47083

Chapter 3

CLUSTERING THE COUNTRIES ACCORDING TO MARITIME TRANSPORT AND TURKEY'S POSITION[1]



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1 This chapter is derived from PhD thesis title of "Turkey Model Research in World Maritime Transport" written by Fatih ALP and supervised by Prof. Dr. Nuray GİRGİNER. This thesis was prepared at Eskişehir Osmangazi University Institute of Social Sciences.

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Introduction

The fact that approximately 75% of the world's population lives on the coasts or near the coasts, 85% of the trade is carried out by sea in recent years and maritime transport has become a giant sector with an income of almost 500 billion USD. It shows worldwide importance and potential of maritime transport. Only countries with a coastline can benefit from this potential as emphasized in the saying "Geography is destiny" (İbn Haldun, 1375)[1], who was one of the important intellectuals of his time Ibn Haldun (1332-1406). Beause of Turkey's advantageous geographical position it is inevitable to receive the maximum share of this giant potential.

In this study, it has been tried to determine the use of geographical advantage of countries. While determining this situation, the maritime transport data of the countries and analyzes were made to determine the position in maritime transport. In this context, when the studies on maritime transport around the world are reviewed, it is seen that the data are generally listed without any analysis and the rank of the countries is listed or there are limited analysis studies on the sub-sectors of maritime transport. Since a holistic analysis study on world maritime transport data was not encountered, it was decided to conduct this study. Scope of work; countries are grouped according to similar features in the maritime transport, countries with similar characteristics in maritime transport were identified, Turkey's position is determined on maritime transport in general and Turkey were determined to do in order to come to a better position in this field. Also Turkey which has a long coast to the open seas associated with ocean and intersection point of continents has been proposed to be acted for a better position in maritime transport.

Clustering Analysis (CA), which was first developed by Tryon in 1939 and started to be widely used since the 1960s, was used in order to group countries according to their similar characteristics (Tryon, 1939). The groups obtained by this analysis method will be homogeneous in themselves and heterogeneous between groups. It is very important for the study to give accurate results that the data and variables are reliable and at the same standards for all countries. For this reason, the data regularly published by the United Nations Conference on Trade and Development (UNCTAD)[2], which is the main body of the United Nations (UN) has been used.

As a result of the literature review, a general analysis study was not conducted on the maritime transport sectors of the countries, nor was an analysis-based study to show the general situation of the Turkish maritime transport sector. When the studies in which CA is used in maritime transport

1 The book named "Mukaddime" is the most important work written in 1375 by Ibn Haldun, which includes many social sciences such as economics, sociology and politics.
2 https://unctad.org

are examined; the results of the survey conducted on the passengers of the cruise ships calling at two ports of Uruguay between 2008-2010 were analyzed with CA and the passengers were grouped according to market preferences by Brida, Scuder and Seijas (Brida, Scuder & Seijas, 2014), it is based on the performance of 17 container ports in Brazil, which is also a South American country by Rios and Sousa (Rios & Sousa, 2014), personal expenditures according to customer types have been tried to be determined on cruise ship tourism in the Panama Canal Region by Thurau, Seekamp, Carver, and Lee (Thurau et al., 2015), CA was used by Laxe, Bermúdez, Palmero, and Corti to group ports in Spain with certain characteristics (Laxe et al., 2016), having a direct impact on the economy of the region and found 20 container ports in Turkey CA was made based on 2015 data by Acer Timor (Acer & Timor, 2017). In order to complete this lack of general analysis study identified in the literature, it has been decided to conduct an analysis study that can be applied to researchers, maritime operators and maritime policy makers.

Methods

Within the scope of the study, a metaphor[3] was created by accepting the maritime transport sector as a living entity. The stages of this life were determined from the data published by UNCTAD under the subheading of maritime. In this context, considering that the life process begins with birth and ends with death, the construction of ships, which is the main element of maritime transport, is considered the birth of this process. The postnatal life is represented by the vessels, which are the components of the transportation process and where the transportation is actually made, the ports where the cargo of these vessels are handled, and the seamen using these vessels. The death of the maritime transport process is simulated to the ships carrying out their commercial life, scrapped and recycled.

The basis of the study is to investigate the maritime data of the UN member countries with very different characteristics and to determine the variables and the data to be used in the analysis. After determining the variables with the correct data, Clustering Analysis (CA) was performed based on these data and variables, and the countries determined as variables were separated into homogeneous and heterogeneous clusters between groups.

