

ANALYSIS OF TURKISH LOGISTICS SECTOR AND SOLUTIONS SELECTION TO EMERGING PROBLEMS REGARDING CRITERIA LISTED IN LOGISTICS PERFORMANCE INDEX (LPI)

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—Abstract —

Nowadays, with the increasing trend of globalization, companies are continuously looking for the ways to improve their performance and stay competitive in their markets. To do so, logistics operations have an increasing importance throughout the World. Logistics as a global term is also very crucial for countries' welfare as well. As a developing country, Turkey's progress in logistics is highly correlated to various parameters such as Turkey's geo-strategic location, ongoing accession negotiations with European Union, participation to routes within the corridors of EU transport policy and container flow between Europe and Asia. Increasing volume and value of logistics activities in Turkey raised the necessity to analyze the market in detail. In this study, Turkish logistics sector is statistically analyzed in the view of each transport mode and logistics activity. Analysis phase is based on three fundamental frameworks that are called as traffic (flows), infrastructure and modal splits. The problems that are derived from analysis phase are clustered according to the criteria listed in Logistics Performance Index Report published by World Bank in 2010. Solutions to apply to emerging problems that can be reflected in each cluster are selected by considering a number of performance factors by using a deterministic dynamic multicriteria decision making technique.

Key Words: Logistics, Multicriteria Decision Making, Logistics Performance Index, Logistics Management, Auditing

JEL Classification: O14

1. INTRODUCTION

As globalization becoming fundamental phenomena of economic structures, transportation and logistics activities are becoming much more important day by day. As a result of this fact, logistics activities have been launched as a primary competence factor in countries' economical assessment in the recent years. Transportation and timely delivery of goods and services are the main factors for all types of businesses throughout the World. Additionally, merchandise transport and logistics enable businesses actors to access new jobs and markets. Accessibility therefore links transport supply with wider policy objectives, such as economic and socio-economic targets. (Chatterjee,2009;1) This wide range of influence has been reflected in WTO transportation/service ratio index. Table-1 shows that total transport GDP in overall service GDP has been one fourth of total service GDP in the World. The ratio has been increasing in the recent years in Turkey. This increase may be interpreted as the increasing logistics activities across the country.

Table-1: Transport GDP/Total Service GDP

Transport GDP/Total Service GDP	2000	2001	2002	2003	2004	2005	2006	2007	2008
World	24,75	24,41	24,01	23,64	24,16	24,21	23,86	23,79	24,26
Turkey (TR)	15,34	18,92	19,99	12,19	14,39	18,22	18,78	21,88	22,53

Source: WTO, Statistical Database, 2010

The rapid rise in the last decade may be explained by analyzing the activities separately. As a developing country, there are several reasons that are directly related to the sharp increase such as Turkey's geo-strategic location, ongoing accession negotiations with European Union, participation to routes within the corridors of EU transport policy and trade flow between and within the regions. European Region (EU27) has been representing 45,4% of total World Merchandise export, and 69,7% of these flow consist of intra Europe movements. In 2009, trade within Europe (EU27+EU Candidates) accounted for 72% of European trade. (WTO,2010:6)

High values of trade in between regional partners increased the importance of Turkey as a logistics center in Europe. Turkish involvement in European fundamental routes (TEN-T and TEN) has been considered as a strategically important movement taken towards the integration with the EU member states.

The routes including Turkey have been analyzed by European Commission in 2010 and future investments are planned in view of the growth in traffic between Member States and Candidate States, expected to double by 2020, the investment required to complete and modernize a true trans-European network is going to be prioritise projects, in close collaboration with national governments, and to ensure effective European coordination. What is more, Turkey is considered to be a critical actor in trade between Europe and CIS as a TRACECA member state. In addition to those, Turkey's strategic location between Europe and Middle East makes it inevitable for logistics partners to use Turkey as a cross bridge.

