EVALUATION OF SERVICE LEVEL OF MAJOR TURKISH CONTAINER PORTS

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Abstract. Due to the severe changes in the international port industry, the ports around the world are in a severe competition to become the "hub" port of their region. For this purpose, they are not only heavily investing in their infrastructure, but also implementing modern management techniques to survive in this fierce competition. Hence, this paper tried to evaluate the service level of major Turkish ports. A questionnaire survey was conducted targeting field experts which are the decision makers of shipping companies in Turkey. Seven factors for service quality of ports were derived from literature. The relative weights of these factors were determined by Analytic Hierarchy Process (AHP) and construct validity of each factor was checked by confirmatory factor analysis. On the basis of the results, several suggestions were derived for Turkish port industry.

1. INTRODUCTION

In the last few decades, international logistics environment has experienced considerable change. Various factors, such as increasing amount of international trade, advent of ultra-large container vessels, changing demands of the shippers, advancements in container handling technology and information systems, formed a hub-and-spoke system, in which cargo is transported by ultra-large vessels to some advanced hub ports and transshipped to smaller ports by feeder vessels. Such a business environment forced the ports to compete severely by investing in infrastructure, deploying high-technology and improving their customer services to assure their position as the hub port of their region.

On the other hand, Turkish seaports fell back in this competition, thus bureaucratic inefficiencies and lack of appropriate infrastructure caused the logistics route between Asia and Europe drift beyond the borders of Turkey. Thus this research aims to evaluate the service level of Turkish ports and to derive contributions for future developments.

2. LITERATURE SURVEY

2.1. Turkish Ports

In the study of Keceli et al. [1] the level of information systems in Turkish public ports were reviewed and direction of improvement was suggested. It is stated that these ports suffer from severe administrational and structural problems. The administrational problems include severe bureaucratic and regulative inefficiency, expensive port services, low speed of port and customs services, inefficient flow of information and coordination between port-related parties, insufficient human resources, insufficient advertising and marketing of the ports, unregistered port land, and insurance policy that does not cover damages given to ships and cargo. Structural problems of include insufficient physical resources of the ports are insufficient, such as quays and wharves, lengths and drafts, equipments and vehicles, insufficient infrastructure for intermodal transport, lack of easy access cargo tracking system and container land terminals, old equipment and frequent congestions. The study also offers a direction of

improvement for information systems to overcome these problems. The research of Keceli et al. [2] studies the information systems of Kumport, which is a private container port in Istanbul. Kumport was awarded as the most efficient port in Turkey in 2006, and the success of the port is mainly due to its information systems. The research focuses on three main points. First, the system should be in consistency with legal requirements of Turkey. Second, the success of Kumport depends on vision, foresight, resoluteness and enforcement of the top management. And finally, lack of consciousness of laborers and customers about information systems may cause resistance, which must be overcome by the port management.

The study of Yilmaz and Cerit [3] explores strategies to increase the potential of Turkish domestic cargo shipping, by interviewing the field experts using Delphi method. The results are categorized under four main conceptual categories; promotion, cooperation, ports, shipping service characteristics. The paper emphasizes the importance of the ports for improving domestic shipping, and points out the necessity of quantitative research on this subject.

The research of Tuna [4] examines the developments of hub ports in Turkey and their impact on national logistics strategy. Turkey's international trade, relations with European Union and regional developments were considered as major determinants of port development and the Turkish ports were analyzed for potential to be a hub port, mainly based on port location and hinterland connections. The research concludes that Turkish ports have a great potential to be hub ports, but the success depends on various other factors, such as economic and political stability, adequate infrastructure, cheaper costs, simplified customs procedures, adequate information infrastructure and a wide range of port services.

Yeni and Tuna [5] conducted a review on logistics oriented developments in Turkish container ports. According to the paper, although Turkey has a strategic position in terms of logistics and shipping, Turkish ports are in the initial stage of offering logistics value added services.

