Introduction

For pricing any service it is first necessary to examine its costs and benefits for the society and providers. Setting up vehicle technical examination stations, will have high costs such as the capital cost for construction, facility costs, equipment requirements, salary costs, investment capital assets and depreciation costs.

Materials and methods

In order to assess the economic costs and benefits need to be measured. In order to measure and quantify the costs and benefits of all auto technical examination stations, may have effects on people in all times and places. The effects of these costs and benefits vary, and may vary over time. Accordingly, in this study, the base year design horizon of 1388 and 10 years later, in 1398 is considered. In this article, parameters affecting the pricing of technical examination centers in both the benefits and the costs resulting from the introduction of automobile technical examination stations and their definition are provided. Next, the benefits and costs of each index is calculated for the base year and the horizon of the plan and a model based on willingness to pay for car owners, the equilibrium price will be determined by technical examination services. In this method, to estimate the equilibrium price of vehicle technical examination services, the demand curve will be used by car owners.

Finding and results

In this study, the maximum cumulative cost curve that drivers are willing to pay has been reviewed. Figure 1 graph the cumulative cost of the unwillingness of most drivers is willing to pay for the show. The cost of technical examination services is 80,000 Rs in the current diagram, which sharp decline. The study of this phenomenon is necessary to mention two things:

1 - Since the first option is 80,000 Rs in questionnaires, many people are willing to pay a smaller amount did not have the option to select it.

2 - In dealing with these questions, many respondents chose to have the lowest possible price to on the way they can reduce the cost.

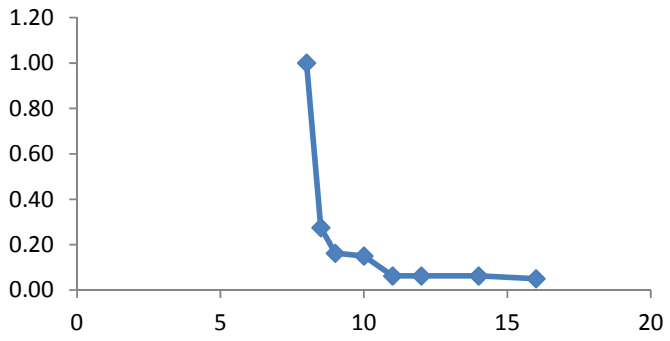

Figure 1. Cumulative graphs unwillingness to pay the drivers interviewed (fee paid (10,000 RS)) Source: Authors.

According to the materials of this paper, in order to estimate the demand curve for technical examination services we have ignored these kinds of drivers in our research. Technical examination demand curve using equation (1) is obtained:

$$P(price) = 0.485 * \left[\frac{\exp(-0.172price)}{1+\exp(-0.172price)}\right] + 0.071 \qquad (1)$$

Where, p is the technical examination request. Figure 2 shows the extent of fitted curve to the actual observed data. This graph shows the accuracy of the model. . According to survey, the coefficient is equal to 0.731. Figure 3 shows the relationship between price and demand of vehicle technical examination services. As expected, the S-shaped curve is a graph. Demand studies generally expected that the demand curve is S-shaped.

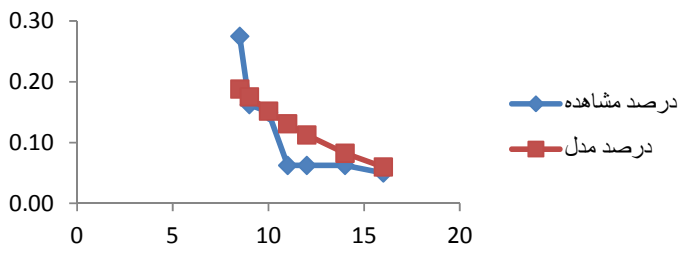

Figure 2. Adaptation of models, observations and fee payments Source: The authors.

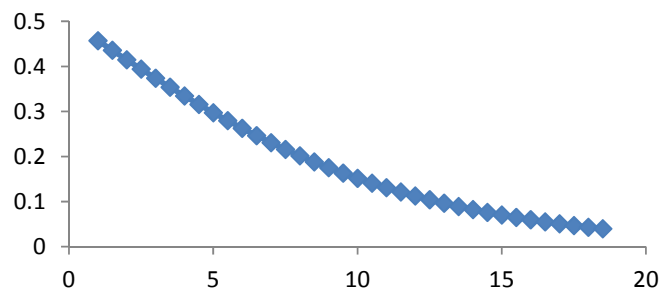

Figure 3. Deflection curve and a rising demand for technical examination, Source: The authors.