Understanding Turkey's increasing importance in the region is not adequate to analyze Turkish logistics system in detail. There are also so many different types of drivers that help analysts to understand Turkish logistics sector such as: Flows within Turkey, Percentage of transport modes, infrastructure and investments in the sector. The systematic approach to sector analysis will base on identification of influence of each transport mode. Main transportation modes may be listed as: Road, Rail, Sea, Pipeline, Air and Inland Waterways. Turkish logistics sector is highly dependent on Road transport. The related statistical data shows that mode division on transport is highly biased on Road segmentation. Table-2 gives brief information about the percentages of modes in international transportation.

Table-2 Modal split of International transport by Turkey ;

Year	Sea	Rail	Road	Air	Others
2001	49,1%	0,6%	36,8%	10,3%	3,3%
2002	51,8%	0,8%	35,0%	9,9%	2,5%
2003	54,0%	0,9%	32,7%	10,0%	2,4%
2004	54,8%	1,1%	31,8%	10,1%	2,2%
2005	53,7%	1,4%	31,7%	9,0%	4,3%
2006	55,1%	1,4%	30,1%	8,3%	5,1%
2007	55,2%	1,3%	30,0%	8,6%	4,9%
2008	57,1%	1,1%	27,6%	8,2%	6,0%
2009	53,6%	1,1%	31,2%	8,8%	5,3%

Source: TurkStat (Turkish Statistical Institute), 2010

International trade of Turkey is mainly made via Sea transport. The usage of container as transportation unit has raised the importance of Sea transport. The

statistical data proofs that International trade throughout the World is also based on Sea transport with an average percentage of 55. On the other hand, 91% of inland transport with respect to quantities to be transported is made by Road in Turkey. Hence, there is a huge gap between the transportation modes in Turkey. Railway and Combined transport strategies are not welcomed by most of logistics operators.

After the analysis of geostrategic location and mode division of transport, sector components may be analyzed in detail. Turkish logistics sector is expected to worth 59 billion dollars with all contributing partners and components. (Kuatro,2008;12)

Dynamic nature of the industry results in a great movement in company profile within the sector. Table-3 gives information about the number of enterprises that are established and shutdown in recent years.

Table-3 Number and percentage of enterprises established and shutdown;

Year	Total Number of companies		Logistics, Warehousing, Transportation		Ratios (Number presented in sector)		Number of Establishment/Number of Shutdowns
	Establish	Shutdown	Establish	Shutdown	E (%)	S (%)	E/S
2000	33161	1 887	2487	118	0,075	0,06	21,076
2001	29 665	2 464	2359	114	0,080	0,05	20,693
2002	30 842	3 667	2359	213	0,076	0,06	11,075
2003	32 259	5 436	2696	352	0,084	0,06	7,659
2004	40 919	7 660	3824	563	0,093	0,07	6,792
2005	47 401	8 886	4233	596	0,089	0,07	7,102
2006	52 699	9 471	4257	661	0,081	0,07	6,440
2007	55 350	9 954	4144	627	0,075	0,06	6,609
2008	49 003	9 578	3826	634	0,078	0,07	6,035

Source: TurkStat (Turkish Statistical Institute), 2010

Total numbers of enterprises that are established in the recent years are much greater than the number of shutdowns. Until the economic crisis in 2008, there is a continuous positive trend in the number of established enterprises in logistics sector. On average, 9% of all new establishments and 7% of all closed ones are logistics companies in each year. To understand the fundamentals of sector,

number of enterprises established each year is divided to the ones that are closed. In 2000, the ratio was 21, while in 2009, it is 9. This shows us that; logistics sector is growing with a slowing acceleration.

Analysis of sector in detail helps to assess the performance of logistics activities compared to international partners. World trade is moved between countries by a network of increasingly global logistics operators. But the ease with which traders can use this network to connect with international markets depends in large part on country-specific factors such as trade procedures, transport and telecommunications infrastructure, and the domestic market for support services. Logistics Performance Index and its component indicators provide a unique global point of reference to better understand these key dimensions of logistics performance by each country. (WB,2010;14)

2. NATIONAL LOGISTICS COMPETENCE AND DERIVED SOLUTIONS

The main concept of national logistics competence implies that there are some general and specific factors which bring about different logistics performance in various regions of the World and in some particular countries. Many researchers have attempted to identify those competencies using a number of different performance criteria. (Moron,2010;4)

One of the most recent concepts of logistics performance measurement was proposed as the interactive benchmarking tool for international comparison of different countries in order to assess the logistics gaps between them. This framework has been launched by World Bank as Logistics Performance Index claimed to provide a comprehensive picture of the supply chain activities in a pre-determined country.