Yurt et al. [6] analyzed the major developments of Izmir Port by considering regional developments in the maritime related logistics services. UNCTAD Model of Port Development was applied to Izmir Port. As a result, the paper concludes that general characteristics of the Port of Izmir illustrate that it is a modern type of a port while adopting the up-to-date activities and services although the port's problems related to infrastructure, human resources, management and port services affect Turkish economy negatively.

All of the studies related above agree on the fact that Turkish ports are very advantageous according to their location and regional developments of the hinterland, but the ports cannot make use of such advantages due to several structural and managerial problems.

2.2. Service Level

The factors required for evaluation of service quality of ports are deducted from similar previous research. For example, the study of Ha [7] has compared and evaluated the service quality factors of major container ports from the viewpoints of ship operators and logistics managers. The factors of importance are separated into 7 groups. The questionnaires focusing on these factors are processed using validity, ANOVA and Duncan test analysis. This study indicates that Busan and Kwangyang if they are to improve their competitive position in the container trades of northeast Asia need to upgrade the service quality in various service categories.

Other group of studies are on the port selection of shipping companies or freight forwarders. The study of Tongzon [8] has sought to determine the key factors in port choice and to assess their relative importance, using a survey method applied to a sample of shippers and basic econometrics. The study of Cuadrado et al. [9] aims to adapt the benchmarking technique to the sphere of ports by comparing the activity of a port with that of its competitors. Tennet [10] conducted a questionnaire survey targeting carriers and freight forwarders in order to seize their perceptions for port selection.

The third group consists of papers that try to determine the service quality of ports within the restricted context, such as Pedersen and Gray [11] trying to find out the transport selection of Norwegian exporters, or Ugboma et al. [12] measuring the service quality of Nigerian ports.

3. METHODOLOGY

On the basis of the previous studies, the following factors were derived to measure the service quality of Turkish ports.

Table 1

Derived Factors

	Factors						
Source	**Port's Location**	**Port's Infrastructure**	**Port's Information Services**	**Port's Cost**	**Port's Efficiency**	**Port's Human Resouces**	**Port's Custumer Services**
Ha (2003)	X	X	X	X	X	X	X
Tennet (2004)	X	X	X	X	X		X
Tongzon (1998)	X	X	X	X	X		X
Ugboma et al. (2004)		X			X	X	X
Pedersen and Gray (1998)				X	X		X
Cuadrada et al. (2004)	X						X

And the construct variables were also deducted out of the previous studies, as shown in Table 2.

Table 2

Construct Variables

Factor	Construct Variable	Source
Port's location	L1-main trunk road	Ha(2003), Tennet(2004), Tongzon(1998), Cuadrada(2004)
	L2-close to industrial areas	
	L3-efficient for transshipment	
Port's infrastructure	I1- vessel traffic system	Ha(2003), Tennet(2004), Tongzon(1998), Ugboma(2004)
	I2- approach channel	
	I3-intermodal(connections with hinterland)	
	I4- availability of yard	
	I5- availability of equipment	
Port's information services	IN1-EDI	Ha(2003), Tennet(2004), Tongzon(1998)
	IN2-web based information offering	
	IN3-cargo tracking	
Port's cost	C1-port charges	Ha(2003), Tennet(2004), Pedersen(1998), Tongzon(1998)
	C2-service charges (pilotage, towage etc)	
Port's efficiency	E1- speed of operations	Ha(2003), Tongzon(1998), Pedersen(1998), Tennet(2004), Ugboma(2004)
	E2- delivery on time	
	E3- damage performance	
Port's human resources	H1- management skills	Ha(2003), Ugboma(2004)
	H2- laborer's knowledge and skills	
Port's customer services	CU1- ease of handling(paperwork, ready procedures etc)	Ha(2003), Tongzon(1998), Pedersen(1998), Tennet(2004), Ugboma(2004),Cuadrada(2004)
	CU2- offer value added services	
	CU3- fast response to claims and problems	
	CU4- free dwell time for cargo	

The derived factors were used to compose a questionnaire to collect the perceptions of 23 carefully-selected field experts, i.e. decision makers of local shipping companies in Turkey. The questionnaire consists of two part, the first one asks the relative importance of the factors, and the second one asks the opinion of the respondents about the seven ports that handled over 100 000 TEU's in 2007 for each particular question.

