

# Service Quality and its Importance for Rail Freight Customers

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*Received: 03. 09. 2018    Accepted: 26. 11. 2018*

## Abstract

In the liberalised markets, service quality is the decisive factor that rail undertakings can use to create difference and achieve competitive advantages. The purpose of this study is to analyse the customer perceived service quality for rail freight transport and to highlight the important service quality gaps that must be dealt with in the process of market liberalisation. The analysis is based on the findings of the survey conducted by interviewing rail customers (shippers and forwarders) to understand their perceptions of rail service quality. The results of the research revealed that the widest quality gap relates to "transit time" which is perceived as the most important dimension of the operational quality of the freight services. It was identified that forwarders' service quality perception is lower than that of shippers.

**Keywords:** Rail freight; service quality; customer perception; SERVQUAL; liberalisation; Turkey

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### 1. Introduction

Transport sector plays important role in the distribution of the goods both in domestic and foreign markets. Although railways contribution is relatively small in this regard, for sustainable transport rail mode should be promoted. Along with the sustainability considerations, the European transport policy focuses on creating more competitive rail transport market through liberalisation of the rail services [European Commission, 2011]. The key objective of rail liberalisation is to promote the efficiency and growth of rail freight. In the competitive markets, service quality becomes a critical aspect of most companies' marketing strategy [Machado et al, 2018]. Moreover, deregulation of the freight transport sector and adoption of new logistics concepts drastically affected the shipping behaviours of the shipping and forwarding companies [Rodrigue, 2013] and these are new challenges for rail service providers to offer higher quality services to customers.

After deregulation of the rail market in Turkey with the new Law No. 6461 on Liberalisation of Railway Transport in Turkey<sup>1</sup>, the state rail incumbent TCDD, is going to operate in a highly competitive market with the entrance of new private operators targeting the most profitable market segments and thus will face a strong pressure more than ever to improve its competitiveness by improving the service quality and cut costs. However, there is no in-depth study conducted in this sector for measuring quality of the services in the pre-deregulation of the market. This study aims to fill the existing empirical gap and contribute to the existing knowledge by highlighting the important service quality gaps that must be dealt within this process. In this paper, service quality is limited to specific operational performance of the incumbent rail freight service provider (TCDD) excluding the measurement of internal efficiency and the financial results of TCDD.

### 2. Rail Market in Turkey

In Turkey, the state rail incumbent, Turkish State Railways (TCDD) operates 12,532 km of the railway network, of which 4,350 km is electrified, 5,462 km is signalled and 1,213 km are high-speed lines [TCDD, 2017]. According to the 2016 figures, about 26 million tons of freight was carried by rail and freight transport generates 66 % of TCDD's total rail operational revenues [TCDD, 2017]. The main freight transport market segments of TCDD are block train and intermodal transport business. The main types of commodities carried by TCDD are machines and vehicles, followed by ores and metal scraps, solid mineral fuels, construction materials, chemicals, and metallurgical products. In general, TCDD has two kinds of business customers: manufacturing companies (shippers) and forwarders, these two analysed separately in this study.

Freight transport over land in Turkey is dominated by road with a share of 90.2 % in the country's modal split in 2016, whereas the share of railways is 4.2 % [TUIK, 2017]. However, foreign trade is dominated by maritime, which accounts for 86% of freight by volume, followed by road transport with 11% and rail %1 according to 2013 figures. Comparatively, the market composition changes in foreign trade in terms of value. Sea freight still accounts for 50% of the market, closely followed by road with 36%, air with 10% and railway with 1% [OECD/ITF, 2015].

In order to improve TCDD's performance and to promote the growth of the rail market, Turkey adopted a rail liberalization law separating infrastructure and rail operations. In the new organizational structure for the rail sector, Turkish State Railways (TCDD) becomes the infrastructure manager, continuing to operate as a public enterprise. A new joint stock company—TCDD Transport A.Ş., 100 % owned by the state, was established to provide passenger and freight rail services as an affiliate

of TCDD. New railway law allows public and private companies to build and operate railways to carry freight and passengers, though the restructured TCDD will remain the owner of the existing lines. The Government will continue to allocate payments for infrastructure investments such as building railways for high-speed trains and rehabilitating the infrastructure within a 5-year transition period, following this period TCDD Transport A.Ş.'s freight operations is expected to become profitable. The goal is to increase rail share in the freight market from 5 % today to 15 % by 2023. Accordingly, the first open access license was issued to an incumbent railway undertaking, integrated to the infrastructure manager. Moreover, the first 'real' new entrant, i.e. not related to the incumbent was licensed on June 2017. All the necessary regulations such as rolling stock, safety, level crossing, PSO and infrastructure access and capacity allocation have been issued except interoperability that is under preparation[<http://www.udhb.gov.tr>].

