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Türkiye'deki Konteyner Terminalleri için Yük Talep Analizi

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Öz

Limanlar dünyaya açılan ticaret kapıları olarak, ticaret sürecinde ulaştırmanın başladığı ya da sürdürüldüğü tesislerdir. Dünyada ticaret olduğu sürece deniz ticareti var olacak, gemi boyutları gelişimini sürdürecektir. Bu nedenle limanlar verdikleri hizmetleri geliştirmek durumundadır.

Talep tahmini tüm işletmeler için geleceklerini görebilmek ve planlamalarını yapabilmeleri adına önemlidir. Limanlar için özellikle önemli olan yük talep tahmini ile gelecekte ne kadar yük elleçleneceğinin belirlenmesi yönünde fikir edinilmektedir. Limanlar gelişen ticarete hizmet edebilmek için gelecekteki yük talebini tahmin etmeli, yeni yatırım ve gelişim planlarını oluşturmalıdır. Bu çalışmada yük talep tahmini için çoklu regresyon analizi kullanılmıştır.

Çalışmanın amacı 2023 yılı için yük talep tahmini yapmak ve Türkiye'deki limanların bu yükü elleçlemek için yeterli olup olmadığını belirlemektir. Çalışma sonuçlarına göre Türkiye'deki mevcut ve planlanmış konteyner terminallerinin mevcut talebi elleçleyebildikleri ve 2023 yılına kadar bir kapasite sorununun yaşanmayacağı belirlenmiştir.

Anahtar Kelimeler: *Talep Tahmini, Regreyon Analizi, Konteyner Terminali, Türkiye*

Cargo Demand Analysis of Container Terminals in Turkey

Abstract

Ports are the points where the countries meet the world and also one of the main facilities where transportation starts or continues in the trade process. As long as trade exist in the world, sea trade will also exist and to keep abreast of the times vessels will continue to grow, for this reason, ports will grow and continue to improve to serve better. The objective of this study is to calculate the containerised cargo demand for 2023, and to analyse if the container ports in Turkey will be able to handle increasing container cargo demand.

Demand forecasting is significant for all the firms to see their future better and make appropriate plans. It is important especially for the ports to get an idea how much cargo they will handle next year. In order to serve increasing trade, ports have to forecast their cargo demand for future and make new investment or improvement plans.

In this study, multi regression analysis is used to cargo demand forecasting of ports in Turkey. According to results current and planned container terminals in Turkey are already able to handle current demand and they will be able to handle increasing containerised cargo demand until 2023.

Keywords: *Demand Forecasting, Regression Analysis, Container Terminal, Turkey*

1. Introduction

In the globalizing world, remain standing for countries are only possible with production and selling what they produce. It is generally accepted that more than 90 per cent of global trade is carried by sea [1]. By taking into account this percentage it can be easily said that sea trade has vital importance in global trade.

Demand forecasting is important for all the firms from all the sectors as well as the port sector. In this way, firms become able to have an idea and predict their future.

This study aims to give an idea about the capacity of container ports in Turkey and analyse if the capacity enough to handle the increasing cargo demand until 2023.

In this study, regression analysis results and capacity of the container ports are compared.

2. Ports and Their Importance

The Port Working Group of the Commission of the European Communities has defined the term of 'seaport' as: A seaport is an area of land and water made up of such improvement works and equipment as to permit, principally, the reception of ships, their loading and unloading, the storage of goods, the receipt and delivery of these goods by inland transport and can also include the activities of businesses linked to sea transport [2].

Ports play an important role in the economics of the coast and provide a crucial link between land and sea transport. They also have an important social function, through the provision of jobs both directly and indirectly.

Ports should be considered as one of the most vital aspects of a national transport infrastructure. And also;

– Ports form the main transport link with their international trading partners and are a focal point for national and regional motorways and railways

– Ports form a vital aspect of the national transport infrastructure

– Ports are major economic multiplier for the nation's prosperity. They provide a gateway for trade and attract commercial infrastructure

– Ports create a hustle and bustle of industrial activity

– Ports are places where foreign cultures and ideas influence a nation [3].

3. Importance of Demand Forecasting For Ports

Every firm wants to see the future. Thus, new strategies can be developed, new plans can be made, and new investment decisions can be taken. Like for all the other sectors, demand forecasting has vital importance for the port sector as well. Demand forecasting can be seen as decision support system for the new plans [4]. It is the basis of the capacity calculations and gives extremely important ideas about the necessity of new investments and capacity increase.