4. RESULTS

The responses of the 23 carefully-selected field experts were analyzed via series of methods. The first part of the questionnaire was consists of questions that the respondents compares assess several pieces systematically by comparing them one another two at a time. This part was analyzed by using Analytic Hierarchy Process (AHP) technique. AHP is a multi-criteria decision making process which provides a method of measurement with ratio scales (Saaty, [13]). During the comparison process assessors can concern the solid data about the pieces or they can take their impressions about relative meaning and importance of the pieces into consideration. This is the very nature of AHP that human impressions are subject to use for performing assessment [14]. Preliminary results are given in Table 3.

Table 3

AHP Analysis Results

	Port's Location	Port's Infrastructure	Port's Information Services	Port's Cost	Port's Efficiency	Port's Human Resouces	Port's Custumer Services	Incon.
Expert 1	0,027	0,056	0,070	0,489	0,103	0,126	0,129	0,420
Expert 2	0,165	0,073	0,037	0,219	0,116	0,195	0,195	0,250
Expert 3	0,068	0,073	0,058	0,194	0,137	0,319	0,150	0,620
Expert 4	0,247	0,180	0,126	0,285	0,112	0,024	0,028	0,540
Expert 5	0,365	0,197	0,088	0,245	0,059	0,019	0,027	0,390
Expert 6	0,337	0,206	0,090	0,250	0,064	0,018	0,036	0,310
Expert 7	0,256	0,211	0,045	0,274	0,116	0,032	0,066	0,170
Expert 8	0,419	0,180	0,040	0,147	0,137	0,021	0,056	0,130
Expert 9	0,439	0,112	0,029	0,217	0,117	0,018	0,068	0,140
Expert 10	0,334	0,266	0,044	0,181	0,119	0,016	0,040	0,170
Expert 11	0,379	0,140	0,059	0,237	0,144	0,020	0,021	0,160
Expert 12	0,237	0,395	0,055	0,146	0,127	0,019	0,020	0,170
Expert 13	0,395	0,115	0,044	0,279	0,113	0,016	0,037	0,200
Expert 14	0,272	0,258	0,049	0,254	0,108	0,026	0,033	0,080
Expert 15	0,144	0,117	0,033	0,206	0,351	0,082	0,067	0,050
Expert 16	0,153	0,045	0,112	0,241	0,166	0,099	0,183	0,070
Expert 17	0,282	0,176	0,173	0,248	0,075	0,013	0,033	0,420
Expert 18	0,205	0,278	0,057	0,271	0,118	0,027	0,043	0,120
Expert 19	0,209	0,257	0,121	0,193	0,072	0,071	0,077	0,600
Expert 20	0,354	0,277	0,030	0,179	0,106	0,016	0,038	0,150
Expert 21	0,335	0,230	0,049	0,239	0,096	0,017	0,034	0,160
Expert 22	0,213	0,231	0,019	0,362	0,118	0,018	0,038	0,200
Expert 23	0,204	0,400	0,033	0,218	0,096	0,023	0,025	0,150
AVR	0,263	0,194	0,064	0,242	0,120	0,054	0,063	0,247
STD	0,110	0,097	0,038	0,072	0,056	0,073	0,051	0,169

In the second part of the questionnaire, the respondents were asked to asses each aspect of seven ports on a 9-point Lickert scale, agree-disagree type of questions. Since every factor is to be measured via several construct variables, the internal validity of the constructs were checked via confirmatory factor analysis. On the basis of the preliminary results, two of the factors, i.e. I3 and E3, were omitted from the solution. The results of the factor analysis are given in Table 4.