In relation to the waiting time in queue and time sensitivity of drivers, as well as the methods used in these studies, demand curve estimation method is used here. Changes of demand have been studied by these two factors and it can be said that the demand curve is estimated compared to these times. Drivers demand model along with the waiting times is according to equation (2):

$$P(wait) = \frac{\exp\left(-0.004wait^2 - 0.015wait\right)}{1+\exp\left(-0.004wait^2 - 0.015wait\right)} \qquad (2)$$

Figure 4 shows the correspondence between the data observed and model results. This model has also acceptable accuracy, thus for some analyzes, the data can be used.

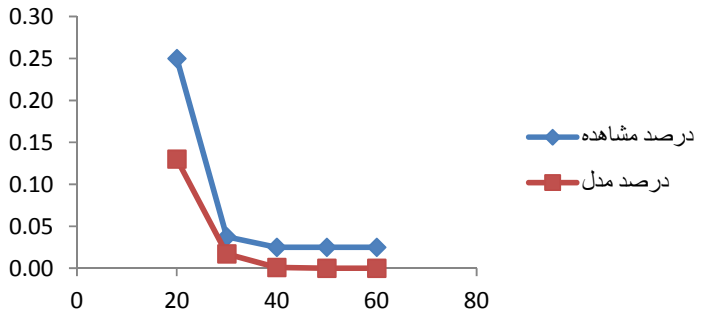

Figure 4. Adaptation of models and observations about the sensitivity of the drivers waiting, Source: The authors.

Figure 5 shows the S-shaped curve, the demand for inspection services by changing the amount of time waiting in line. In this graph we can see clearly the sensitivity of drivers to waiting in queue. It seems that about 5 and 10 minutes is the greatest demand time. The following model shows the relationship between the service demands of technical examination with total time.

$$P(time) = \frac{\exp\left(-0.001time^2 - 0.013time\right)}{1+\exp\left(-0.001time^2 - 0.013time\right)} \quad (3)$$

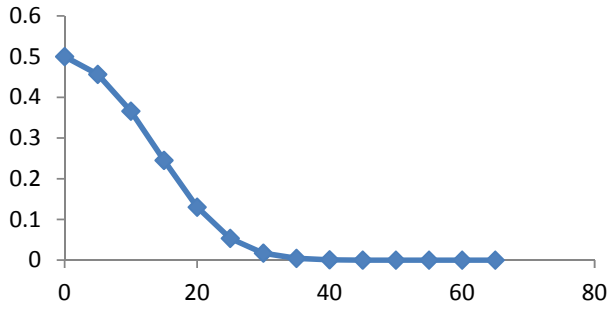

Figure 5. Deflection curve compared to the expected demand, Source: The authors.

In some of the questionnaires it was observed that drivers have chosen the same number for the maximum waiting times and the total time of the system, this fact means that these people are not willing to spend the time in the system that is not rational. This has increased the accuracy of the model. Figure 6 shows the plot of observed and estimated demand model. The model provided a good fit to the data shows. S-shaped curve can be requested in the diagram (7) can be observed.

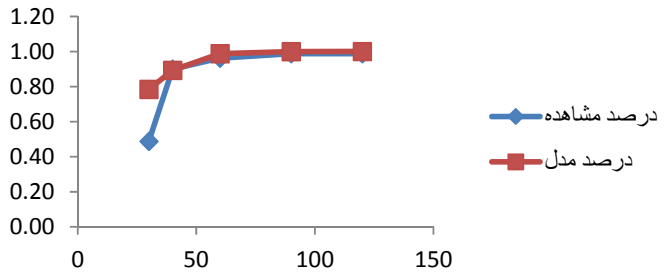

Figure 6. View the sensibility of conformity assessment and inspection time; Source: The authors.