After determining the countries to be included in the analysis, in order to determine the variables; Maritime data published by UNCTAD for all countries in 2017 were analyzed and it was decided to use the variables defined below.

3 Metaphor is the analogy or other expression of a situation using simulation for a stronger expression, https://www.metafor.com/metafor-nedir/

Table-1: Variables in Cluster Analysis and Their Definitions

Variables and Definitions		
	Coast/Area Ratio	It is the length of the coast determined in meters per square kilometer of the surface area of the countries.(m/km²)
	Liner shipping connectivity index (LSCI)	The amount of transportede containers such as the number of regular transpot lines, the number of enterprises, the loading amount of large container vessels and the number of countries to which regular maritime transport lines are connected.
	Capacity of Ship Building	It is the value in GT of the total size of commercial ships built in 100 Gross Tonnage (GT) and above of the countries.
	Capaciy of Ship Recycling	100 Gross Tonnage (GT) and above of countries is the value in GT of the total size of commercial ships that are scrapped and recycled.
	Container port throughput	It is the value of the total container quantity capacity of all container ports of the countries in Twenty-foot Equivalent Unit (TEU).
	Number of Seafarers	It is the number of captains, engineers and the other professional crew working on merchant ships.
	Number of National Flag Ships	It is the total number of all types of vessels with national flags, 1000 GT and up.
	Number of Other Country Flag Ships	It is the total number of all types of vessels with the other country flags, 1000 GT and up.

In order to determine the countries to be used in the analysis, the data of 248 countries recorded in the UN records in 2017 were examined. As a result of the examination; total of 94 countries were excluded from the scope of the study due to the fact that there is no data belonging to 27 countries, 39 countries are not coastal and the data of 28 countries are less than 0.01% compared to the world and the data of 154 UN member countries were used in the study.

Table-2: Determining the Countries to Cluster Analysis

Number of UN Registered Countries is 248			
	Number of countries without data is 27		
	Number of not coastal countries is 39	Total number of countries withdrawn from the study is 94	Total number of countries analyzed is 154
	Number of countries with data less than 0.01 is % 28		

The 248 countries registered with the UN and the countries excluded from the study and their reasons are as in the table below.

Table-3: UN Countries Included in the Study

1	* Afghanistan	63	Dem. Rep. of the Congo	125	Latvia	187	*** St.Martin (French p.)
2	Albania	64	Denmark	126	Lebanon	188	** St.Pierre and Miq.
3	Algeria	65	Djibouti	127	* Lesotho	189	St.Vincent and the Gren.
4	** American Samoa	66	Dominica	128	Liberia	190	Samoa
5	**Andorra	67	Dominican Republic	129	Libya	191	** San Marino
6	Angola	68	Ecuador	130	Lithuania	192	Sao Tome and Principe
7	** Anguilla	69	Egypt	131	* Luxembourg	193	Saudi Arabia
8	Antigua and Barbuda	70	El Salvador	132	Madagascar	194	Senegal
9	Argentina	71	Equatorial Guinea	133	* Malawi	195	* Serbia
10	* Armenia	72	Eritrea	134	Malaysia	196	Seychelles
11	Aruba	73	Estonia	135	Maldives	197	Sierra Leone
12	Australia	74	* Eswatini	136	* Mali	198	Singapore
13	* Austria	75	* Ethiopia	137	Malta	199	** St.Maarten (Dutch p.)
14	Azerbaijan	76	*** Ethiopia (...1991)	138	Marshall Islands	200	* Slovakia
15	Bahamas	77	** Falkland Is. (Malv.)	139	Mauritania	201	Slovenia
16	Bahrain	78	Faroe Islands	140	Mauritius	202	*** Soc.Fed.Rep. of Yug.
17	Bangladesh	79	Fiji	141	Mexico	203	Solomon Islands
18	Barbados	80	Finland	142	Micronesia (Fed. Sta.)	204	Somalia
19	* Belarus	81	France	143	* Mongolia	205	South Africa
20	Belgium	82	** French Polynesia	144	** Montenegro	206	*** St.Geo.and S.S.Is.
21	Belize	83	*** French Southern Ter.	145	** Montserrat	207	** South Sudan
22	Benin	84	Gabon	146	Morocco	208	Spain
23	Bermuda	85	Gambia	147	Mozambique	209	Sri Lanka
24	** Bhutan	86	Georgia	148	Myanmar	210	* State of Palestine
25	* Bolivia (Plur. State of)	87	Germany	149	Namibia	211	* Sudan
26	* Bonaire, St.Eust. and Sa.	88	*** Ger. Dem. Rep.of	150	** Nauru	212	*** Sudan (...2011)
27	Bosnia and Herzegovina	89	*** Ger., Fed. Rep.of	151	* Nepal	213	Suriname
28	* Botswana	90	Ghana	152	Netherlands	214	Sweden
29	*** Bouvet Island	91	Gibraltar	153	*** Netherlands Ant.	215	* Swit., Liechtenstein
30	Brazil	92	Greece	154	New Caledonia	216	Syrian Arab Republic
31	***British Ind. Ocean Ter.	93	** Greenland	155	New Zealand	217	* Tajikistan
32	** British Virgin Islands	94	Grenada	156	Nicaragua	218	Thailand