Table 4

Factor Analysis Results

		KMO and Bartlett's Test		Communalities	Total Variance Explained	Component Matrix
		Sampling Adequacy	Significance (<0,01)	Extraction	% of Variance	Component
L	L1	0,5677	0,0000	0,4129	49,8332	0,6426
	L2			0,6245	28,6904	0,7903
	L3			0,4576	21,4764	0,6764
I	I1	0,7206	0,0000	0,6798	55,2803	0,8245
	I2			0,5625	18,0533	0,7500
	I4			0,4312	16,1659	0,6567
	I5			0,5378	10,5005	0,7334
IN	IN1	0,6774	0,0000	0,7050	67,3545	0,8397
	IN2			0,5937	19,2104	0,7705
	IN3			0,7219	13,4350	0,8496
C	C1	0,5000	0,0002	0,644895	64,489529	0,803054
	C2			0,644895	35,510471	0,803054
E	E1	0,5	0,0000	0,844467	84,446652	0,918949
	E2			0,844467	15,553348	0,918949
H	H1	0,5	0,0000	0,759759	75,975943	0,871642
	H2			0,759759	24,024057	0,871642
CU	CU1	0,610292	0,0000	0,614111	46,481946	0,783652
	CU2			0,376091	24,062621	0,613263
	CU3			0,65319	18,040325	0,808202
	CU4			0,215886	11,415107	0,464635

On the basis of the results; average values of each port for each factor is given in Fig. 1, whereas Fig. 2 shows average values of each factor for each port. Finally, overall scores of each port is given in Fig. 3.

