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PRICE DISCRIMINATION FOR TOPKAPI PALACE MUSEUM IN TURKEY: VIP OR REGULAR ENTRANCE*

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Abstract

Museums, which are our cultural heritage, are a socio-cultural phenomenon but play an active role in terms of economy. The main issue for the operation of museums is the admission-entrance fee. In order to solve the admission-entrance fee problem, there are different ticket types. This study aims to develop a policy for museum's revenue by setting different access fee values to the museum for only full fare. These access values can be classified into three groups depending on weather conditions; Regular, Exclusive and VIP. In order to attract more customers, museum operation is planning to give a souvenir as a gift to visitors during inclement weather time. This study considers how handing out the souvenir to visitors will affect the profit. Utilizing the optimal price of the Museum operation, yearly average extra revenue is calculated and compared with the other access policies that are applied. We illustrate our approach with an application to empirical data from Topkapı Palace Museum. Monthly data were considered from January 2010 to December 2012. As a result, to make profit of extra revenue of museum operation, regular access demand can be maximum 60% of total visitor and minimum fee of VIP and Exclusive accesses can be 400TL and 200TL.

Keywords: *Museum management, Entrance fee, Visits, VIP access.*

TOPKAPI SARAYI MÜZESİNDE FİYAT FARKLILAŞTIRMASI: VİP YA DA SIRADAN GİRİŞ

Öz

Kültürel mirasımız olan müzeler, sosyo-kültürel bir olgu olmakla birlikte, ekonomi bakımından etkin rol oynamaktadır. Giriş ücretlerinin fiyatlandırılma konusu müze yönetimlerindeki başlıca sorundur. Fiyatlandırma sorunun çözümü için farklı farklı bilet türleri kullanılmaktadır. Bu çalışmada sadece tam bilet satışları için geçerli olan farklı ücretten müzeye erişim değerlerini belirleyerek, müzenin gelir yönetim politikasını geliştirmek amaçlanmıştır. Bu erişim değerleri hava şartlarına bağlı olarak üç grupta sınıflandırılabilir; Sıradan müşteri girişi, Seçkin müşteri girişi ve Önemli müşteri girişi. Havanın kötü olduğu günlerde daha çok müşteri çekebilmek için ziyaretçilere hediye eşya verilmesinin karı nasıl etkileyeceğinin araştırılması değerlendirilmiştir. Daha önce belirlenen uygun müze işletim fiyatı kullanılarak, ortalama fazladan yıllık gelir hesaplanmış ve diğer giriş politikaları ile karşılaştırma yapılmıştır. Yapılan çalışmada, Topkapı Sarayı Müzesi'nden Ocak 2010'dan Aralık 2012'ye kadar toplanan veriler kullanılmıştır. Sonuç olarak, müze işletiminden kâr elde etmek için sıradan müşteri yüzdeliği en fazla toplam ziyaretçi sayısının %60'ı kadar olması gerekmektedir ve en düşük VIP, Seçkin giriş ücretleri sırasıyla 400TL ve 200TL olarak belirlenmiştir.

Anahtar Kelimeler: *Müze yönetimi, Giriş ücreti, Ziyaret, VIP girişi.*

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1. INTRODUCTION

The museums, custodians of our cultural heritage are a socio-cultural phenomenon as well as an economic phenomenon. Since museums offer a service to the public, operation of it is a business service. The main issue for the operation of a museum is the admission-entrance fee. The entrance fee can be defined as a monetary equivalent for a museum ticket or pass. Negotiation on this problem is quite an interest of managers, policymakers and academics (Cowell, 2007).

Museum admission fee policies vary over the cities or countries. Some museums charge a fixed entry fee while others ask for an endowment and others apply for a free entrance (Steiner, 1997). Moreover, variation in admission fee pricing can be extended to the intra-museum level; some sections which have more valuable works of art require an extra fee for the entrance. For example, in order to visit Harem and Halberdiers with Tresses Dormitory in the Topkapı Palace Museum, you have to pay an extra fee to buy a separate ticket.

Visitors can be described as the individuals who go to the museum as well as who buy the tickets or museum card to go (O'Hare, 2009). There are two types of demand for a museum. The first one is social demand due to external factors such as prestige, inheritance and organization. This type of demand generates direct income for the tourism sector and indirect income for the other economic sectors (Sezen & Murat, 2008; Sezen & Tüzüntürk, 2010). The second type of demand is individual demand. In order to use their leisure time for personal satisfaction and enjoyment and physical and mental health, they visit museums. The effects on museum visits can be listed in five factors: entrance fee, the opportunity cost of time, cost of alternative activation, additional cost (fare, accommodation, food), and personal preference (Sezen, 2015). Visiting a museum may be an expression of a lifestyle rather than an economic decision. So, identity and lifestyle influence personal preferences. Therefore, a sociological model can be used to predict the demand for museum visits based on the lifestyle of the customers.