33	Brunei Darussalam	95	* Guam	157	** Niger	219	* Timor-Leste
34	Bulgaria	96	Guatemala	158	Nigeria	220	Togo
35	* Burkina Faso	97	Guinea	159	** Niue	221	** Tokelau
36	** Burundi	98	Guinea-Bissau	160	*** Norfolk Island	222	Tonga
37	Cabo Verde	99	Guyana	161	*** North Macedonia	223	Trinidad and Tobago
38	Cambodia	100	Haiti	162	** Nort.Mariana Is.	224	Tunisia
39	Cameroon	101	***Heard Is.and McD.Is.	163	Norway	225	Turkey
40	Canada	102	** Holy See	164	Oman	226	Turkmenistan
41	Cayman Islands	103	Honduras	165	*** Pac. Isl, Trust Ter.	227	** Turks and Caicos Is.
42	** Central African Rep.	104	* Hungary	166	Pakistan	228	* Tuvalu
43	* Chad	105	Iceland	167	* Palau	229	* Uganda
44	Chile	106	India	168	Panama	230	Ukraine
45	China	107	Indonesia	169	*** Panama, Canal Z.	231	*** Un.of Sov.Soc. Rep.
46	China, Hong Kong SAR	108	*** Indonesia (...2002)	170	*** Panama, exc. Can.Z	232	United Arab Emirates
47	** China, Macao SAR	109	Iran (Islamic Rep.)	171	Papua New Guinea	233	United Kingdom
48	China, Taiwan Pro.	110	Iraq	172	* Paraguay	234	Un.Rep.of Tanzania
49	*** Christmas Island	111	Ireland	173	Peru	235	*** US Minor Out. Is.
50	*** Cocos (Keeling) Is.	112	Israel	174	Philippines	236	Un.States of America
51	Colombia	113	Italy	175	*** Pitcairn	237	Uruguay
52	Comoros	114	Jamaica	176	Poland	238	* Uzbekistan
53	Congo	115	Japan	177	Portugal	239	Vanuatu
54	Cook Islands	116	Jordan	178	Qatar	240	Venezuela (Bol. Rep.)
55	Costa Rica	117	Kazakhstan	179	* Republic of Moldova	241	Viet Nam
56	Côte d'Ivoire	118	Kenya	180	Romania	242	** Wallis and Futuna Is.
57	Croatia	119	Kiribati	181	Russian Federation	243	** Western Sahara
58	Cuba	120	Korea, Dem. Peo. Rep.	182	* Rwanda	244	Yemen
59	Curaçao	121	Korea, Republic of	183	*** Saint Barthélemy	245	*** Yemen, Arab Rep.c
60	Cyprus	122	Kuwait	184	** Saint Helena	246	*** Yemen, Democratic
61	* Czechia	123	* Kyrgyzstan	185	* Saint Kitts and Nevis	247	* Zambia
62	*** Czechoslovakia	124	* Lao People's Dem.Rep.	186	** Saint Lucia	248	* Zimbabwe

* Landlocked countries.

