

Measuring the Service Quality of Fast-food Restaurants in Turkey Using a Hybrid Multi Criteria Decision Making Approach

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Abstract

In this paper, multi criteria decision making approach been used to determine service quality of fast-food restaurants in Turkey. To measure service quality of fast food restaurant, a hybrid method, AHP and TOPSIS methods together, has been used. We have decided to choose 10 nationwide fast-food restaurants. 228 participants attended to a survey which consists of 20 questions. Afterwards, 6 criteria has been decided using exploratory factor analysis. 5 restaurant mangers' opinions, as expert, have been collected for the relative comparisons of the criteria. The weight of the criteria obtained by the AHP method is used in the TOPSIS method for the final comparison of the 10 fast-food restaurant. The results of the study produced an enriched perspective to determine the service quality of fast-food restaurant as well as the best restaurants and major criteria from consumer perspective.

Keywords;

Service Quality, Multi Criteria Decision Making, Fast-food Restaurant, AHP, TOPSIS, Survey, Exploratory Factor Analysis.

1. Introduction

Service quality has been discusses in many articles (Grönroos, 1982, Parasuraman et al., Li et al., 2002). There are various types of service quality. Fast food, industry is the one of the most discussed topic in the service industry. Fast-food, a type of mass-produced food, which is prepared and served quickly, has been introduced in the 1950s in the United States. Popularity of fast-food has been increased over the decades in all around the world. The selection of the fast-food restaurants have been discussed over the decades. There are variety reasons behind the selection of a restaurant. In this article, we explore the major and minor criteria for restaurant selection. In order to uncover the criteria, we decided to choose fast food industry in Turkey. Fast-food concept develops constantly in Turkey. Therefore, market is remarkable for researchers. In this article, we selected the nationwide restaurants across the country.

Fast-food restaurants listed in this study are denoted as A, B, C, D, E, F, G, H, I, and J which represents, Burger King, Chicken World, Popeye's, Pizza Pizza, Domino's Pizza, Carl's JR, Papa John's, Mc Donald's , KFC, and Arby's respectively.

In order to discover the main criteria for the selection of restaurant, a survey and an interview method have been used. Those methods produced the weights for each criterion. The weights of criteria have been calculated by using the AHP method. Afterwards, TOPSIS method is used for the final comparison of the 10 fast-food-restaurants.

2. Literature Review

The primary research was trying to determine what service quality meant to fast-food restaurant customers (Zeithaml et al., 1996) and the main criteria which place companies in a higher place in the market. Service quality has been discussed in many articles. Practitioner and researchers tried to determine what service quality is and how it can be measured. Zeithaml claimed that due to characteristic of the service, it was hard to define and evaluate it (Zeithaml, 1981). Since in the previous researches, quality has been defined multi-dimensional (Parasuraman et al.) there was no agreement about how to evaluate the service quality (Cronin and Taylor, 1992).

There are many different service quality models has been developed in various industries i.e. retailing and servicing industry. In 1982, Grönroos also defined service quality dimensions as functional aspect and technical aspect. Later, ServQual by Parasuraman has been developed (Parasuraman et al, 1988).

Among all models, ServQual which was defining and measuring service quality was the most cited and discussed article. ServQual had a significant impact on quality of service in literature and industry as well. ServQual was measuring performance (P), customer expectations (E) and quality as follows $Q=P-E$.

After these studies, in 1997 Berry's and Parasuraman published another article regarding quality of system "Listening to the Customer-The Concept of a Service-Quality Information System," This was another remarkable study which encouraged organizations to measure the quality of their customer service(Goceri, 2017).

2.1 Measuring Service Quality

Although service quality was hard to be defined and measured, various researchers defined service quality and tried to measure it (Lewis and Booms 1983, Grönroos 1984, Parasuraman et al. 1985 and 1988, Carman 1990, Cronin and Taylor 1992, Teas 1993, Westbrook and Peterson 1998).

Lewis and Booms (1983) looked at the service quality in customer perspective and claimed that service level delivered to customer has to be matched with customer expectations. Grönroos (1984) claimed that consumer's measure (perceived) service quality by comparing their expectations with experiences of the service that they have received. In addition, Parasuraman (1988) pointed out that "perceived service quality is viewed as the level of discrepancy between consumers' perceptions and expectations".

In this study, we used a hybrid approach which combines AHP (Analytic Hierarchy Process) and TOPSIS (the Technique for Order of Preference by Similarity to Ideal Solution) in order to evaluate the quality of service industry for fast-food restaurant in Turkey.

TOPSIS method has been used for order preference by similarity to ideal solution (Hwang and Yoon, 1981). The best alternative is the solution, which has the shortest distance to the ideal solution and the longest distance from the negative ideal solution. Similarly, AHP, developed by Thomas Saaty (1980) was used for organizing and analyzing complex decisions. The weights of criteria have been calculated by using the AHP method. Afterwards, TOPSIS method has been used for the final comparison of the 10 fast-food restaurants.

