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The Transportation and Logistics Sector in Turkish Economy: A Review about Growth Potential and Education Infrastructure

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Abstract: *Transportation and logistics sector is one of the rapidly developing sectors in the world. It is known that in Turkish economy which has high rate of growth, nearly 15% of total Gross Domestic Product belongs to transportation and logistics. In this scope, it is critical to create education opportunities that would provide qualified personnel which is the need of rapidly developing transportation and logistics sector. In this study first of all, the place and growth potential of transportation and logistics sector was analyzed in Turkish economy. In this sense, the status of transportation and logistics infrastructure in Turkey was put forward and education necessities were pointed out. Despite of this sector's growth potential, transportation and logistics education in Turkey is below the level that would compensate the needs both in the sense of providing qualified labour force, and education of expert and academicians. Analyzing examples throughout the world, suggestions were developed about the way transportation and logistics education would be formed according to sector.*

Key words: *Transportation, Logistics, Education.*

1 INTRODUCTION

Logistic is an integrated structure which includes transportation, stocking, storing, material handling, order processing, packaging and recently security [2]. Logistic is also defined as providing presentation of correct product in right way, right amount, right quality, right time and for right customer with right cost. Logistics includes transportation management activities within its own body (Figure 1).

Globalization which effects all nations deeply and sharply so it changed business's operation ways and enlarge their commercial activities. These enlargement reshaped transportation and logistics sector and increased the importance of logistics. Transportation and logistics sector is one of the most rapidly developing sectors in the world and in Turkey. Parallel to this situation, it has a critical importance to form and develop education

opportunities that would provide qualified labor force required for the sector and education of expert and academicians that would educate related labor force.

Logistics is accepted as a novel discipline throughout the world and start and development of logistics education is thought to fall behind the requirement of logistics sector [7; 6]. Similar to this worldwide situation, despite this growth potential in the sector, transportation and logistics education in Turkey is below the level that would compensate the needs both in the sense of providing qualified labour force (logistics occupation education), and education of expert and academicians that would educate related labour force (logistics academic education).

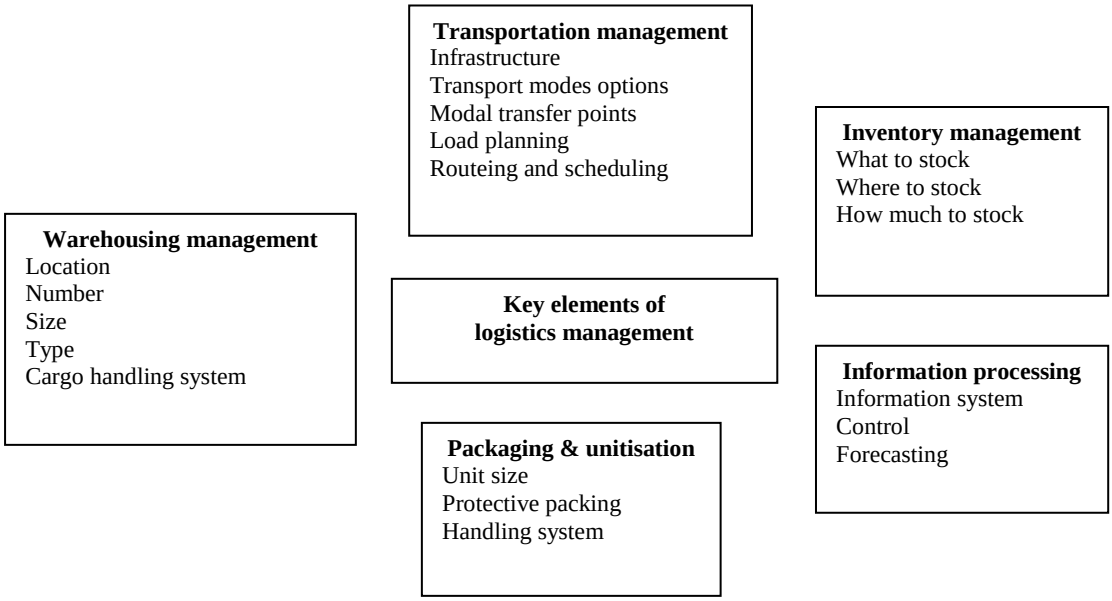

Fig. 1: *Key elements of logistics management [2]*

Main aim of this study is first of all to analyze place and growth potential of transportation and logistics sector within Turkish economy and put forward condition of education infrastructure in transportation and logistics area in Turkey and draw attraction to education requirements. Although there are studies which examine economic growth and potential of transportation and logistics sector in Turkey, there is restricted number of studies [3; 1] about transportation and logistics education. This paper is planned to fill the lack of study which analyses growth of transportation and logistics sector and educational requirements with up-to-date information.