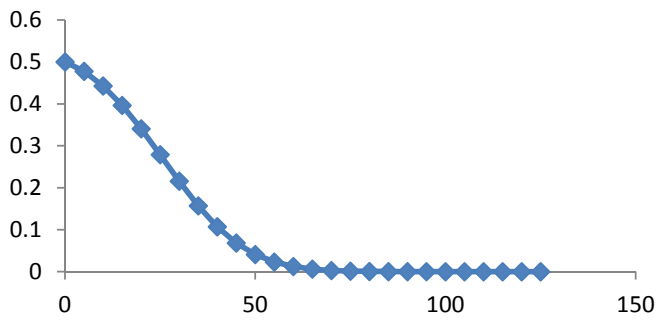

Figure 7. Deviation of the demand curve to the time of technical examination, Source: The authors.

In this section, the proposed pricing model based on estimated demand function is provided in Section 3.1. The overall structure of the model in equation (4) is provided:

$$(P) \quad Max\ x.p(x)$$

$$s.t.$$

$$p(x) = \frac{exp(x)}{1 + exp(x)}$$

$$x \geq 0$$

Where x represents demand and p (x) is the demand price. The goal of presented formula is to maximize total revenue. In this regard, it is assumed that the technical examination system monitoring is as like current status. To solve the problem, GAMS software is used in these studies. According to this model, the optimal price is Rs

75,000, which means that the drivers are willing to pay for technical examination services, 5000 Rs drop in the price of this service will increases the profits. Another point that should be noted in this regard, the model is strictly concave. This feature makes the model to have only one answer. Figure 8 shows some of the possible solutions. It is observed that the number is actually at the top of the charts.

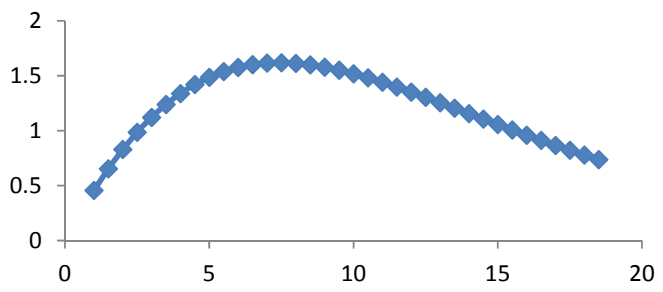

Figure 8. Graph to determine the price based on the demand curve, Source: The authors

It is better to urge that although the model suggests decreasing the price, but it is better to fix the price. In other words, if we want to increase the system's benefits, it does not change the price.But if we could lead users to visit technical examination stations with reinforcement or punishment means, we can use other methods to determine the price that will be discussed in the next section. The main issues that led to the dynamic changes in price and it is time, is inflation.

98	**97**	**96**	**95**	**94**	**93**	**92**	**91**	**90**	**89**	**88**	**Year**
47.2	41.1	35.7	31	27	23.5	19.4	15.9	12.9	10.3	8	**Price(10000Rs)**
47	41	36	31	27	23.5	19.5	16	13	10.5	8	**Rounded price(10000Rs)**

TABLE 1. Presented technical examination services cost with regard to the dynamic model of inflation.

In the second method, each of the administration costs and benefits of administration and users are predicted. In this model, the total cost of the system is anticipated in

1398. Considering the amount of profits required for administrators, prices of a technical examination test for vehicles would be 615000 Rs. The comparison between these two methods, the price of second method, is much higher than the first method. The assumptions used in the second method are more reasonable and realistic.

Conclusion

As a result of these studies, using two methods, the cost of technical examination is estimated. In the first method, the cost of these services was estimated based on people's willingness to pay. In Second method, benefits of users and administrators were considered to estimate the cost of the service. Finally, in this study, the second method is proposed for the pricing of these services. The first method shows the optimal price of 75,000 Rs and the second method only with considering the price of fuel, (Assuming 1000 Rs instead of 5000 Rs) observed that benefit of users is about 105 Rs benefit of users is. Assuming 30% profit for users, it can be seen that, the first method and the second method provide same results. Dividing the number by 7.5 to 0.7 Rs (for the benefit of the consumer) we will achieve very close to the second way. It also approved the methods used in this study and also indicates that by changing fuel price the udders will show more interest for doing examination services test. Two methods have been proposed for dynamic method; according to the high cost of the second approach it is more realistic to choose the first method as the measuring tool of pricing.