In 2010, the released report consists of six fundamental dimensions to score countries' performance in respect to logistics activities. These dimensions may be listed as: Efficiency of clearance processes, Quality of Infrastructure, Ease of arranging competitive priced shipment (Non-monopoly), Competence and Quality of Logistics activities, Ability to track and trace shipments and Timeliness of shipments. Data required to calculate LPI are being collected by means of surveys of global freights forwarders throughout the World. On the basis of data countries are initially ranked in the ascending order. Turkey has been placed in number 39 out of 155 listed countries. Nowadays problems of Turkish logistics sector should be directly related to performance criteria listed in LPI. The problems that are

derived from the analysis phase are clustered by using performance measures of Logistics Performance Index. The criteria listed above are in directly relationship with real time logistics performance of the investigated country. So, solutions that are proposed are determined within the structural framework of the LPI. (İris,2011;186)

Criteria 1: Efficiency of clearance activities:

- Custom regulations should be revised regarding logistics costs
- Custom affairs should be more reliable based on bilateral trust and pre-clearance activities.
- Temporary storing and allocation status should be given to A type bonded warehouses.
- Modernization of custom procedures and equipments should be completed.
- Active working hours at customs should be enlarged.
- Companies with L&R competence may employ custom regulator staff within the company.

Criteria 2: Quality of Infrastructure

- Turkish government should form equilibrium in between transport modes without suffering from monopoly.
- A new infrastructural institution regarding intermodal and multimodal capacity of Turkish logistics sector should be established.
- Combined transit regime regulations should be set and investments on transit transportation infrastructure should be increased.
- A detailed database should be designed for all warehousing and distribution activities and networks across the country
- Feasibility assessment for linkages within the industrial zones and ports via railway connections should be started.
- A new infrastructural group regarding capacity and capability of Turkish freight villages should be established.

Criteria 3: Ease of arranging competitive priced shipment

- Turkish government should diminish quantity restrictions (commonly known as import quotas)
- In international road-transport regulation, the need of standardized fuel tank regulation should be relaxed. Because, it impossible to find a proper truck to operate in rush hour or unexpected logistics activities

- %1 of tolerance for vehicle height should be set as a standard as in EU transportation legislation.
- In free zones, the supportive funds in petroleum products for Turkish trucks should be settled.
- So as to support transit transportation, Turkey should diminish extra taxes on petroleum on customs.
- Routing and scheduling of trucks should be planned properly. And, a unified database should be designed to track all shipments
- Turkish government should establish a structural body to control warrants and licenses of transportation activities

Criteria 4: Competence and Quality of logistics activities

- Enlargement of the scope and non-monopoly area of logistics activities should be set as primary focus
- Educational institutions should agree on job education standards for logistics activities.
- Drivers should be educated in practical aspect (Simulation and control).
- Design of EU anticipated driver license structure should be accelerated.
- Green and Reverse logistics activities should be supported by companies.

Criteria 5: Traceability of Shipments

- Logistics internet structure based on logistics database may be endorsed.
- E-trade application including e-tax, e-procurement, e-sign, and e-certificate should be widened.
- E-commerce in transportation activities should be applied by some contractors with each country.
- Satellite communication with trucks should be widened. Required infrastructure should be established.
- Intelligent transportation systems should be applied through the country.
- RFID applications should be compulsory for upper level of logistics activities.

Criteria 6: Timeliness of Shipments

- Number of hubs and distribution centers should be increased regarding cost minimization aspect.
- Risky places for logistics activities should be analyzed, and required precautions such as additional security precautions should be taken.