In the paper, the following indicators are used: the number of employee, number of firms, firms revenue's, export and import values and change of these variables. Moreover change of lengths of pipe line, highway, motorway and railway were used and the condition in recent years was interpreted. This information was compiled from Turkish Statistical Institute (TUIK) and web pages of related Ministries and specific published sector reports.

The paper was carried out within the scope of undergraduate and graduate levels in analysis of transportation and logistics education. Since analysis of high-school and associate degree education [1] would also require analysis of different and various programs such as "retailing", "sales", "accounting" and "business management" which are directly related with sector bringing intermediate personnel for the sector, it was accepted as the subject of another study. In this sense, logistics education status of America, China and Europe which considerably effect world economy was analyzed and the condition in Turkey was put

forward by making use of Student Selection and Placement Center (OSYM) and web pages of universities. Suggestions were developed considering how transportation and logistics education can be shaped in a way that would adapt to the sector.

2 TRANSPORTATION AND LOGISTICS SECTOR IN TURKISH ECONOMY AND GROWTH POTENTIAL OF THE SECTOR

Logistics sector is an important actor in economic development due to its strong relations with industry sector and services sector. In Turkish economy which has high rate of growth, nearly 15% of total Gross Domestic Product (GDP) belongs to transportation and logistics (Table 1). This rate was around 12% since 2000 while exceeded estimations and reached 15% since 2007. Due to strategic location on important transportation routes and exponential economic growth rates of Turkey, it is expected that logistics sector will be in the forefront as a strategic sector in economic development in future years.

Table 1: *Economical and Social Indicators (2000-2010) - Added Values and Fixed Capital Investments (FCI) in Transportation Sector [15]*

Years	Added Values (Thousand Turkish Liras, 1000 TL)			Fixed Capital Investments (Thousand Turkish Liras, 1000 TL)		
	Transportation	GDP	Transportation / GDP	Transportation	Total FCI	Transportation /Total FCI
2000	8.908.992	72.436.399	0,12	4.663.254	16.116.404	0,29
2001	8.580.577	68.309.352	0,13	2.740.334	11.195.045	0,24
2002	9.618.386	72.519.831	0,13	2.406.210	12.881.304	0,19
2003	10.473.106	76.338.193	0,14	2.547.176	14.818.710	0,17
2004	11.597.023	83.485.591	0,14	3.873.703	18.884.408	0,21
2005	12.950.854	90.499.731	0,14	4.793.671	22.251.225	0,22
2006	13.830.467	96.738.320	0,14	4.951.056	25.234.306	0,20
2007	14.811.164	101.254.625	0,15	4.991.921	26.259.984	0,19
2008	15.026.108	101.921.730	0,15	5.552.179	24.891.676	0,22
2009	13.936.885	97.003.114	0,14	4.833.871	19.880.712	0,24
2010	15.402.230	105.738.813	**0,15**	6.589.978	25.894.268	0,25

The rate of transportation services in during 2000-2008 in Turkey to total services GDP is given in Table 2. According to this, rate of transportation services to total services GDP dropped in due to economic crisis in 2003 yet reached at 22,53 later on. Besides this, the number of recently founded establishments in Transportation, Storage and Communications sector was 4.233 in 2005; it was 3.597 in 2009 and around 2.835 in 2011 (Table 3). That there are still new establishments being founded as of 2011 shows potential and growth of sector.

Table 2: *The rate of Transportation Services GDP / Total Services GDP [5]*

Years		2000	2001	2002	2003	2004	2005	2006	2007	2008
Transportation GDP	Services	15,34	18,92	19,99	12,19	14,39	18,22	18,78	21,88	22,53

Table 3: *Number of Establishments Founded in Transportation, Storage and Communications Sector [13]*

Years	2005	2006	2007	2008	2009	2010	2011
Total	47.401	52.699	55.351	49.003	44.472	49.741	54.442
Transportation and Storage	4.233	4.257	4.144	3.826	3.597	2.763	2.835

Other indicators about logistics sector are about revenue and number of employees. Data for 2003-2008 years could be found about revenue and number of employees in the sector (Table 4). 10.881.881.219 TL revenue and 266.646 paid employees in 2003 increased up to 24.971.418.347 TL revenue and 442.330 employees in 2008.