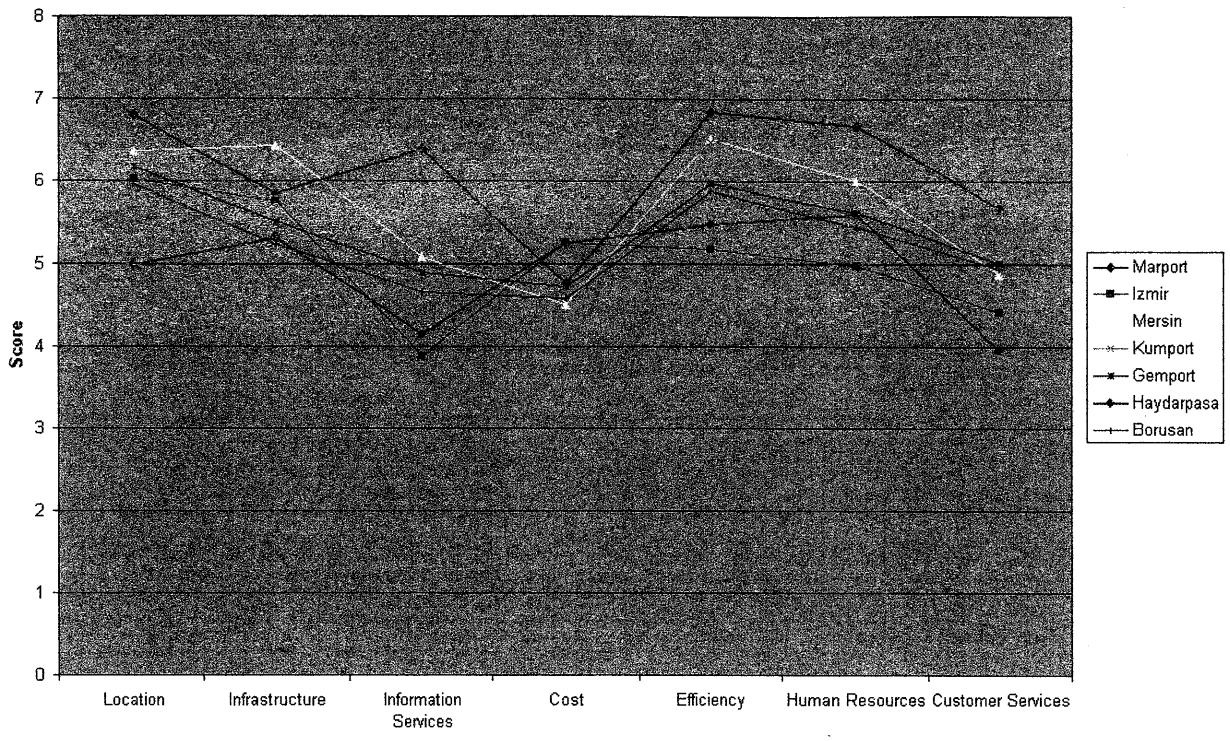

Fig. 1. Average Values of Each Port for Each Factor

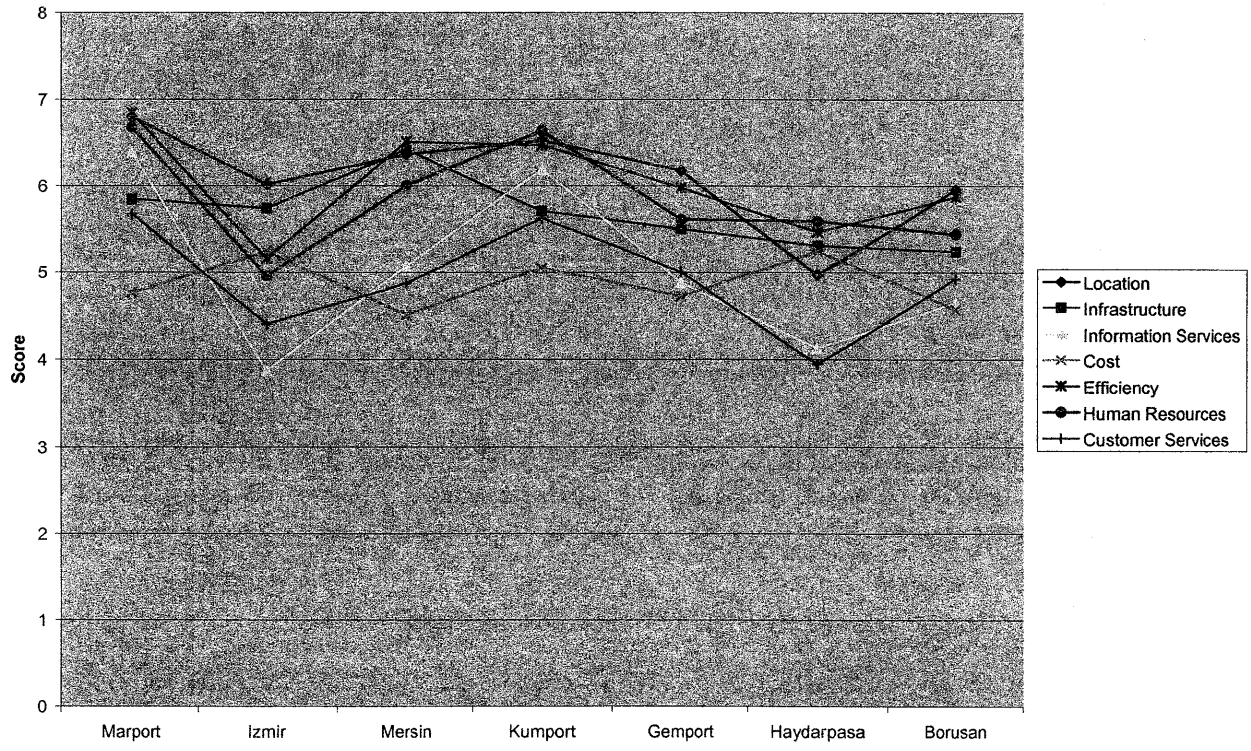

Fig. 2. Average Values of Each Factor for Each Port

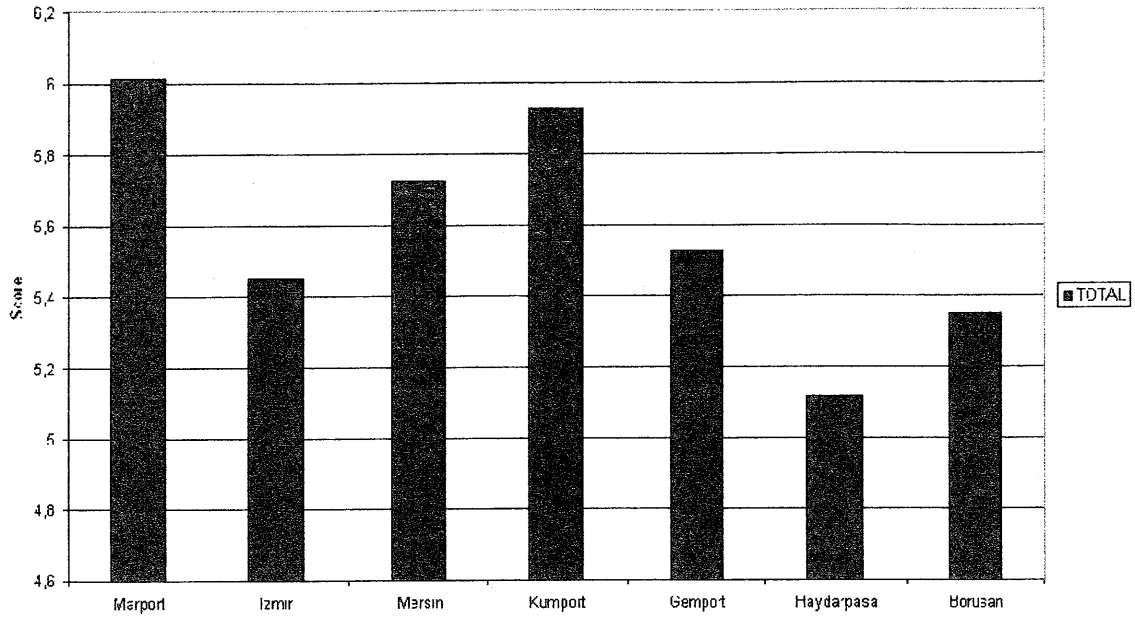

Fig. 3. Overall Scores of Each Port

5. DISCUSSION

Locations of Marport and Kumport are in close proximity to each other. Beside that they have appropriate connection points for distribution to Europe Continent. Marport has the highest result in Location Factor and Kumport follows Marport. TCDD Haydarpasa Port is the worst for this factor. It might be a result of that TCDD Hapdarpasa Port is in the center of Istanbul and the port needs solution at the point of connection with traffic. Thus, The Turkish Government plans to transport the port to another location.

Mersin International Port is the widest Turkish Port. In related with this ingredient, MIP has the highest value according to our survey results in Infrastructure Factor. TCDD Haydarpasa Ports has the worst result in this factor. The reason of this may be limited maneuvering space of TCDD Haydarpasa Port.

The qualities of Information Services provide to complete feedback cycle more quickly. Kumport and Marport are on the top of the scale in Information Service Factor. These two ports have obvious difference between the other ports in this factor. TCDD Izmir Port is the worst and TCDD Haydarpasa Port is on the second bench after TCDD Izmir Port which is operated by the Turkish Government with TCDD Haydarpasa Port (Keceli et al., [1]).