- Timeliness is a function of city traffics, so city and urban logistics investments should be increased.
- Bilateral agreements with specific countries for pre-clearance activities should be enriched.
- Control mechanism of logistics activities should be restricted with higher level of quality

Listing those solutions do not imply to implement all of them in a short period of time. Each of them has its obstacles in its nature. The alternative solutions determined in this stage are inputs for multicriteria decision making procedure. The weights of each factor are determined with decision makers who are expertise in implementing such proposals in logistics sector. Another important decision is the selection of multicriteria decision making technique. Most of the papers in this subject use discrete selection techniques such as weighted score models or Analytic Hierarchy Process. In this study, weighted score model is used as decision making technique.

3. SOLUTIONS SELECTION PHASE

The set of solutions proposed composes different types of alternatives. Some of those may be applied in the short term without the need of any investment. These solutions are related to legislation actions and short-term applications, while some others are very complicated due to the nature of problem and solution methodology.

The model in the paper is intended to analyze these types of solutions and help to decide to prioritise them. Each project requires some level resources such as budget, time and men-hour etc. So, limited resources entail the implementation plan of proposed alternatives. In this section, selection in between those alternatives is made by regarding some project evaluation criteria. Evaluation of common alternatives should be made by regarding some performance criteria. These criteria are directly related to project selection in logistics sector. The weights of each performance criteria and points of each alternative are determined with decision makers in the sector. The following table gives information about the applicable alternatives to be prioritized. Solution alternatives are coded with the characters A, B, C, D, E, F to ease the selection procedure. Related alternatives are;

- A: Forming a national database for all warehousing and distribution activities and networks across the country to obtain statistics, routes, schedules
- B: Linking all industrial zones with feasible ports or railway connections
- C: Obligatory satellite communication and RFID applications for upper levels of logistics activities
- D: Building a structural body to assess freight villages and combined transport strategies
- E: Establishing new hubs and distribution centers to handle products and to help truck drivers rest
- F: Modernizing control mechanism and equipments in customs, ports and hubs with higher technology.

After determining factors and weights, score of each alternative on behalf of given performance criteria is discussed and summation of weighted products is listed in Table-4, the notation p in the table represents related score, while Σ represents total score of given alternative. Ratings are made via dual comparison techniques.

Table-4 Decisions table

Wght	ALTERNATIVES Factors	A		B		C		D		E		F	
		p	Σ	p	Σ	p	Σ	p	Σ	p	Σ	p	Σ
8,5	Budget required to implement the project	8	68	3	25,5	5	42,5	7,5	63,8	6	51	6	51
8	Effect on logistics in national aspect	7,5	60	9,5	76	6	48	7	56	7	56	8	64
6	Time required to implement the project	4,5	27	3,5	21	7	42	7,5	45	5	30	4	24
7,25	Effect on customer service level	6	43,5	6,5	47,1	8	58	6	43,5	7	50,8	8	58
5,75	Sustainability effect of the project	4,5	25,9	9	51,8	5	28,8	9	51,8	5	28,8	6	34,5
7	Infrastructure required to implement the project	5,5	38,5	3,5	24,5	6	42	8	56	7	49	4	28
5,5	Effect on cost reduction in company aspect	5	27,5	8,5	46,8	6	33	6,5	35,8	6	33	5	27,5
5,5	Human Resource and Information Technology required to implement the project	6	33	7,5	41,3	7	35,8	6	33	9	49,5	7	38,5
	Total Score of Alternatives		323		334		330		384		348		325

The results give information about the most compromising solution within the alternatives space. Alternative D (Building a structural body to assess freight villages and combined transport strategies) is selected as primary solution. This alternative is related to governmental and structural facts, so time to establish the system is directly correlated with the will of government. After that, establishing new hubs&DCs and linking industrial zones with feasible ports or railway connections are most appropriate projects to take into implementation.

4. CONCLUSION

In this study, Turkish logistics sector is statistically analyzed with respect to a number of aspects. Analysis phase is composed of parameters such as; modal split, establishment number, flows in international point of view. The problems that are derived from analysis phase are grouped according to the criteria listed in Logistics Performance Index Report published by World Bank in 2010. Solutions to apply to emerging problems that can be reflected in each cluster are selected by considering a number of performance factors determined by decision makers in sector by using a weighted score multicriteria decision making technique.

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