One of the best ways for successful management of certain transport companies is traffic demand planning. Demand is one of the most important aspects of business economics. Mismatch between supply and demand leads to a number of problems. Therefore, in case of port operations, higher supply than demand leads to the failure in the utilization of port infrastructure and superstructure, and to the lack of cost-effectiveness. When the demand for port services exceeds the supply, there comes to congestion of port facilities, an increase in costs of ships and losses of time due to waiting. Since the traffic capacity is not flexible and its construction and development require substantial financial resources in order to be payable, supply must be designed in accordance with the anticipated demand in the future. Therefore, in order to avoid the consequences of non-compliance of port supply and demand, and to create a basis for sizing supply, there is a need for demand forecasting of port services [5].

Traffic forecasts are used as a basis for investment planning and design of port projects (ports, docks, shore protection,

deep pools). The size and the quality of these investments depend on the handled traffic. They are also used for the day-by-day management (plan loading and unloading, equipment to be assigned, HR, etc.) [6].

4. Methodology: Demand Forecasting

Demand forecasting is the process of estimating the quantity of a product or service that consumers tend to purchase. It helps the company make decisions on whether to enter a new market and also to match supply with demand in order to assess optimal production and inventory capacities. The forecast uses quantitative methods, such as historical sales data or current data from test markets as well as informal methods, such as educated guesses [7].

Demand forecasting is paramount to the future success of any business. It is one of the most important aspects of managing a business. Finding the right balance of supply and demand allows a company to produce enough to meet the needs of its customers. If the company overestimates demand, it runs the risk of producing too much, leaving it with unsold merchandise. If the company produces too little, it runs the risk of not meeting demand and losing sales [8].

Here there is a list including some items about the importance of demand forecasting in details.

- Distribution of resources
- Helps in avoiding wastages of resources
- Serves as a direction to production
- Pricing
- Helps in devising sales policy
- Decrease of business risk
- Inventory management

Demand forecasting is useful and important in all areas such as distribution of resources, production, sales or inventory. The markets are nothing but a play of demand and supply. Since demand is such an indispensable part of the market, demand forecasting is bound to be of great help to the producers [9].

In order to determine the container cargo demand of Turkey from 2015 to 2023, multiple regression analysis was used as quantitative research method. Multiple regression analysis is a method for studying the relationship between a dependent variable and two or more independent variables [10]. In the multiple regression analysis equation, the container cargo amount of Turkey is used as dependent variable and the total volume of import and export, the GDP and the population of Turkey are used as independent variables. Those variables cover the data from 1998 to 2014.

To forecast the containerized cargo demand from 2015 to 2023, multiple regression analysis method were used.

Regression analysis, like most multivariate statistics, allows you to infer that there is a relationship between two or more variables. These relationships are seldom exact because there is variation caused by many variables, not just the variables being studied. There can be functions where one variable depends on the values of two or more other variables which calls multiple regression (Y=a+bX1+cX2) where X1 and X2 together determine the value of y [13].

Multiple Regression analysis method was used to analyze the correlations between the cargo movements in the past and the social-economic indicators of the hinterland of the related ports. In this regression, cargo handling amount of Turkey from 1998 to 2014 was considered as dependent variable and GDP, foreign trade and population of Turkey were considered as independent variables. Finally consequently an equation was created:

(Eq. 1)

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \varepsilon$$

where;

- y is container handling amount
- B_0, B_1, B_2 and $B_3$are regression coefficients.
- x_1 is GDP amount of Turkey
- x_2 is foreign trade amount of Turkey
- x_3 is population of Turkey

Dependent and independent variables were collected from Türklim and Turkish Statistical Institute respectively (See Table 1 for 5 year between 2010-2014). Then, with these data which cover 1998-2014 years, the demand for each of it was estimated until 2023. And finally, by putting all the data into their places in the equation, the result came up.

Table 1. *Dependent and Independent Values (2010-2014)*

Year	TEU (Million)	GDP (1998 Price, Trillion Tl)	Foreign Trade (Billion US Dollar)	Population (Million)
2010	5,8	105,8	299,4	73,7
2011	6,6	115,2	375,7	74,7
2012	7,3	117,6	389,0	75,6
2013	7,9	122,4	403,4	76,7
2014	8,4	126,1	399,8	77,7

Source: *[11] [12]*

According to regression analysis results, the multiple correlation coefficient (R) calculated 0,99, indicates a good level of prediction, coefficient of determination (R2) is 0.99 which means independent variables explain % 99 of the variability of dependent variable (Adjusted R2 is 0,99). According to F-ratio in the ANOVA table shows that the independent variables statistically significantly predict the dependent variable, $F(3, 13) = 551$, $p < .005$ which means regression model is a good fit of the data. (Table 2).