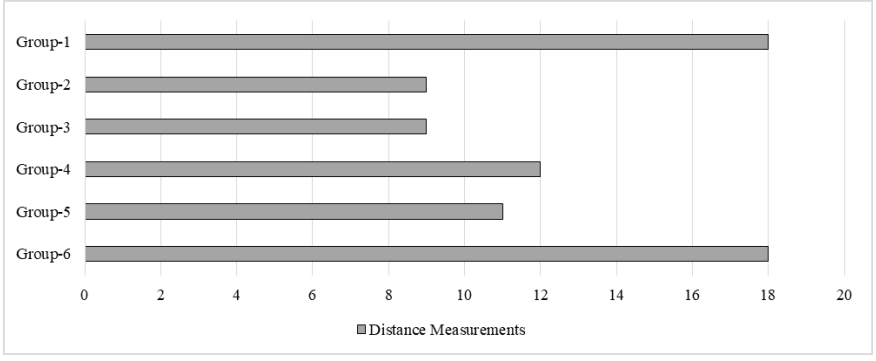
** Countries with maritime data less than 0.01% compared to the world.

*** Countries without data.

Ward Connection Clustering Method which is one of the hierarchical clustering methods was chosen to divide the variables into the most appropriate number of clusters according to similarity or differences, *Squared Euclidean Distance Measure* was used which gives the values of the variables to each other, *Maximum-Minimum (0-1) Standardization (Normalization)* was preferred to reduce the sensitivity of differences between units (Tatlıdil, 1992). The 23rd version of *IBM SPSS Statistic* package program, which is widely used, was used in the analyses made within the scope of the study.

Analysis Results

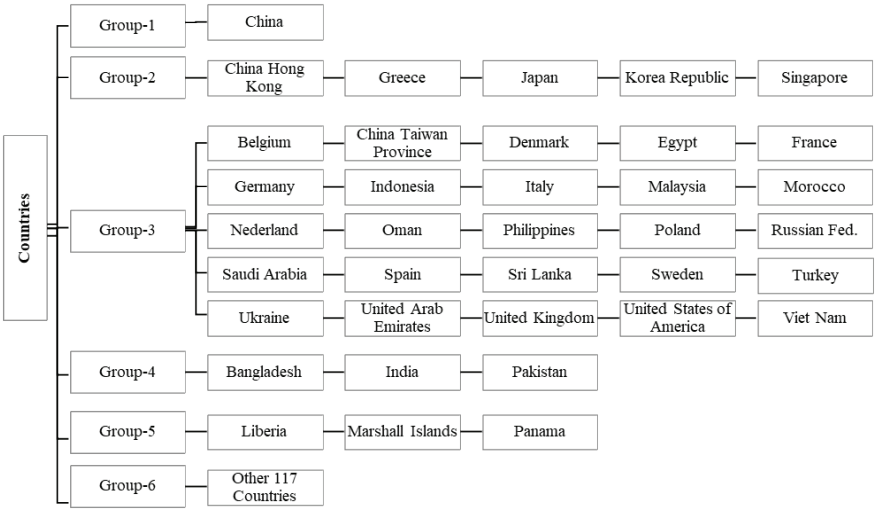
When the dendogram was examined, it was seen that 6 groups were formed with the distance measurement between the clusters about 10 units or more. This situation shows that the groups are clearly separated from each other. The table showing the distance measurements between the groups is as follows.



Graph-1: Distance Measurement Between Country Groups

The dendogram that illustrates the groups obtained as a result of the CA is shaped as follows. It is seen that most effective result is 6 groups.

Table-4: Country Groups obtained by Cluster Analysis



As a result of KA, it is seen that Turkey is located in the Group-3. In this group, there are 25 countries that have some different characteristics although they are similar according to the variables determined. Although not as much as the countries in the first two groups, these countries are ahead of many countries in the world in terms of maritime transport. Although the values of the variables belonging to the countries in this group are above the average, they are neither too high nor too low, like the countries in the 1st and 2nd groups. In addition, some single variable value of countries in this group does not have very high values like the countries in the 4th and 5th groups. So variables belonging to these countries to which Turkey is included, are not outliers. They values are close to the average or above the average. The cause and effect of this situation; it is because some of the characteristics of the countries in this group are similar and some of their features differ. In other words, some of the countries in this group are at the center of trade, some are transit countries in trade, some have maritime potential due to their history, and some make good use of the geography that has a coast to the sea. These countries can reach a better position in the world by taking the good practices of the countries in the first two groups or by implementing the practices that cause the outliers of the countries in the 4th and 5th groups or by using their potential. As a result, similar features and differences of the countries in this group were observed in Turkey. Therefore, Turkey's commercial potential, geographic location and the open-source development potential of the maritime history shows that take place in this group of coincidence.