On the other hand, Kirchberg (1998) determined that a reason for preventing visitors from going to the museum was the ticket price. Thus, the most important factor in determining personal attitude is income. Other factors such as education, occupation, white-collar, blue-collar, age, sex, the size of families, children, and distance do not seem to be effective. However, income has a close relationship with education and occupation (Kirchberg, 1998).

Museum entrance fees can be ineffective in the real reason for a low number of visitors. There is low and irregular access when free entrance is implemented in the National Museum. The reason for low-level access of low-income groups must be sought as non-cost factors. The effect of the price on visitor behaviors, especially of those from other cities or countries, may not be immediately noticeable. According to the study by O'Hagan (1995), foreign visitors (from different cities or countries) were less likely to be price-sensitive and many of them were in the high-income level and price changes did not affect their demand. The findings of cross-sectional data of other counties mention that the higher-priced museums have more visitors. Bailey & Falconer(1998) show that individuals who come to the museum have generally higher-income level in England.

There are two main arguments about making the museum entrance free. The first one is that some of the museums have positive external effects because those services must be funded by the money collected from taxes. Those who visit the museum benefit more, so the entry fee should be taken as a contribution rather than taxes. This approach does not seem to be a clear proof that it would harm low-income groups (O'Hagan, 1995). Also, there is no evidence showing that low-income groups visit museums mostly when they are free (Dickenson, 1993). The second argument is very low or zero marginal cost per visitor; it means that the zero price is active. The zero marginal cost argument can be criticized from a different perspective.

Price discrimination can be defined as the act of offering the same product to different customers at different prices (Varian, 1989). A general idea of differentiation; it is sold at the highest price to the buyer who is willing to take the product. In this case, a consumer surplus is being reset and all additional (marginal) resources are transferred to the server (the manufacturer). Such price discrimination of the market is based on the idea of the separation into subgroups according to the elasticity of price. The customers are classified into subgroups according to household, commercial, industrial, and institutional types of classification, as well as individual

pleasure-habits and the separate price is applied for each subset (Sezen, 2015). However, applications of this discrepancy reveal three dangerous situations; “cannibalization”, “arbitrage” and “black market”.

Price discrimination is also a common practice in terms of the amount of purchased product and time of the purchase. In terms of their applicability to the conditions of a price, differentiation strategy is an important factor for the museum ticket price. The conditions of “monopoly” can be listed as tickets not being resold or difficult to sell and those with information about visitors (Sezen, Sert Eteman, Eren Şenaras, & Kara, 2015). Museums have many different goals such as social equality, financial income and international, regional and local level prestige beyond economic efficiency. To achieve these goals, different price programs should be taken into consideration (Frey & Steiner, 2012).

Price discrimination can have many different purposes and characters; under the revenue management notion, maximizing revenue and/or profit, achieving the highest number of visitors, reduction of idle capacity, reducing customer dissatisfaction, etc. Methods and policies to be followed are different for each purpose. Sezen (2015) mentioned that 45% of visitors supported the idea of VIP entrance and only 10% of the visitors stated that price discrimination could cause a problem. This paper was motivated by Sezen (2015)’s result and investigated the effects of adding a private entrance to Topkapı Palace Museum. On the contrary to (Kirchberg, 1998) the study which reported that entrance fee was a barrier to visiting museums, a VIP entrance is presented to the visitors who feel special and have money to have a better service. Besides increasing the entrance fee for private entrance, the Museum operation is planning to give a souvenir as a gift to regular visitors who come to the Museum during inclement weather. The management of the museum knows the weather condition in advance and advertises the museum by giving a souvenir to attract buyers. To reduce the price of the museum during bad weather conditions, museum management gives a souvenir as a gift to prevent cannibalization.

The remainder of this paper is organized as follows: Section 2 presents a literature review of the related research in the areas of the museum access fee and price elasticity. Section 3 represents the method of price elasticity and simulation model used in the application part. Our illustrative application to Topkapı Palace Museum in Turkey appears in section 4. Finally, section 5 contains a discussion of the results and conclusions.

2. LITERATURE REVIEW

The museum access fee is an issue in theoretical and empirical research in the economic literature. Charging or not charging is the first critical issue to decide. Bailey & Falconer’s (1998) study established a paradigm, “who pays what, when and how”, to be considered when making a decision whether to charge public museums.