### 3. Literature and Research on Service Quality and SERVQUAL

A key issue in the service sector is to understand the customer's needs and requirements and to be able to provide the desired service. The level of the service quality offered by the transport service provider influences customer behaviour [Samimi, Kawamura and Mohammadian, 2011].

The term service quality refers to a judgement about a service provided by a third party (i.e. the rail service provider) that is more difficult for customers to understand and measure compared to product quality. Customers have a range of pre-existing expectations of service and judge satisfaction based on the extent to which the purchase experience met or didn't meet those expectations [Patterson and Spreng, 1997; Grönross, 1984] conceptualized a service quality model identifying two service quality variables as expected service and perceived

service. In order to understand service quality better, Parasuraman, Zeithaml and Berry [1985] developed SERVQUAL model, also known as the gap model, in which they defined service quality as the gap between customers' expectations and their perceptions of the service experience. Service quality is determined by subtracting customer's perception scores from customer expectation scores ( $Q = P - E$ ). The basic model is that customer perceptions of quality emerge from the gap between performance and expectations.

SERVQUAL has five generic dimensions, which are stated as reliability, assurance, tangibles, empathy, and responsiveness is known also as RATER [Parasuraman, Zeithaml and Berry, 1988]. There have been some discussions in the literature about the dimensions of service, on which there is no agreement yet. Indeed, Parasuraman, Zeithaml and Berry, [1988] have claimed that SERVQUAL provides a basic skeleton through its expectations/perceptions format encompassing statements for each of the five generic service quality dimensions. The skeleton, when necessary, can be adapted or supplemented to fit the characteristics or specific research needs of a particular service industry or organization [Babakus and Boller, 1992]. This ability to easily adding new service categories can be considered as one of the strengths of the gap model [Martinsen and Björklund, 2012]. Therefore, SERVQUAL gap model is often adjusted to the specific situations in different service industries [Skålén and Fougère, 2007]. Dimensions of SERVQUAL model are not universal. However, the SERVQUAL model has been seriously questioned in many studies on both theoretical and operational grounds [Buttle, 1996; Durvasula, Lysonski and Mehta, 1999; Gounaris, 2005]. Cronin and Taylor [1992] proposed a performance-only service quality measurement tool called SERVPERF on the basis that it was more efficient than

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SERVQUAL. Buttle [1996] argued that there is little evidence that customers assess service quality in terms of P-E gaps and five

Despite criticism from other research, SERVQUAL model remains popular and widely used approach for evaluating service quality and continues to be because it combines ease of application and flexibility [Cronin and Taylor, 1992]. SERVQUAL is a useful tool for evaluating the magnitude of the differences between users' expectations and their perceptions as it provides a superior indicator of quality [Jiang, Klein and Crampton, 2000]. However, SERVQUAL gap model might serve best when services are previously experienced and the price is not an issue [Patterson and Spreng, 1997; Crosby and Lemay, 1998].

Indeed, SERVQUAL has been widely used in many service-industry categories by a large number of studies. Several researchers in the logistics and transport sector have also applied gap model by modifying the SERVQUAL measure to the specific context under study either through deletion or addition of dimensions. Using the SERVQUAL instrument, Hopkins et al. [1993] surveyed both shippers and carriers to determine service-quality gaps between two groups. Seth, Deshmukh and Vrat [2006] used a gap model to analyse service quality gaps at various interfaces between logistics service providers (LSPs) and other actors in the supply chains. Pakdil and Aydın [2007] analysed expectations and perceptions in airline services using weighted SERVQUAL scores.