When the other groups are examined in order; in the field of maritime transport, which is one of the cornerstones of China's growth in the world economy, it is seen that it has a distinct advantage over other countries and

as a result, it forms a group alone. When the data of this analysis and the values obtained as a result are examined, it is seen that the values of China are in extreme values in proportion to its population and economy. For this reason, it is evaluated that other countries are difficult to reach the Chinese values in the short term, and there may be many examples of applications that should be taken from China in maritime transport.

It can be said that China Hong Kong, Greece, Japan, Korea Republic and Singapore, which constitute the second group, are the countries that is dominant in the field of maritime transport after China. These countries had a distinct advantage over other countries in variables such as the number of ships, shipbuilding industry, high capacities of their ports and number of seafarer employment. These countries are the leading countries in maritime transport, which are exemplary applications worldwide, after China, based on the determined variables.

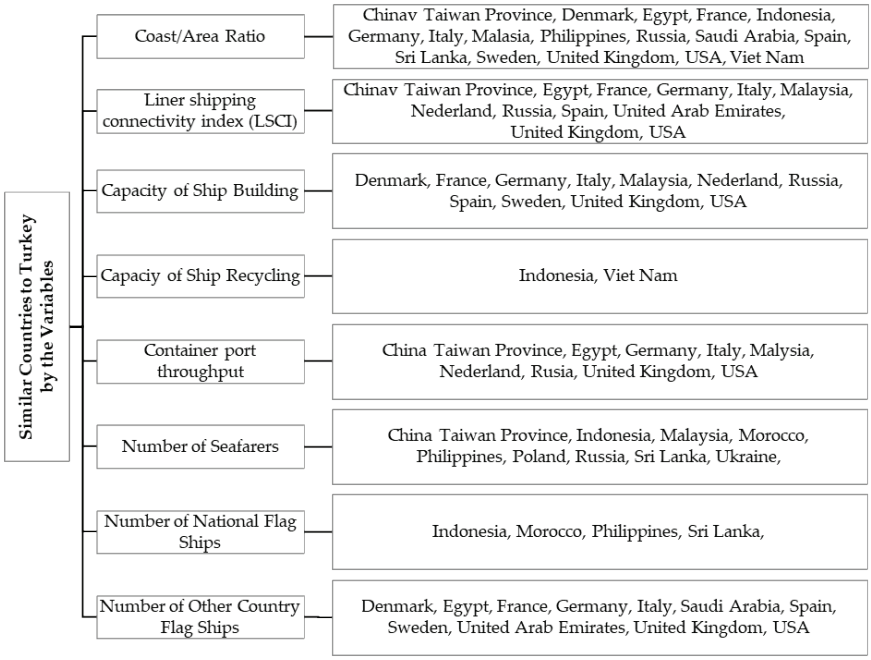
Although the maritime transport data of the countries in the Group-4 are generally not high, it is seen that some of their variables have significantly very high values. For example, Bangladesh, India and Pakistan, have 91% of the world's ship recycling industry together with China.

Countries in Group 5 also have markedly extreme values for a variable, like countries in Group 4. Liberia, Marshall Islands and Panama are far behind the world in terms of development and economy. But they have very high values in the number of national country flagged ships due to the very low tax regimes with the lack and uncontrolled bureaucratic procedures. The other variables of these countries in Group-4 and Group-5 are very low. Another contribution of these two groups to this study confirms that the grouping, which is the purpose of the study, is based on correct values of variables at the same time.

117 countries in the 6th group of other countries are determined as other countries that cannot have a say under the title of maritime transport due to very limited coasts, low economic development levels, or very low level of investments in maritime transport. Data for these countries were not used in the duration of the study.

Based on the variable vauesl that show similarities with countries that Turkey is in Group-3 as in the following Table-5.

Table-5: Smilar Countries in Group-3 with Turkey by the Variable Values



When analysis results are investigated as a whole; since it is clearly seen that the countries in the obtained groups exhibit similar characteristics, it is evaluated that the results are consistent and reflect the real situation to a great extent. This situation confirms that the variables were chosen correctly. Thanks to the consistency of the results of the analysis, the lessons that should be learned from the common characteristics of the obtained groups and the suggestions made for the development of Turkish maritime transport have been rational and applicable.