3. Methodology

20 closed ended question survey with 228 participants and an interview with 5 experts have been used in this study. Additionally, in order to determine each criteria for the selection of each restaurant, SPSS exploratory factor analysis has been used. 20 questions produced 6 main criteria. Furthermore, we calculated the weight of each criterion by averaging the sub-factors 'weights. Afterwards, AHP was to obtain the averaged weights of each criterion by

comparing each criterion. Finally, TOPSIS was applied to determine the best fast food company and uncover the main criteria which produce this outcome.

4. Results

In survey, although, we received 274 responses, we eliminated 46 participants because of inconsistency in their responses. Additionally, we distributed to survey to those who recently experienced the service quality the fast-food restaurant which they want to contribute. For instance, for the evaluation of Burger King, participants have been selected among those who received service recently from Burger King. Thus, reliability of their response has been confirmed. Exploratory factor analysis (IBM SPSS 20) has been used to determine criteria for selection of each restaurant. 20 questions has been analyzed and 6 criteria have been found. These factors have been named as follows: Certifications of the Restaurant, Service Quality, Location and Interior Design, Amenities of the Restaurant, Menu Variety and Design, and Food Price.

For AHP, the steps can be described as follows:

Step 1. Decision makers (DMs) who has year experience, regarding fast food restaurant, are defined. In AHP method, decision-makers (i.e. D1, D2, ..., Dk) decided the weight of each criteria by comparing each criterion (i.e. C1, C2, ..., Cn) . The importance averaged weights that obtained using AHP are given in Table 1.

Table 1. Weights for Criteria

Certifications of the Restaurant	Service Quality	Location and Interior Design	Amenities of the Restaurant	Menu Variety	Food Price
0.174	0.183	0.164	0.142	0.169	0.169

In Table 1, we used 5 experts' opinions for each criterion. We asked them to rank and compare each criterion. Afterwards, we normalized the findings.

As seen above, service quality has the highest impact on customer selections. Service quality includes service speed and the way how service is presented by staff. Second important criteria are the certification of restaurant. This could be explained as cultural effect because people in Turkey could pay attention to certification due to cutting style of animals and storage conditions of the products from their religious perspective.

Step 2. A decision matrix has been composed using average weight of each criterion for each restaurant. A Likert scale of 9 is used. We collected all survey responses and find the averaged weight value for each criterion.

Table 2. Decision Matrix

Restaurants	Certifications of the Restaurant	Service Quality	Location and Interior Design	Amenities of the Restaurant	Menu Variety	Food Price
A	7.54	6.58	6.21	5.38	5.21	7.42
B	7.59	7.13	5.82	4.64	5.84	6.46
C	6.59	6.07	6.46	5.18	5.7	8.07
D	8.14	7.97	5.72	5.2	5.72	6.78
E	8.15	8.13	5.65	5.77	6.08	6.58
F	7	6.41	6.53	6.02	6.1	7.29
G	6.88	6.38	6.15	5.21	5.31	7.92
H	7.45	7.03	6.58	5.39	5.89	7.25
I	7.66	7.11	5.97	5.91	6.14	7.08
J	7.51	7.05	6.07	5.47	5.64	6.43

The decision matrix is $X = (x_{ij})_{m \times n}$ and normalized criteria is r_{ij}

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^m x_{ij}^2}} \text{ for maximization, where } i = 1, 2, \dots, m \text{ and } j = 1, 2, \dots, n \quad (1)$$

Table 3. Normalized Decision Matrix

Restaurants	Certifications of the Restaurant	Service Quality	Location and Interior Design	Amenities of the Restaurant	Menu Variety	Food Price
A	0.322	0.322	0.300	0.321	0.270	0.286
B	0.318	0.318	0.313	0.310	0.318	0.285
C	0.325	0.320	0.308	0.338	0.344	0.313
D	0.316	0.317	0.339	0.324	0.313	0.321
E	0.345	0.359	0.295	0.314	0.303	0.300
F	0.279	0.274	0.333	0.313	0.301	0.357
G	0.292	0.288	0.317	0.292	0.303	0.351
H	0.297	0.289	0.337	0.335	0.350	0.323
I	0.344	0.367	0.295	0.325	0.340	0.290
J	0.320	0.297	0.320	0.286	0.313	0.328

Step 4. $V = (v_{ij})_{m \times n}$ the weighted normalized decision matrix has been calculated as follows:

$$v_{ij} = r_{ij} \cdot w_j \text{ where } i = 1, 2, \dots, m \text{ and } j = 1, 2, \dots, n \quad (2)$$

where w_j is the relative weight of the j^{th} criterion obtained in Step 1, and $\sum_{j=1}^n w_j = 1$

After obtaining the normalized matrix, the weighted normalized decision matrix has been calculated using Equation 2 and shown below in Table 4.

In other words, after obtaining the normalized matrix, the weighted normalized decision matrix has been calculated using Equation 2 and shown below in Table 4. We multiple the weights found in AHP with normalized data generated Table 4.