Table 4: *Endorsement Amount and Number of Paid Employees in Transportation and Storage Sector [13]*

Years	Revenue (TL)	Number of Paid Employees
2003	10.881.881.219	266.646
2004	11.779.106.822	278.802
2005	16.396.070.054	367.309
2006	16.387.625.191	363.414
2007	20.117.889.966	378.598
2008	24.971.418.347	442.330

Another indicator that can be used in order to reflect improvement in logistics sector is the change of highway, railway, airline and pipeline transportation in Turkey. As it is given in Table 5, the length of natural gas pipeline which was 4.739 km in 2002 became 12.528 km in 2011; the length of motorway which was 1.851 in 2002 became 2.119 km in 2011 and railway line which was 8.671 km in 2002 became 9.642 km in 2011.

Table 5: *Length of Pipeline, Highway, Motorway and Railway in Turkey According to Years [13]*

Years	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Length of pipeline										
Oil (petroleum) pipeline	3.065	3.065	3.065	3.065	3.065	3.065	3.065	3.065	3.038	3.038
Natural gas pipeline	4.739	5.490	6.323	8.041	8.509	10.153	11.483	11.685	11.906	12.528
Length of motorway										
State roads	31.319	31.358	31.446	31.371	31.335	31.333	31.311	31.271	31.395	31.372
Highway	1.851	1.882	1.741	1.667	1.908	1.908	1.922	2.036	2.080	2.119
Length of railway										
Railway	8.671	8.697	8.697	8.697	8.697	8.697	8.699	9.080	9.594	9.642

Apart from these information, according to World Bank Logistic Performance Index which measure logistic growth and quality of countries with (1) customs, (2) infrastructure, (3) international deliveries, (4) logistic sufficiency, (5) monitor and follow-up and (6) timeliness criteria, while Turkey was 34th among 150 countries with 3,15 scores out of 5,00 in 2007; moved back to 39th rank with 3,22 scores in 2010 and went up to 27th rank with 3,51 scores in 2012 [12]. Although scores of Turkey moved up in 2010, it fell behind in the ranking since not having an upward trend as good as other countries. Accelerating its development in 2012 it took the place in higher ranks again. In addition the study of World

Bank in which countries of 2012 Logistic Performance Index were listed according to national income, Turkey was in the 4th rank among 24 countries whose national income is between 3.856 and 11.905 $. When these ranks are evaluated, it can be said that Turkey is at better level in the sense of development of logistics sector among countries which have similar level of national income.

3 TRANSPORTATION AND LOGISTICS EDUCATION IN TURKEY AND COMPARISON WITH THE WORLD

Logistics education basically includes human and related properties, money and financial and contractual elements related to money, properties about equipment and technology and planning methods in organizational sense [7].

Considering the situation around the world, nearly 40 universities included transportation and logistics undergraduate program in America in 1978 [8]. However there was no such expected development in following decades after this year. It was determined that there are transportation, logistics, supply chain management and such as programs in undergraduate level accredited by American Faculty Association (Association to Advance Collegiate Schools of Business) at 51 business programs out of 459 in 2007 and 65 business programs out of 475 in 2010 [8]. Transportation and Logistics education started as a single discipline in Europe for the first time in 1994 at Holland Eindhoven Technology University, Faculty of Technology Management [7]. Professional logistics education started in China in 2001 and there had been no such professional discipline named as "logistics" within higher education until that date [6]. "Logistics management" discipline was formed in 2001 and "logistics engineering" discipline was formed in 2002 and after that date logistics education gained acceleration. As of 2006, "logistics" was included as the main branch nearly at half of the education institutions in China [8]. Logistics education system was developed at high-schools and universities at undergraduate, graduate and doctorate levels. In addition to this, since the logistics education was based on theory in China and practice during education are insufficient, it is complained that graduates have high-level of knowledge but have inadequate skill for analysis, planning and organization [6].

In addition to this summary information about America, Europe and Asia, according to a study carried out in 2007 [9], there are around 224 institutions directly related with logistics in the world. It is known that nearly half of these institutions are in America (123) other are in Argentine (2), Australia (2), Canada (6), Chili (1), Denmark (4), Finland (7), France (1), Germany (44), Hong Kong (1), Hungary (1), Japan (4), Mexico (1), Holland (3), New Zealand (1), Poland (3), Singapore (1), Spain (1), Sweden (7), Switzerland (2), Taiwan (3), Thailand (1) and England (5). There is no institute in Turkey directly related with transportation and logistics education. Whereas there is a need for human resource that have education in transportation and logistics sector in Turkey, like the case is so through the world. The profile still working at most of the logistic firms in Turkey are composed of people who have risen from the ranks and conveys his/her experiences and knowledge to people who are recently involved in the sector [4]. In this context, despite the growth potential in the sector, transportation and logistics education in Turkey is below the level that would compensate the needs both in the sense of providing qualified labor force *(logistics occupation education)*, and education of expert and academicians that would educate related labor force *(logistics academic education)***.** Universities which give education of transportation at undergraduate level of faculties and college in Turkey are presented in Table 6, universities which give education at graduate level are presented in Table 7.