Results and Suggestions

Since this study is the data - based analysis, suggestions made at the end of the study were determined concretely and based on the data. Recommendations in this context; it has been grouped under two main headings, comparisons with other transport types and examples that should be learned from other countries' good practices.

When the comparison of highway, airline and rail transport and maritime transport, which are other transport sectors, it can be said that maritime transport is the transport way that gives the best results in terms of transportation costs, carrying capacity, energy consumption and negative environmental effects. However, it is observed that although the risk of accidents and have a good performance in terms of the safety, maritime transport is at least benefiting from government support of maritime

transport in Turkey. As a result, it is seen that maritime transport is an economically cost-effective and sustainable transport type.

The analysis made in the context of good practices of other countries was made based on the variables used in the study. Turkey's Ship Building Industry' product range, customer satisfaction and delivery time are in good condition compared to developed countries. However, it is seen that there is a need for improvement such as cost, quality, external dependency, raw material and financial competition (TÜRKTERMAP[4]). In this context, although it is seen that the Turkish shipbuilding industry needs improvement in all aspects that affect it, the most basic need is seen as the necessity of opening new areas for the sector region in Istanbul and Yalova. The advantage of Turkey's geography and historical heritage reveals that the ship is open to hosting a great potential for the development of the construction industry.

Ship recycling sector is in the hands of Turkey, Bangladesh, Pakistan, India and China worldwide. Although Turkey has a better condition in environmental sensitivities, occupational health and safety and quality compared to the countries which has the biggest recycling industry worldwide, it is seen that it is open to improvement in terms of labor costs, dismantling costs, delivery time and financial competition (TÜRKTERMAP). In addition, the Turkish ship recycling sector, which is the only one in the Mediterranean basin, offers the closest and economical recycling opportunity for Europe, North Africa and Middle East countries. The weakest situation in this sector is that it is region in the Aliağa district coasts of Izmir. With this context in particular iron and steel raw materials and natural resources are limited identifying new recycling zones in Turkey and operate on occupational health measures with this region of the environmental effects can be achieved earnings very much in this area.

The increase in the supply of goods and services and the depletion of national markets and the world becoming the international market have caused the oceans to become highways with countless transcontinental lanes. In order to use these highways effectively and efficiently, the construction of ports built in the right places and at the appropriate capacity depends on the countries' own trade potential as well as being at the node of the international trade network geographically. In terms of the assessment of Turkey's container port capacity; although Turkey has great geographical advantage, It is seen that its ports are open to development in terms of capacity and port equipment. (Balık, 2014). In addition it is seen that the growth potential of the transfer ports is high due to the potential to become a central port thanks to its developing economy and to be one of

4 Shipyards Master Plan (TÜRKTERMAP) was prepared in 2006 by the Turkish Prime Ministry Undersecretariat of Maritime Affairs and Türk Loydu Foundation.

the nodes of the *Transport Corridor Europe-Caucasus-Asia- TRACECA*[5], which is accepted as the modern Silk Road.

In terms of the maritime profession, ss of the beginning of 2019, there are approximately 1,5 million seafarers, including 800 thousand officers and 900 thousand crew members worldwide. It is known that the number of Turkish seamen is approximately 120 thousand, of which 50 thousand are officers and 70 thousand are crew. In addition, approximately 200 thousand amateur sailors in Turkey, 500 pilot captains, there are 3000 professional diver. The number of licensed amateur sailors in Turkey seems to be too much. However, it is observed that seafarers with amateur sailor certificates can use marine vessels with very limited features after a short-term training and are not included in UNCTAD data. For this reason, there is a need for educational institutions that have a good level of foreign language education at the associate and undergraduate degree and have the ability to work in international conditions. Finding work in national and international ships who are likely to receive training from Turkey's maritime transport investments to be made in this area is evident, the share will increase.