Regarding rail freight services, Shainesh and Mathur [2000] attempted to identify the dimensions, which customers used to evaluate the quality of railway freight services by developing a comprehensive instrument, RAILQUAL. Prasad and Shekhar [2010] used RAILQUAL to evaluate the quality of railway passenger services.

Grimm and Smith [1986] looked at shipper perceptions of rail service before and after deregulation. Among other things, they concluded that in the United States, shipper perceptions of both rail rates and rail service have improved since deregulation. McGinnis [1990] conducted one such comparison of pre- and post-deregulation studies of transport choice including empirical studies from the 1970s and 1980s among the shippers in the United States and revealed that in most instances service is more important to shippers than cost. He concluded that shipper priorities in the United States have not changed fundamentally before and after deregulation. Murphy and Hall [1995] also analysed the relative importance of cost and service in freight transportation choice before and after deregulation in the USA.

In fact, much of the recent literature and research on service quality has been oriented to passenger transport and other transport modes and logistics in general, lacking a rigorous orientation towards rail freight transport in Europe. The existing studies assessing the impacts of liberalisation and the change in the service quality perceptions of the shippers after deregulation are mainly conducted in the USA. There is also lack of studies concentrated mainly on the point of views of the market actors with first-hand data gathered via a face-to-face interview with customers to analyse the gaps between customer expectations and their perceptions of the rail freight service experience in the period of pre-deregulation in Europe. This study aims to measure the quality of the rail freight services in the pre-deregulation of the rail market and contribute to the existing knowledge by highlighting the important service quality gaps that must be dealt within this process. This study is also important to be able to assess the impacts of liberalisation and the change in the service quality perceptions of the shippers and forwarders after deregulation in Turkey.

## 4. Methodology

Data has been obtained primarily through qualitative method, which fits particularly well to understand the rail freight market, with the bulk of the research being face-to-face interviews with business customers of TCDD.

During the study, we analysed separately the two business customers (shippers and forwarders) of TCDD in order to consider their perspectives of rail service quality hypothesizing that there is a gap between these two kinds of customers. In this paper, the term "forwarders" includes actors such as forwarding agents, companies, third-party logistics providers, logistics service companies. The term "shipper" includes manufacturers and retailers. Also, we considered separately the two major freight market segments of TCDD (block train services and intermodal transport services). We used SERVQUAL gap model to measure the gaps between customer perceptions and expectations of the rail freight service quality. The main focus of this study was not the non-users of TCDD because we concentrated efforts on customer retention rather than on acquisition taking into account the effect of market orientation that has a more pronounced effect on profits than sales [Kumar et al. 2011]. Furthermore, past researchers provide evidence that there are often problems related to how to describe and define expectations and perceptions when services not previously experienced are applied to the SERVQUAL model [Mukherjee and Nath, 2005].

### 4.1 Population and Sampling

96 companies were selected for interview based on geographical distribution (covering the 7 regions of TCDD), company size and type of goods transported. An experienced survey company conducted the interviews between May and June 2010. All persons selected for the interviews were directors, marketing or logistics managers. Since the main purpose of this study is to understand the perceptions of rail

freight customers on service quality before liberalisation, the data were not updated.

### 4.2 Questionnaire Design and Content

Section A of the questionnaire comprised the transport data (total transport market, modes used, types of goods handled, a period of transport programme, domestic and/or international transport, rail usage, forecasts etc.) of the sample. This information about customers' market requirements would give rail service providers a better understanding of customers' perceptions for better managing the supply chain [Ghijsen, Semeijn and Linden, 2007].

Section B comprised the identification of perceptions and expectations of customers regarding rail service quality dimensions identified in the literature review and adapted from the work of previous researchers used SERVQUAL model. These are transit time, reliability, availability of wagons, safety/security, accessibility, flexibility (ability to face sudden requests) and technical equipment. In this section, the interviewees have been asked to provide an assessment of their current level of satisfaction with current performance in respect to the assessed parameter on a 10-point scale, where 1 implied the lowest satisfaction and 10 implied the highest satisfaction. Additionally, the interviewees have been asked for their direct evaluations of parameters in terms of their importance, known as 'stated' importance measurement [Chrzan and Golovashkina, 2006]. Interviewees ranked the level of importance of each parameter in the list compared to others, i.e. first, second, third, etc. in order to distinguish the most important from least important, which gave a more varied scale value. Furthermore, in order to investigate the attitude towards rail freight transport, the interviewees were asked to state if they would advise others to use rail freight transport. Also, they were asked to state their judgment on the

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propensity to repurchase with a value from 1 to 10 where 1 means certainly not repurchase rail freight transport from TCDD, 10 means certainly continue to repurchase.