According to the Table 6, in 2012-2013 academic year, transportation and logistics education is given in 21 universities in Turkey. Whereas in 2010-2011 academic year only 10 universities had transportation and logistics undergraduate program [3]. Hence there is a remarkable development about transportation and logistics undergraduate education. In addition to this, it is known that transportation and logistics undergraduate program was founded at Niğde University, Kahramanmaraş Sütçü İmam University but did not start to receive students due to lack of academicians. On the whole nearly 1500 logistician[1] graduates of transportation and logistics education are brought to the sector each year.

On the other hand, in Turkey as of 2010-2011 academic years, while transportation and logistics education at graduate level is given in 12 higher-education institutes [3]; this number is increased to 17 in 2012-2013 academic year (Table 7). In fact graduate program at doctorate level should be evaluated actually in the sense of logistics academic education. But unfortunately in 2012-2013 academic years only two higher-education institutes give graduate education at doctorate level.

Turkey which is developing in the sense of occupational education of logistics has not still gained required speed in academic education of logistics. The majority of academicians in current undergraduate and graduate programs, doctorate education is not directly related with transportation and logistics [1], but they are rather related with fields such as management, economics, industrial engineering, management engineering. As mentioned above, inadequacy of number of academicians in this field makes education at undergraduate and graduate level difficult.

People who receive transportation and logistics education are expected to have qualitative and quantitative skills which would form a bridge between technical-engineering requirements in solving logistic problems apart from knowledge about business administration discipline such as financing, human resources management and organization [7]. Since most of the decisions taken for planning and application of logistics activities require preference in the sense of conflicting purposes, acting intuitionally while taking these decision would cause important losses [8]. Effective and efficient logistic system needs an integrated approach in which service levels are balanced in the sense of transportation time (speed), reliability, flexibility and above all cost [2]. Therefore logistics education which is to be taught for logistics employee and managers should have a wide content including raw material supply, production, delivery, inventory management, packaging, transportation, international trade, clearance, marketing, law, data exchange, security management, computer and suchlike functions.

[1] In job advertisements published by establishment throughout the world and in Turkey generally statements such as "logistics analyst", "logistics manager" and "logistics directors" are used generally. Similar to the usage of Logistics Institute of England, American Logistics Association and American Logistics Management Council, with the decision of Board of Higher Education date 26.07.2012; graduates of faculties and colleges from "Logistics Management", "Transportation and Logistics" and "International Logistics and Transportation" departments have the title of "logistician".

Table 6: *Universities which give Transportation and Logistics Education at Undergraduate Level at Faculties and Colleges in Turkey [10]*

Uni.Name	Status	Faculty Name	Department Name	Quota
Akdeniz Uni.	Public	The School of Ayse Sak Applied Sciences	International Trade and Logistics	30
Atılım Uni.	Foundation	Faculty of Management	International Trade and Logistics	30
Beykent Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Logistics and Transportation	60
Cumhuriyet Uni.	Public	Faculty of Economics and Administrative Sciences	International Trade and Logistics	110
Çağ Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Logistics	25
Gaziantep Uni.	Public	Faculty of Economics and Administrative Sciences	International Trade and Logistics	65
Hasan Kalyoncu (Gazikent) Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Trade and Logistics	50
Işık Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Logistics Management	60
İstanbul Arel Uni.	Foundation	School of Applied Sciences	International Logistics and Transportation	74
İstanbul Bilgi Uni.	Foundation	School of Applied Sciences	International Logistics and Transportation	50
İstanbul Gelişim Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Logistics and Transportation	50
İstanbul Kemerburgaz Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Logistics Management	60
İstanbul Uni.	Public	School of Transportation and Logistics	Transportation and Logistics	70
İzmir Uni.of Economics	Foundation	Faculty of Economics and Administrative Sciences	Logistics Management	100
Kadir Has Uni.	Foundation	School of Applied Sciences	International Trade and Logistics	68
Maltepe Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Trade and Logistics Management	122
Nişantaşı Uni.	Foundation	Faculty of Economics Administrative and Social Sciences	International Trade and Logistics	60
Okan Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Logistics	100
Toros Uni.	Foundation	Faculty of Economics Administrative and Social Sciences	International Trade and Logistics	30
Yaşar Uni.	Foundation	Faculty of Economics and Administrative Sciences	International Logistics Management	55
Yeditepe Uni.	Foundation	Faculty of Commercial Sciences	International Logistics and Transportation	80