The gains of the ships used in maritime trade and legislation of the countries in the world and Turkey regarding the determination of the flag state obtained after these applications with applications made on this issue have been examined. Between 2007 and 2017, there was an increase of approximately 10% in the number of Turkish flagged ships and approximately 8% in the number of ships with the Russian Federation flag. In the same period, however, there was a 300% increase in the number of Marshall Islands flagged ships and a 48% increase in the number of Panama flagged ships, without significant growth in their economies. These rates are a result of the concept of "Easy Flag Country". These easy flag countries manage to become the flag state of the maritime transport fleets of many countries, thanks to the simplicity of their legislation and the convenience they provide to shipowners with their cooperation. (Karataş and Şimdi, 2019: 72). By the Turkish Shipowners Association; it is stated that the ships with the flag of Panama, Liberia, Malta, Bahama and Marshall Islands, which are the leading countries of these countries and which are published as easy flag countries, constitute 76% of the world maritime trade fleet (Şişmanyazıcı, 2019). Considering that more than half of the ships belonging to Turkish shipowners carry the flags of these countries; application to the study of similar legislation in Turkey but also easy to flag country where it lags behind the general developments in the world can not be seen very efficiency. In this context; In this context; Turkey should take examples from Liberia, Marshall Islands, and Panama which are the easy

5 https://traceca.uab.gov.tr

flag countries. In addition, it is evaluated that it will increase the number of national flag ships thanks to the examples it will take from quality easy flag applications such as Singapore and Malta.

Considering the analysis results and the gains that can be obtained from other transportation types and good country practices, the things to be made for Turkish maritime transport to be better are listed as follows.

- Turkey's shipbuilding industry, ship recycling industry and large-scale ports must be made to make more efficient use of the appropriate coast.
- Turkish entrepreneurs should be encouraged with the use of low labor cost and increasing labor quality.
- The potential of being a transit country between Asia and Europe and the advantage of being close to the European, North Africa and Middle East markets should be evaluated.
- The capital insufficiency and financing support opportunities of the maritime transport sector, where costs are high, need to be diversified and developed.
- It is necessary to reduce bureaucratic and social barriers, especially in establishing large port and ship industry zones.
- In order for the ship recycling industry, which is seen as an environmental risk for the coasts, to be seen as a green industry, it is necessary to increase the effectiveness of the organization in the management of environmental impacts and to apply the standards meticulously.
- It is necessary to make bilateral and multiple cooperation with the leading countries in maritime transportation for increasing the number of national flag ships and the number of major ports worldwide in the medium and long term.
- In order to provide the need for qualified seafarers, the number of higher education institutions that train professional seafarers should be increased.

The ultimate aim of this study is as the world's largest trade route TRACECA geographical accepted in the key areas of Turkey, using the maritime heritage from history is to contribute to come to the position it deserves in marine transport. All of the suggestions made based on the analyses made and the findings obtained within the scope of the study were made to achieve this goal. In order to achieve this goal, it should not be forgotten that NGOs that carry out important activities in maritime transportation should also operate more effectively, and the state and these NGOs should work in coordination with each other.

As a result; since this study is the data-based analysis study, the original values and innovations that it will bring to the world maritime transport industry and the literature are as follows.

- It is the first and only study in which the numerical data related to the world maritime transport sector are used in an analysis of this scale.
- It is the first study conducted in the field of maritime transport worldwide in terms of the content of the study and the analysis.
- It will be ensured that other countries included in the analysis will see countries that are similar to them in the world maritime transport sector and countries that are better than them. Thus, the results will be able to be used in the studies to be carried out on the maritime transport sectors of each country and in the strategic decisions of the countries.
- As a result of the planned work, concrete results will be obtained and the work is open to improvement in all aspects. In this context, if data on the sub-sectors of maritime transport are obtained from reliable sources, it is evaluated that similarly, the efficiency of sub-sectors can be determined and these efficiency values will strengthen the overall results by deepening.
- The fact that this study will achieve practical results and its open nature of development means that it includes many political and social opportunities for maritime transport, especially economic.

The development of a country is directly related to economic growth. However, it is inevitable that economic development will bring social development along with it. However, countries that have developed economically and socially reach political power throughout the world. Economic development can be achieved by the increase in trade and social development can be achieved by the healthy regulation of basic elements such as employment, income distribution, security and education (Erdoğan, 2016: 195-197). It is inevitable for socially and economically developed countries to be politically strong, as in the whole world. Thanks to Turkey to reach the position it deserves in maritime transport, have a say in the world again will be given as examples in the history of a country contributing to arrive.

Acknowledgement

This chapter is derived from PhD thesis title of "*Turkey Model Research in World Maritime Transport"* written by Fatih ALP and supervised by Prof. Dr. Nuray GİRGİNER. This thesis was prepared at Eskişehir Osmangazi University Institute of Social Sciences.

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