Then, we conducted a gap analysis to identify the gaps between expectation (importance) and perception (satisfaction) and to find out which dimensions should be improved to increase the overall satisfaction with the rail freight services. The gap analysis was based on the mean values of the answers from the interviewees in parallel with the previous researches that used gap models [Martinsen and Björklund, 2012; Hopkins et al. 1993].

### 5. Results and Discussion

#### 5.1 Characteristics of the Business Customers

The majority (78 %) of the forwarders worked directly, whereas 15 % through another forwarder and the remaining (7 %) had no transport with TCDD. Freight traffic of both forwarders and shippers was dominated by domestic transport, which accounted for 75 % and 70% of their total traffic respectively. International traffic was limited and accounted for 25-30 % of total traffic. While the road was the most used mode by forwarders and shippers, intermodal transport was highly preferred only by forwarders. The share of rail within the total transport volume declared by forwarders was around 25 % whereas the rail share was much lower in the total transport volume of shippers.

#### 5.2 Resulting Gaps in Service Quality among Existing Customers

The results of the gap analysis (when a price is not an issue) are displayed in Table 1. The bigger gaps between importance and satisfaction highlight where the railways are failing to meet customers' requirements and these are the areas to be focused on to improve customer satisfaction. Average SERVQUAL P score represents the overall satisfaction score. As can be seen in Table 1, forwarders' service

quality perception was lower than that of shippers according to average SERVQUAL P scores. This result is in line with the finding of Chen, Chang and Lai [2009] who concluded that service quality perception of forwarders is lower than that of shippers in their study on the maritime industry of Taiwan. Shippers, compared to forwarders were slightly more satisfied with the quality of block and intermodal rail freight services with overall satisfaction scores of 6.99 and 6.71 respectively. The reason may be the percentage of the interviewed forwarders who worked directly with TCDD was more than that of shippers, so that forwarders might be well informed of working steps in the process of freight delivery and the extent of service quality that they could obtain from railways.

It is important to notice that the importance ranking of the business customers did not change according to main business market segments (block train and intermodal) of TCDD. On the other hand, the importance ranking of quality dimensions was quite similar between forwarders and shippers except for reliability and flexibility.

The results revealed that the widest gap relates to transit time, which was perceived as the most important quality dimension by forwarders and shippers as opposed to previous studies. Murphy and Hall [1995] identified transit time as the second most important variable before deregulation period in the United States, while reliability has been the top-ranked category in each pre- and post-deregulation period.

For forwarders, transit time was the only dimension in which the perception score as a measure of satisfaction was less than expected in general and their satisfaction score was lower than the overall satisfaction (Average SERVQUAL P score) in block train services. It means that forwarders are more satisfied with "transit time" in intermodal services compared to block train services. On the other hand,

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according to shippers, there were two dimensions (transit time and availability of wagons) with a negative gap, meaning that the perception is less than expected. However, their satisfaction scores were higher than the overall

satisfaction. Regarding intermodal services, although it was not as much as in block train services, the gap was widest for “transit time” perceived as the most important dimension by forwarders and it was quite the opposite for