Table 7: *Universities which give Graduate Education in Logistics and Related Branches in Turkey (Web pages of Related Universities)*

University Name	Status	Institute Name	Program Name
Doğuş Uni.	Foundation	Institute of Science and Technology	Logistics and Supply Chain Management **PhD. Prog.**
Maltepe Uni.	Foundation	The Graduate School of Social Sciences	Logistics and Supply Chain Management **PhD. Prog.**
Bahçeşehir Uni.	Foundation	Graduate School of Natural and Applied Sciences	Supply Chain and Logistics Management Master Prog.
Dokuz Eylül Uni.	Public	Graduate School of Social Sciences	Logistics and Maritime Transport Master Prog.
Dokuz Eylül Uni.	Public	Graduate School of Social Sciences	Logistics Management Master Prog.
Dokuz Eylül Uni.	Public	Graduate School of Natural and Applied Sciences	Logistics Engineering Master Prog.
Galatasaray Uni.	Foundation	Graduate School of Social Sciences	Marketing and Logistics Management Master Prog.
Gaziantep Uni.	Public	Graduate School of Social Sciences	International Trade and Logistics Master Prog.
Turkish Military Academy	Public	Defense Sciences Institute	Material Supply and Logistics Management Master Prog.
İstanbul Uni.	Public	Managerial Economics Institude	Logistics Management and Transportation Master Prog.
İstanbul Uni.	Public	Graduate School of Social Sciences	Supply Chain Management Master Prog.
İstanbul Ticaret Uni.	Foundation	Graduate School of Social Sciences	Logistics Management Master Prog.
İzmir Uni. of Economics	Foundation	Graduate School of Social Sciences	Logistics Management Master Prog.
Maltepe Uni.	Foundation	Graduate School of Social Sciences	Logistics and Supply Chain Management Master Prog.
Okan Uni.	Foundation	Graduate School of Social Sciences	Logistics Management Master Prog.
Yeditepe Uni.	Foundation	Institute of Science and Engineering	Logistics Systems Management and Engineering Master Prog.
Yeditepe Uni.	Foundation	Instıtute of Social Sciences	International Trade and Logistics Management Master Prog..

4 CONCLUSION

Transportation and logistics sector is one of the rapidly developing sectors in the world. Logistics sector has great importance in the sense of competitive advantage of a country in foreign trade. It is known that in Turkish economy which has high rate of growth, nearly 15% of total GDP belongs to transportation and logistics.

Turkey has a great logistics potential especially in the sense of its geographical position. Turkey is advantageous in the sense of transportation and logistics for having coast by the sea, temperate climate that would make transportation easy, having natural (the Bosporus) and artificial corridor such as bridge and tunnels. Moreover, being located on global trade routes between Asia and Europe is enough for explaining critical importance and development of logistic sector in Turkey.

Transportation and logistics sector is generally arranged with international legislations. Legislations and standards are determined by member unions. In European Union (EU) harmonization process, Turkey made various arrangements in laws and regulations according to standard structure determined by the union. In this scope, transportation and logistics education is of critical importance considering criteria included in EU directives and sought in labor force in transportation and logistics field, development of sector in Turkey and global competition. It is a precondition and important competitive advantage to plan this education process in a way that would bring in graduates who have comprehensive knowledge of logistic infrastructure, international trade and economic relations, have interdisciplinary education in management, informatics. The graduates should also know more than one foreign language. In addition to these, education infrastructure should answer the needs of private sector and be cooperation with them.

In this study it was displayed that academic education in the field of transportation and logistics in Turkey is yet quite novel, most of the programs in undergraduate and graduate are in Istanbul and did not spread through Turkey. For these reasons, logistics education should be improved in Turkey.

On the other hand, logistics graduate education is given as a program either in social sciences or natural and applied sciences institutes in Turkey. It is known that there are directly logistics institutes throughout the world. It would be requirement to found logistics institutes in Turkey both for training academicians and experts in the sector. To become widespread academic education in the field of transportation and logistics, especially at doctorate level, would contribute education of academicians and also increases the number of them.

In further papers, transportation and logistics education in Turkey can be examined starting from high-school level to vocational high school, undergraduate and graduate programs. Moreover, the empirical papers planning about requirements of sector and to what extent they are compensated with current education are critically important. The papers in this aspect will contribute considerably both to the development of sector and advance the education in this field. As last word, papers can be prepared which analyze transportation and logistics academicians' specialization area.

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