Table 2. *Coefficients*

	Coef.	t	P	VIF
Cons.	-20254714	-6,4	,000	
GDP	0,00003	2,3	,000	1,5
F.T.	0,006	2,8	,000	1,8
Pop.	285	4,9	,000	1,3

The general form of the equation to predict cargo volume from GDP, foreign trade and population is:

(Eq. 2)

Cargo Volume= -20254714+ (0,00003 X GDP) + (0,006 X Foreign Trade) + (285 X Population)

The statistical significance of each of the independent variables are also calculated and the test shows that all independent variable coefficients are statistically significantly different from 0 (zero) which means that all three variables added statistically significantly to the prediction, $p < .05$.

At last, estimated growth rate of GDP, foreign trade and population of Turkey for years between 2015 and 2023 were needed to forecast and the rates obtained from Turkish Statistical Institute for population and from World Bank for foreign trade and GDP.

5. Research Findings

Regression analyses results are shown in Table 3.

Table 3. *Results of Demand Forecasting (TEU)*

Year	Forecast
2015	8.513.118
2016	9.009.165
2017	9.512.592
2018	10.023.023
2019	10.541.245
2020	11.067.783
2021	11.603.183
2022	12.147.734
2023	12.701.747

Table 3 shows the demand forecasting for the container handling amount of Turkey from 2015 to 2023. As it can be seen, there is a continuous increase in the container handling of Turkey and reaching 12,7 million TEU in 2023.

6. Capacities of Container Ports in Turkey

Table 4 shows container ports in Turkey and their handling capacity. Currently there are 22 ports that are able to handle containerised cargoes in Turkey and this number expected to reach 25 at the end of 2015 and 26 at the end of 2023. On the other hand, current total container handling capacity of Turkey is 15,3 million TEU and this capacity will be 20,4 million TEU at the end of 2015 and 24,4 million TEU at the end of 2023.

Table 4. *Capacities of Container Ports in Turkey*

Container Ports in Turkey	Existing	End of 2015	End of 2023
	Capacities		
Çandarlı	-	4.000.000	-
APM	-	1.300.000	1.300.000
ASYAPORT	-	2.500.000	2.500.000
DP WORLD	-	1.300.000	1.300.000
ASSAN PORT	250.000	250.000	250.000
BORUSAN	450.000	450.000	450.000
ÇELEBİ PORT OF BANDIRMA	350.000	350.000	350.000
EGE GUBRE TERMINAL	1.000.000	1.000.000	1.000.000
EVYAPPORT	700.000	700.000	700.000
GEMPORT	660.000	660.000	660.000
KUMPORT	1.700.000	1.700.000	1.700.000
LIMAKPORT ISKENDERUN	1.000.000	1.000.000	1.000.000
LIMASPORT	250.000	250.000	250.000
MARDAS	800.000	800.000	800.000
MARPORT	2.400.000	2.400.000	2.400.000
MERSIN INTERNATIONAL PORT	1.800.000	1.800.000	1.800.000
NEMPORT	450.000	450.000	450.000

7. Conclusion and Recommendation

The aim of the study is forecast of the Turkish container volume and compare with the container handling capacity for 2023.

Total container handling amount of Turkey expected to reach 12,7 million TEU in 2023 and it can be said that Turkey is already able to handle predicted container amount. In this perspective, there is no need for any new port investments and/or improvement of existing ports.

In the last 2 years (2013-2014), many new investments for port sector made and several new ports are already counting days to commence the service like Port of Çandarlı, APM Terminals, DP World etc. On the other hand, as long as sea trade exists, vessel sizes continue its development and existing seaports always need improvements in terms of infrastructure, superstructure and equipment.

Table 4. *Capacities of Container Ports in Turkey (Cont')*

Container Ports in Turkey	Existing	End of 2015	End of 2023
	Capacities		
HOPAPORT	320.000	320.000	320.000
PORT OF CANAKKALE	100.000	100.000	100.000
PORT OF TRABZON	200.000	200.000	200.000
PORT AKDENIZ	500.000	500.000	500.000
RODAPORT	150.000	150.000	150.000
SAMSUNPORT	250.000	250.000	250.000
TCDD PORT OF HAYDARPASA	654.000	654.000	654.000
TCDD PORT OF IZMIR	810.000	810.000	810.000
YILPORT	520.000	520.000	520.000
TOTAL CAPACITY	**15.314.000**	**20.414.000**	**24.414.000**

Source: [12]

Because of the hinterland of each ports have different possibility to increase their container handling amount and the container handling increase cannot be homogenous for the all ports, the next step of this effort is to apply location (port) based regression analysis.

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