Marport and Kumport are at the same point for Cost Factor. As shown on the Graph -1, compared with other factors, in these factor Marport and Kumport have less satisfactory results. The other five ports have close results. However, they have more satisfactory values compared with other factors.

Efficiency, Human Resources and Customer Services Factors have parallel results. In these factors the main results is that the ports which are operated by Turkish government have lower ranks than the other ports (Keceli et al., [1]).

6. CONCLUSION

The ports that we examine in this paper could be collected in three groups which are arrayed by ports survey results in our study. First group contains Marport and Kumport, second one contains Mersin International Port, Gemport and Borusan and the last one contains TCDD Haydarpasa and TCDD Izmir Ports which are operated by the Turkish Government.

Mersin International Port was operated by Turkish Government until May 2007. The port was leased to Port of Singapore Authority within the scope of privatization in 2007. In a comparative aspect, development of MIP can not be denied against to the TCDD Haydarpasa and TCDD Izmir Ports which are still operated by Turkish Government. One of our contributions, signalize how privatization affects recent status Of the Turkish Ports. Thus, The TCDD Haydarpasa and The TCDD Izmir Ports could be formed an opinion about how privatization eliminates their lacks and assist to develop their ports service level.

On the other hand, this study reveals lacks of the ports in which service point, assists to develop their service productivity and it also assists for their further research.

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