**Table 1. Gap analysis of perception and expectation of customers regarding rail service quality (mean scores)**

Forwarder				Shipper			
Service quality dimensions	Perception (Satisfaction)	Expectations (Importance)	Gap P-E	Service quality dimensions	Perception (Satisfaction)	Expectations (Importance)	Gap P-E
<b>Block train services n=35</b>				<b>Block train services n=35</b>			
Transit times	6.00	8.14	2.14	Transit times	7,06	8,35	-1,29
Availability of wagons	6.97	6.02	0.95	Availability of wagons	7,46	7,85	-0,39
Safe/secure transport	6.59	5.91	0.68	Safe/secure transport	7,46	5,18	2,28
Reliability	6.82	4.81	2.01	Reliability	6,24	5,02	1,22
Flexibility	5.51	4.48	1.03	Flexibility	7,57	4,75	2,82
Technical equipment	4.23	3.34	0.99	Technical equipment	5,74	2,65	3,09
Accessibility	4.20	2.95	1,25	Accessibility	4,83	2,23	2,60
Average SERVQUAL Score P			6,17	Average SERVQUAL Score P			6,99
<b>Intermodal services n=26</b>				<b>Intermodal services n=26</b>			
Transit times	7,19	8,14	-0,95	Transit times	7,41	8,35	-0,94
Availability of wagons	7.26	6.02	1.24	Availability of wagons	7,00	7,85	-0,85
Safe/secure transport	6.84	5.76	1.08	Safe/secure transport	7,50	5,18	2,32
Reliability	7.00	4.81	2.19	Reliability	5,63	5,02	0,61
Flexibility	5.72	4.48	1.24	Flexibility	7,33	4,75	2,58
Technical equipment	4.91	3.24	1.67	Technical equipment	5,67	2,65	3,02
Accessibility	6.67	2.95	3.72	Accessibility	5,93	2,23	3,70
Average SERVQUAL Score P			6,58	Average SERVQUAL Score P			6,71

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shippers and their satisfaction scores were higher than the overall satisfaction with this dimension. As the gap between perception and expectation was negative, we might conclude that customers have more expectation than they actually received.

We identified "availability of wagons" as the second most important variable, which received the highest satisfaction score from forwarders for both market segments and shippers for only block train services. The importance of equipment availability was also ranked among the top criteria in the studies of [Murphy, Daley and Hall, 1997; Kent, Parker and Luke, 2001]. The other dimensions perceived as high in satisfaction, but low in importance were "reliability" and flexibility". Reliability was not the most important dimension (4th or 5th important dimension out of 7) of the rail freight service quality, however, in terms of satisfaction, reliability scored much better than transit time, in general as opposed to the previous research that has shown that reliability is a decisive factor and key element of customer satisfaction [Edvardsson, 1998]. Results revealed that of the seven perception factors, transit time and availability of wagons (equipment availability) had a greater effect than reliability.

Technical equipment and accessibility were low in importance but high in satisfaction. With respect to "accessibility", there was an interesting difference in terms of satisfaction. Though the forwarders' satisfaction level exceeded the overall satisfaction in intermodal services, it was negative in block train services due to low satisfaction level. However, in order to increase the impact of "accessibility" dimension on the overall satisfaction, it is necessary to increase its importance in intermodal services.

In fact, whether the service gap significantly existed or not, will profoundly influence the enhancement of the overall service satisfaction. In general for a transport operator, it is more important to perform better in aspects that are

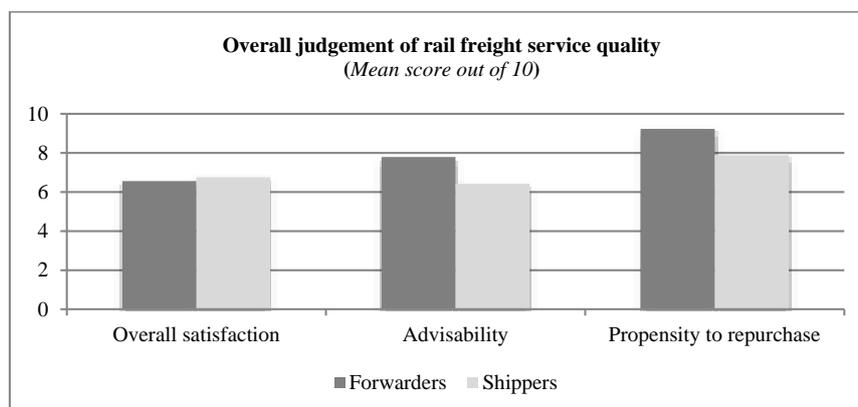
more important to customers [Konings, Priemus and Nijkamp, 2008]. Lin and Liang [2011] argued that priority has a direct relationship with the importance degree and has an inverse relationship with the satisfaction degree. Therefore, the overall satisfaction can be increased either by improving the quality of dimensions of the rail freight service with high importance or by decreasing the importance of dimensions with a low satisfaction score or increasing the importance of those with a high satisfaction score [Brons and Rietveld, 2009]. As TCDD will, in general, have less control over the perceived importance of aspects of rail freight service than over satisfaction, the focus should be on quality improvements. In order to make rail freight services more attractive to forwarders and shippers, "transit time" can play an important role. This is a dimension to be invested to improve the overall satisfaction. "Flexibility" also may have a positive impact on customer satisfaction.