Many studies have examined the general field of the entrance fee of the museums. The study by Chen, Chen & Tsai (2016) mentioned that free admission to museums increased visits by 14.73% in New Taipei City applying the same free admission policy in England. Cowell (2007) suggested that the study on the impact of the free admission policy of museums required evaluation. O’Hagan (1995) argued that charging national museums involved many problems such as reducing private donations and public subsidies. Bailey & Falconer (1998) and Luksetich & Partridge (1997) analyzed the impact of admission charges on visits. However, free access to a museum can cause to waste economic benefits of the museums. Also, Maddison & Foster (2003) disputed that congestion cost significantly appeared because of the free admission policy. Frey (1998) classified the well-known museums as “superstar museums”, places to visit. Rosen (1981) and Adler (1985) indicated superstar effects as small changes in quality and ability that could make a large difference. The same was valid for their museum. Since the number of visitors was over a million small price changes ended up with huge revenue. Topkapı Palace Museum is one of such "superstar museums" that national or international tourists traveling to Istanbul feel obligated to visit.

Museums can be present as a significant source for the city in terms of revenue. The revenue from the visit of the tourists who travel for cultural purposes contributes to the sector in an economic sense. The effect of the entrance fee policy on the revenue is clearly observed. Although Istanbul Archaeological Museum has the most ticketed visitors in the community of the Archaeological Museums throughout Turkey, the Bodrum Museum of Underwater Archaeology created an income difference of more than 1,000,000 TL compared to Istanbul

Archaeological Museum, and it is located on the first line in terms of income (Ak, Sürücü, & Kılıç, 2017). Similarly, Arslan's (2014) study mentions that the number of visitors to Harem in 2012 was nearly four times higher than the number of visitors to Istanbul Archaeological Museum (197.995) although the entrance fee for Harem of Topkapı Palace Museum is more expensive than the entrance fee for Istanbul Archaeological Museum. These fee increases and price discrimination occur not only for museums but also for National Park services which have this issue because of public funding appropriation. Sage, Nickerson, Miller, Ocanas, & Thomsen (2018) investigated the effects of entrance fee increment for Yellowstone National Park. As a result, they found that the price increment reduced attendance to the National Park to a smaller proportion.

Proper pricing is to manage different subjects of the museum attentively and consistently. Those subjects can be who, when, how, and how much paying for the museum. Internet price levels, price sensitivity and the range of indifference can be tested in real-time (Baker, Marn, & Zawada, 2001). The cost, customer and competition-based approaches can be used for determining the price of a product (Nagle & E.Hogan, 2006; Phillips, 2005). Pricing is a process rather than a transaction (Dolan, 1995). Another pricing policy is a single price which is the same price offered to every customer. Huntington (1993) argued that the single price would lead total profits to be less since customers were not charged at the price level that they agreed to pay extra and the controversy would discourage the customers who could not afford that ticket price. Generally, the demand price for the services of theater and museum institutions are inelastic, indicating that increased prices will decrease attendance by a smaller proportion and result in increased revenues (Luksetich & Partridge, 1997). The elasticity of demand of low-high income may differ depending on the type of product or service. However, which price policy optimizes box office revenue is not clear (Huntington, 1993).

O'Hare (2009) indicated that demand of the Boston Museum for Fine Arts museum services was highly inelastic, with the own-price elasticity coefficient estimated at approximately - 0.10. The study of Frey & Meier (2006) found that the ticket price did not affect the number of visitors to the museum with -0.2 price elasticity. Goudriaan & Van 't Eind (1985) analyzed the impact of admission charges on access and the average price elasticity of -0.1 to -0.2 was determined. A similar analysis was conducted for a particular museum in Great Britain and a higher elasticity was -0.55 (Darnell, Johnson, & Thomas, 1990). Luksetich & Partridge (1997) estimated price elasticity based on the type of museum and determined this range from -0.12 to -0.26. One of the studies for the Museum of the Plaze Ducale in Venice shows that access quite stable even though the entrance fee increases by 10% (Frey, 2000). Dickenson (1993) used 20 variables to define demand elasticity for 1077 museums in the USA. As a result, entrance fees, membership and income were found to be significant factors in the number of visitors.

Another factor in deciding whether to go to the museum or not is the weather conditions. It affects forecasted visitor demand as well as the decisions of visitor attendance (Perkins & Debbage, 2016). There are many studies in literature regarding attendance in outdoor-oriented activities depending on the weather conditions such as soccer (García & Rodríguez, 2002), golf (Nicholls, Holecek, & Noh, 2008; Scott & Jones, 2006) and baseball (Butler, 2002). Although visiting the museum is an indoor activity inclement weather might disrupt the transportation system as finding a cab may be hard or people may fail to use the ferry/sea bus. These uncomfortable conditions may lead visitors to change their decision to go to the museum. Thus, the weather is also another significant factor in the revenue due to the number of visitors.

3. METHOD: Price Elasticity and Simulation Design

A historical museum is a more attractive place among various museum places and the number of visitors has been steadily increasing (Luksetich & Partridge, 1997). The Topkapı Palace Museum is one of the most popular museums that exhibit the imperial collections of the Ottoman Empire and its architecture. The construction of the Topkapı Palace was started in 1460 after Sultan Mehmet II conquered Istanbul in 1453 and completed in 1478. Throughout the long history of the Ottoman Empire, the museum served as the residence of Ottoman sultans, and also an administrative and educational center. After the establishment of the Republic of Turkey, Topkapı Palace was transformed into a museum on the date April 3rd, 1924 and it is also the first museum of the Republic of Turkey ("Topkapı Palace Museum" nd.)

Estimation of demand is a useful input for the assessment of museum price policy. In the economic theory, there is a contrary association between the demand for service and price (Parasız, 1994). This association's impact is summarized by a single parameter, the price elasticity (Casacuberta, 2017). Price elasticity can be easily defined by estimating a museum's demand function. The price elasticity of demand; the percent (%) measurement of the change in the price of the product will respond to a change in demand (Sezen, 2015). The rate of inflation and reduced real wages can be used for calculation of flexibility in the case of the variation at nominal price but this is not enough where long-term time series case (Steiner, 1997). Elasticity takes different values for different demand-price levels.

The price elasticity of the demand is the factual measurement of how it responds to the price change of the product and how much change there would be in the quantity of demand. The elasticity coefficient can be found as follows (Parasız, 1994);

D: Quantity of demand;

D1: Quantity of demand after price rise,

D0: Quantity of demand before price rise,

P: Price;

P1: Price after rise,

P0: Price before rise,

Ep: Price elasticity of demand.

$$Ep = \frac{(\Delta D = (D1 - D0)) / (D = (D0)) * 100}{(\Delta P = (P1 - P0)) / (P(P0)) * 100}$$

Adjusted price elasticity of demand would be calculated in this way: First, the increasing rates of a visitor demand concerning each seasonal-visiting term, except within the rise carried out in one term, are estimates. Later, the average value of the increasing rates is calculated. The expected number of visitors can be found via the former season visitor amount before the rising by multiplying with the rising rate. This value takes place in the formulation below.

$$\text{Adjusted } Ep = \frac{(\Delta D(\text{Number of visitors that have visited museums} - \text{Expected number of visitors})) / (D(\text{Expected number of visitors})) * 100}{(\Delta P(P1 - P0)) / (P(P0)) * 100}$$

The relation between the price elasticity of demand and the total income can be explained as follows:

- Price rise enables to increase the total income when demand is not flexible (elasticity < 1). Price decrease lowers the total income.
- When demand is flexible, price rise decreases the total income (elasticity > 1). Finally, the total income decreases. On the contrary, a decrease in the price raises the total income.
- When demand elasticity is an equal unit (elasticity = 1) the change in price doesn't affect the total income.

Based on this formulation, the price elasticity for the Topkapı Palace Museum is found as -0.22 (Sezen, 2015). In other words, 1 % increment in price can lead to 0.22% decline in the number of visitors and this indicates inelastic demand.

A simulation model is increasingly used in research to get a better result with less cost and within less time. All those; time, quality and cost are important restraints of research. The study of Kellner, Madachy, & Raffo, (1999) clustered simulation models using simulations of software processes into six categories of purpose: strategic management; planning; control and operational management; process improvement and technology adoption; understanding; and training and learning.

In this research, the diversity of museum entrance will be illustrated by the simulation model. The essential factor to support our VIP entrance idea is the public survey that queries whether or not to have a VIP entrance (Sezen, 2015). About %45 of survey results support the idea of having VIP entrance and only 10% of visitors mention that price discrimination can cause problems. In addition, Maddison & Foster (2003) argued that congestion cost needed to be placed in revenue management operation. Thus, these two studies are our initial starting points to define VIP access.