### 5.3 Overall Satisfaction, Advisability, and Propensity to Repurchase

Business customers of TCDD were more prone to express positive opinions about rail freight services than to criticize or remain indifferent (Figure 1).

Customers rated the overall quality (including administrative aspects i.e. management of order and management of invoices) of rail freight transport as positive. For shippers, with the highest rate of satisfaction, we observed lower advisability and propensity to repurchase compared to forwarders. A reverse tendency has been observed in forwarders, while the level of overall customer satisfaction was lower than shippers but had a much stronger tendency to express positive opinions with higher values for advisability and propensity to repurchase. Indeed, customers with high satisfaction with TCDD expressed a greater tendency to make repurchases. These results indicated a higher propensity to become a loyal customer for TCDD.

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**Figure 1. Overall judgment of rail freight service quality (forwarders N: 43 shippers N: 40)**

The first significant contribution of this study is that it highlights the important rail freight service quality gaps that must be dealt by the rail service providers with in the process of market liberalisation whereas satisfaction and loyalty are its consequences. This study provides several practical implications for managers of rail service providing companies on how to increase customer satisfaction by service quality improvements i.e transit time and flexibility. It suggests that managers must understand the importance of service quality in order to create difference and achieve competitive advantages in the liberalised markets. This study might also be a base to assess the impacts of liberalisation and the change in the service quality perceptions of the shippers and forwarders after deregulation.

## 6. Conclusions and Future Research

Considering the future competition within the railway market, the industry must be prepared by offering higher quality service to customers to meet growing demands for better levels of service. This paper reports the findings of the survey conducted in order to understand the perceptions of rail freight customers on service quality before liberalisation.

Based on the analysis of the survey results, the following conclusions can be drawn. First, the widest quality gap relates also to “transit time” which is perceived as the most important dimension of the operational quality of TCDD’s freight services. This is the only dimension in which actual performance is lower than expected. “Transit time” and “availability of wagons” are the two most important dimensions of the rail freight in the sense that they have the strongest impact on the overall satisfaction. Second, forwarders’ service quality perception is lower than that of shippers. Third, reliability is the 4th or 5th important dimension out of 7 of the rail freight service, however, in terms of satisfaction, reliability scores much better than transit time. In general, customers have rated the overall quality of rail freight transport as positive. These results indicate a higher propensity to become a loyal customer for TCDD that provide a higher level of customer satisfaction.

In the present context of rail liberalisation, the conclusion of service quality gap perception of the forwarders compared to shippers’ suggests that incumbent rail freight service provider should examine the gap deliberately when they make marketing decisions and review the strategy of resource allocation between forwarders and shippers; otherwise the effectiveness of the marketing efforts would be

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undermined. In this study, we focused only on the quality evaluation of the operational aspects of the railway freight services by concentrating on the interviews with the current customers of TCDD. Therefore, in the future researches, the effect of other aspects of the rail service on the customer satisfaction level and the perceptions of non-customers on the service quality of the rail operators could be studied. After the implementation of liberalisation, forwarders' and shippers' priorities and perceptions may change, so post-liberalisation studies on forwarders' and shippers' satisfaction and perceptions level regarding rail freight transport would be valuable. Such comparisons could provide insights into the relative importance of particular service quality variables before and after liberalisation.

### 7. Acknowledgement

The author would like to thank the consultants of the ITALFERR S.P.A + TRENITALIA S.P.A Joint Venture who contributed their expertise to the World Bank project for "TCDD Freight Market Research" in 2011.

### 8. End Note

<sup>1</sup>Promulgated in the Official Gazette of the Republic of Turkey No: 28634 of 01 May 2013

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