VIP access is a private entrance for visitors. Any visitor who has VIP access does not need to wait in the ticket or entrance line. Since Topkapı Palace Museum is being one of the superstar museums, the tourists do not want to miss it. Because of that, huge lines can occur at the entrance in the high season time. The Topkapı Palace Museum is not the only historical place in Istanbul, there are many historic buildings that have equal importance and value such as Dolmabahce, Blue Mosque and Bosphorus. Thus, a tourist who comes to Istanbul wants to visit all those places. Then, scheduling becomes an issue. Since having a limited time, a VIP entrance is a pleasant opportunity for the tourists. Even the local community will have a chance to visit the Palace without a wait in line.

Beside the VIP entrance, we also have an exclusive entrance, which is cheaper than VIP access. Since the applied price of VIP access is quite high, so little cheaper exclusive access is created. The working logic of it is priority passes to exclusive access if there is no VIP access. To see the effects of having private access on revenue, VIP and Exclusive entrance policies are applied to the Topkapı Palace Museum by simulating each visit.

Application of VIP and Exclusive policies can be a challenge during inclement weather, however, we still assume that those two accesses are available in inclement weather time. Since the habits of people who are a part of luxury are unchangeable, private access has not been canceled. Nevertheless, the number of visits can be low during the cold/rainy/windy weather because of uncomfortable conditions or failure to use ferry/sea buses or because it may be hard to find a cab. To increase the number of arrivals, the museum operation manager decides on a new application to give an Ottoman chalice as a gift. Those chalices reflect modern trends and exhibit the remarkable prestige of Ottoman ornamentation. There is no specific price for the Ottoman chalice. To see the effects of the production cost of the chalice, the price of it varies in the simulation models.

4. APPLICATION and RESULTS: Simulation Design for Museum Entrance

Before applying our simulation models, the number of visits in each year is investigated. In the years between 2007- 2012, the number of visitors who came to the museum and got adult tickets increased except in 2009, see Figure 1. The rise in adult ticket price and the world economic crisis in 2009 affected the visitor number in 2009.

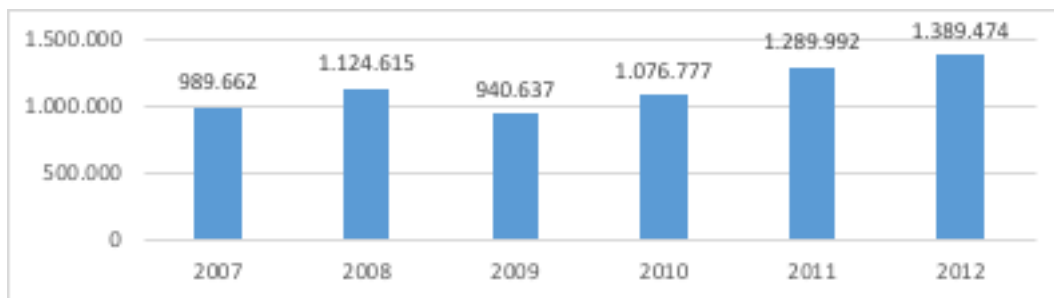


Figure 1. Number of adult ticket visitor

Total revenue of museum access for adult tickets is shown in Figure 2. Although the number of access decreased in 2009 a trend of growth was observed in total revenue. This total revenue increase can be explained by an increment in the ticket price. By August 1, 2008 ticket price increased from 10 TL to 20 TL, in order words, 100% increment occurred. One more rise took place on April 15, 2012 and the price increased from 20 TL to 25 TL.

When it comes to the subject in terms of revenue management it is seen that an increment in ticket prices induced a rise in total revenue. Even the number of accesses decreased in 2009 the increment of the ticket price paid off the gap in total revenue. The right decision has been in place to raise revenue.



Figure 2. Total revenue from adult ticket

The real number of total visitors was 1,389,474 in 2012. Figure 3 shows the observed visitor number for each month. Also, our predicted visitor numbers are shown in figure 3. Again, we have three different forecasted numbers of visitors based on the method. Among these methods, ARIMA gives minimum error when we compare with real observation.

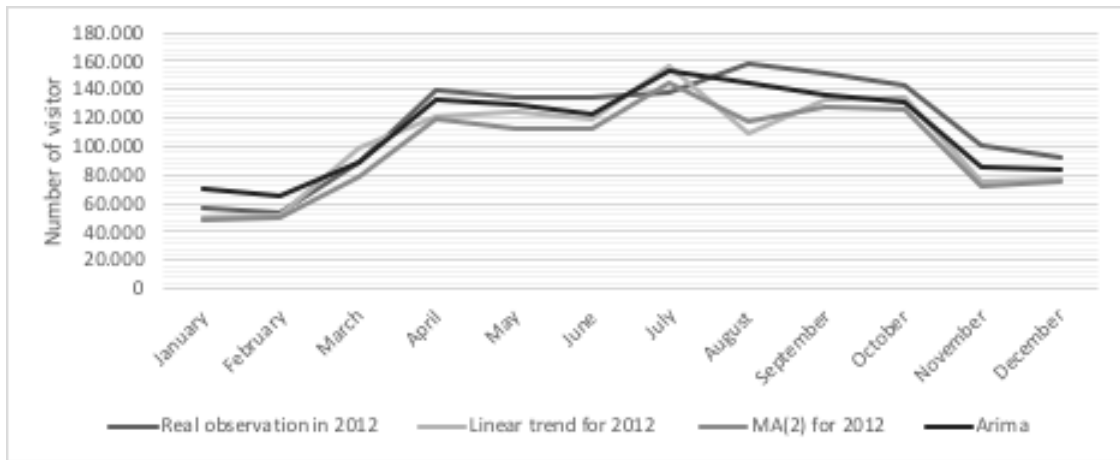


Figure 3. Estimated and real customer number for each month in 2012

Since the ARIMA model has the smallest Mean Square Error value we picked the run simulation model for this predicted value to answer those questions. After we forecasted visitor numbers with the ARIMA method, VIP, regular and exclusive access needed to be differentiated based on the percentage of the simulation model. To calculate the visitor number for each percent group, the simulation model runs 100 times and determines the average visitor number of each percent group.

One of the main priorities of the organization is to maximize revenue by determining different price levels. Sezen (2015) determined a model to maximize the revenue of Topkapı Palace Museum and found out that the optimal price level was 69.32 TL which was 277 % of the regular price (25 TL). This optimal price is utilized in the simulation model for the new price policy. The total revenue value is calculated by the multiplication of customer numbers on each percentage and ticket price of these groups of customers. The ticket price of regular

access comes from the optimal price calculation of Sezen's (2015) study in which the optimal price was 69 TL. VIP price and Exclusive access price are determined as 600 TL and 400 TL respectively. Those prices are chosen by the authors to have a large access fee. In the following calculation, different large numbers can be tried with different simulation models.

Total revenue of museum operations by applying this price cannot be compared with real total revenue of the museum. Even optimal regular price, 69 TL, is 277% times higher than the current price, VIP and Exclusive access price are incomparable with it. In this case, the question is how extra revenue, which is obtained from an increasing number of people because of the gift given, can cover the total cost of the gift that is given to everyone who comes to the Museum during inclement weather. What should be the price of the gift and the percentage of each access? When should the souvenirs be handed out?

In the simulation model, there are two input variables. The first one is the number of total customers for each month. Utilizing customer data from 2007 to 2011, Moving average, Linear Trend and ARIMA the best-fitted models are applied to forecast the number of customers for each month in 2012. The second input variable is weather probability. Utilizing the data from Sert's (2014) study, which used fuzzy logic and grouped each day as very cold, cold, chilly, comfortable, hot, and very hot, bad weather probability is calculated for each month. Based on the probability of having good or bad weather, the number of visitors' probability for each policy will change. On the contrary to the result of the VIP access survey of Sezen (2015), we defined that 10% of total customers preferred VIP access, 80% of customers preferred Regular access and 10% of costumers preferred Exclusive access for a good weather time. So, those percentages are fixed. However, different probability levels are investigated for the bad weather. Furthermore, giving a souvenir advertises the Topkapı Palace Museum, so the number of visitors might be increased. In this case, price elasticity was involved in our study. The price elasticity of the Topkapı Palace Museum was -0.22 (Sezen, 2015). We applied this elasticity to the number of arrivals in bad weather conditions; the number of visitors will increase by 0.22% if the price decreases by 1%. This price decrement can be provided by giving souvenirs. So, different souvenir prices are investigated. All those differentiations are represented by simulation models. Our system model simulation runs with Python2.7.

There are six different simulation models. Those models are constituted by a different combination of threshold probability of VIP, Regular and Exclusive access during the bad weather and price of souvenirs. Model 1 contains 0% of VIP access, 100% of Regular access and 0 % Exclusive access when the gift cost is changing between 2 TL-13TL. Model 2 uses 5%, 90% and 5% for VIP, Regular and Exclusive respectively with the gift cost of 2TL. A different gift cost, 3TL, and 10%, 80% and 10% values for VIP, Regular and Exclusive respectively create Model 3 and Model 4 is formed by 20%, 60% and 20% of VIP, Regular and Exclusive percent threshold respectively with the gift cost changing between 2 TL and 13 TL. Model 5 contains 30% of VIP access, 40% of Regular access and 30 % Exclusive access for the gift cost changing between 2 TL-13.5 TL. Lastly, with the same percent values in Model 5 and 14 TL gift cost, Model 6 is formed.

All simulation model results are shown in Table 1. In the first simulation model, Model 1, VIP and Exclusive percentages are 0, which means no one will go to those accesses during bad weather. And, the cost of the chalice of Ottoman varies between 2 TL and 13 TL. As a result, total extra revenue does not cover the total average cost. When we increase VIP and Exclusive access by 5% and reduce regular access to 90% the total average extra revenue (392,013 TL) is still behind the total average cost (1,116,644 TL). The situation remains the same for all different cost and percent values tried up to 30% for VIP and Exclusive and 40% for Regular in Model 3 and Model 4. In model 5, VIP and Exclusive percentages are 30% and Regular percentage is 40% with different cost values (2, 3...13.5) and the total average extra revenue is always higher than the total average cost. The total revenue is linearly increasing when we increase the cost of chalice between those values. This total revenue increment continues until the cost of chalice reaches to 14 TL. According to Model 6, total average cost is higher than the total average extra revenue value when VIP, Exclusive and Regular have 30%, 30% and 40% access values respectively and the cost of the chalice is 14 TL.

Table 1. Average extra revenue and average total cost

Simulation Models	Average Extra Revenue (in a year) TL	Average cost (in a year) TL
Model 1(VIP 0%, Regular 100%, Exclusive 0%) with 2TL-- 3TL--13TL	168,360—336,444—1,586,862	1,116,410 — 1,678,797 — 7,514,403
Model 2(VIP 5%, Regular 90%, Exclusive 5) with 2TL	392,013	1,116,644
Model 3(VIP 10%, Regular 80%, Exclusive 10%) with 3 TL	816,222	1,679,403
Model 4(VIP 20%, Regular 60%, Exclusive 20%) with 3TL--13	1,277,220---13,797,600	1,682,019----7,513,363
Model 5(VIP 30%, Regular 40%, Exclusive 30%) with 2TL--3TL ---13.5TL	1,153,814---1,731,549---7,822,329	1,116,632 — 1,682,181 ---- 7,813,476
Model 6 (VIP 30%, Regular 40%, Exclusive 30%) with 14TL	8,119,542	8,125,880

If we look at the Model 5 and Model 6 in more detail, we can see that access percentages are the same and only the cost of the souvenir is changed between 2 TL and 14 TL. Again, remember this cost value is our discount, on ticket price, so it affects the access number of museums. The total average revenue is higher than the total average cost until the price from 2TL to 13.5 TL. That means changing the price of chalice does not have a significant effect on the number of visits. Accordingly, the total average extra revenue covers the total cost of giving a souvenir to everyone. When the price of a chalice increases to 14 TL then the number of extra people increases, but giving the souvenir to everyone who comes to the museum during inclement weather increases the total average cost and the total extra revenue does not cover the total average cost.

After running the simulation model with picking different percent values and see different results, another question appears; what is the maximum percentage of regular access to make a profit from extra revenue? In other words, which percent values of regular access make total average extra revenue greater than the total average cost? Since high regular access is more applicable in the real system defining the maximum threshold of regular access becomes another aim. So for the 3 TL cost of the chalice, 50% of regular access, 45% of VIP access and 5% of exclusive access make the total average extra revenue 1,713,580 TL and total average cost 1,680,372 TL. Thus, museum operation still makes a profit from extra revenue. For 14 TL costs of the chalice, total average revenue is 8,273,145 TL and total average cost is 8,118,292 TL with 50% Regular, 50% VIP and 0% Exclusive access. Regular access percentage has not changed, but VIP percentage increased from 45% to 50% to beat the break-even point.

In general, it should be noted based on the price elasticity calculation that the extra revenue source is the number of extra people when the promotion is applied. Since any price discount reflects the increment visitor numbers, there is no extra revenue or total cost if the chalice price is 0 TL. In other words, total extra revenue and total cost are always 0 TL, if the chalice price is 0 TL.

As we mentioned earlier 600 TL and 400 TL for VIP and Exclusive access fees are chosen to provide a large access fee notion. Here, another question might be compromised: how will the percent threshold change if the access fees are changed? To answer this question, different (200 TL 800 TL) VIP and Exclusive prices are applied. Note that VIP access fee should be greater than the Exclusive access fee. There are many different combinations of access percentage and fee. Since the highest regular percentage is more reasonable to real life, we picked the highest percentage to access it. Table 2 shows all highest percent values for Regular access and the access fee of VIP and Exclusive to make a profit from extra revenue.

Table 2. Make profit with highest regular percent value and VIP exclusive access fee

VIP percent	Regular percent	Exclusive percent	VIP access fee	Exclusive access fee
0%	60%	40%	700	700
10%	60%	30%	700	700
15%	60%	25%	700	700
20%	60%	20%	700	700
25%	60%	15%	700	700
40%	60%	0%	700	200
40%	60%	0%	700	300
40%	60%	0%	700	400
40%	60%	0%	700	500
40%	60%	0%	700	600
40%	60%	0%	700	700

Topkapı Palace Museum operation can make a profit from extra revenue with these combinations. Also, percent division supports the idea of having VIP access in Sezen's study (Sezen et al., 2015). Here, a reasonable result is 40% of VIP and 60% of Regular access with a 700 TL VIP entrance fee. When we look at other results, the Topkapı Palace Museum can still make a profit with 0 percent value of regular access and highest VIP (95%) and Exclusive (5%) access. However, those percent values are not reasonable to be applied in real life. Also, the lowest fee and the highest regular percent combination are provided by 400 TL and 200 TL for VIP and Exclusive fee and percent values are 75%, 25% and 0% for VIP, Regular and Exclusive respectively. That result is also not applicable when we compare it with the result of Sezen's study (Sezen et al., 2015).

5. CONCLUSION

This study aims to investigate different access policies rather than the regular entrance to the Topkapı Palace Museum. To see the effect of the different access fees, a simulation model is formed. It is clear to say that if we increase the price of museum tickets, the revenue of the museum will increase even if the number of customers decreases because of the high ticket fees. However, we are interested in how extra revenue will cover the total average cost if we give a gift to a customer in inclement weather. As a result of the simulation model, up to 13.5 TL, the cost of the gift's total average extra revenue is always higher than the total average cost of 30% VIP and Exclusive and 40% regular access. Implicitly, that means changing the price between 0 and 13.5 TL of the gift does not have a significant effect on the number of visits.

However, when we increase the gift cost to 14 TL the average cost is higher than the average revenue. So gift price should not be higher than 13.5 TL if the access percentages are 30, 30 and 40 for VIP, Exclusive and Regular respectively. Here note that our access percentage is fixed. If we want to pay less for the gift, we need to change the percentage of access value. We show the result of any chosen percentage and cost value of the gift. According to decision-makers, this simulation model can be redesigned.

These results have led us to ask a new question; which percent values of regular access make total average extra revenue greater than the total average cost? To be eligible in real-life, regular access should be high. Based on this idea, we changed the percent values. As a result, even if the gift price was 14 TL the total average revenue was still higher than the total average cost. Even if we increased VIP access by 15% and reduced Exclusive access by 25%, our extra revenue was higher than the average cost. Because the VIP entrance fee was much higher than an Exclusive and Regular entrance fee.

Finally, we decided to apply different access fees for VIP and Exclusive entrance (regular access fee is fixed) in order to see the attitude of percent threshold of entrance policy. We fixed the Regular entrance percentage at 60%, which is agreed to the survey result, and tried different percent values for VIP and Exclusive entrance. As a result, 40% of VIP and 60% of Regular access with a 700 TL entrance fee for VIP are considered to be a reasonable

result for this simulation model to make a profit from extra revenue.

In this study, price discrimination was applied to a single museum entrance and its effects were investigated. Instead of comparing two different museum entrance fees, as in the study of Ak, Sürücü, & Kılıç, (2017) and Arslan, (2014), only different prices for a single museum were studied. It is not appropriate to compare the number of visitors and prices of the same museums since they do not have the same opportunities, even if they are not in the same city. Besides, it was observed that more income was obtained by applying different price policies for the full fare compared to single price ticketing, which supports the idea of Huntington, (1993).

This price discrimination can be applied to other distinguished museums and ruins. Well-known and must-go museums are more foreign visitor-dense, so they are less likely to be price-sensitive (O'Hagan, 1995). Therefore, price discrimination can be a great application to increasing the revenue of museum management. However, it may not appropriate for small and boutique museums such as Koc or Sabanci Museum since their number and types of visitors are certain. The number of visitors to those kinds of museums can be more sensitive to price discrimination.

In conclusion, the most important factors in determining the prices of the museums can be listed as the marketing policy, location and easy transportation. These impact visitor numbers, so they have a large effect on total income. The high entrance fee is not a deterrent to visitors if these opportunities are available.

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