Table 4. Weighted Normalized Decision Matrix

Restaurants	Certifications of the Restaurant	Service Quality	Location and Interior Design	Amenities of the Restaurant	Menu Variety	Food Price
A	0.0558	0.0587	0.0492	0.0457	0.0456	0.0482
B	0.0552	0.0581	0.0514	0.0441	0.0537	0.0480
C	0.0563	0.0585	0.0505	0.0481	0.0581	0.0528
D	0.0548	0.0579	0.0556	0.0461	0.0530	0.0541
E	0.0598	0.0656	0.0484	0.0447	0.0511	0.0506
F	0.0484	0.0500	0.0547	0.0446	0.0509	0.0602
G	0.0506	0.0526	0.0520	0.0415	0.0512	0.0591
H	0.0515	0.0528	0.0552	0.0477	0.0592	0.0544
I	0.0596	0.0670	0.0484	0.0462	0.0574	0.0488
J	0.0554	0.0542	0.0525	0.0407	0.0528	0.0553

Step 5. The positive-ideal (A^*) and negative-ideal (A^-) solutions has been determined using Equation 3 and 4.

$$A^* = \{v_1^*, v_2^*, \dots, v_n^*\} \quad \text{where} \quad v_j^* = \max_i(v_{ij}) \quad (3)$$

$$A^- = \{v_1^-, v_2^-, \dots, v_n^-\} \quad \text{where} \quad v_j^- = \min_i(v_{ij}) \quad (4)$$

The Euclidean distances of each alternative from the positive-ideal solution and the negative-ideal solution has been calculated as follows:

$$d_i^* = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^*)^2} \quad i = 1, 2, \dots, m \quad (5)$$

$$d_i^- = \sqrt{\sum_{j=1}^n (v_{ij} - v_j^-)^2} \quad i = 1, 2, \dots, m \quad (6)$$

The distance values can be shown in Table 5.

Table 5. Euclidean Distance of each Alternative

	d_i^*	d_i^-
A	0.0215	0.01246
B	0.0177	0.01405
C	0.0129	0.01928
D	0.0137	0.01661
E	0.0149	0.02068
F	0.0224	0.01524
G	0.0203	0.01345
H	0.0175	0.01842
I	0.0137	0.02419
J	0.0176	0.01380

Step 6: The relative closeness of each alternative to the ideal solution can be calculated as below. The relative closeness of the alternative A_i with respect to A^* is defined as CC_i

$$CC_i = \frac{d_i^-}{d_i^* + d_i^-} \quad i=1, 2, \dots, m \quad (7)$$

The bigger the CC_i , the better the alternative A_i . The best alternative is the one with the greatest relative closeness to the ideal solution.

Table 6. Relative closeness to the ideal solution.

A	0.370
B	0.405
C	0.548
D	0.509
E	0.594
F	0.396
G	0.390
H	0.451
I	0.629
J	0.418

As seen above in Table 6, using the AHP-based TOPSIS method, restaurant I has been determined as the best, Domino's Pizza as the second best fast-food restaurant. Additionally, service quality and certification have the highest impact on restaurant selection for customer where amenities have the least effect. The reason behind amenities' impact on customer selection could be explained because all shopping centers offers free parking for customers and most restaurants and offers free Wi-Fi. Additionally, accessibility to internet is becoming easier by network providers through the mobile devices. However, in another study (Goceri MS, and Goceri T, 2017) for airline selection, accessibility to internet was one of the most important reasons for selection of fast food restaurant because in the air there is no network provider except the airline companies. This confirms that why amenities has been found less important for fast-food customers.

5. Conclusion

In this study, service quality of fast-food restaurant as well as the best restaurants and major criteria from consumer perspective has been determined in Turkey using AHP and TOPSIS method. The results produced valuable insight for fast-food companies as well as customers for fast-food consumers. The most important criteria for the selection of fast food restaurant from customer perspective have been found. Using AHP based TOPSIS method with statistical tool was a sophisticated approach to determine service quality of fast-food restaurants. This study could be a significant research for fast-food restaurant regarding the details customer expectation from a fast-food restaurant.

Applying survey to only Turkish fast-food consumers was the main weakness of the study. This could be an excellent starting point for future researches.

References

- Carman, J. M., Consumer perceptions of service quality: An assessment of the SERVQUAL dimensions, *Journal of Retailing*, 66(1), pp. 33–55, 1990.
- Cronin, J.J., and Taylor, S.A., Measuring Service Quality: A Reexamination and Extension, *Journal of Marketing*, 56(3), p. 55, Jul 1992.
- Goceri, M.S., A usability evaluation methodology with a questionnaire supported with qualitative data for web site user interface, PhD Thesis, pp. 13-15, 2017.
- Goceri, M.S., Selection of the Best Airline Company in Turkey, IEOM Bogota Conference, Bogota, Colombia, 2017.
- Grönroos, C., A Service Quality Model and its Marketing Implications, *European Journal of Marketing* 18 (4), pp. 36-44, 1984.

- Hwang, C.L., and K. Yoon, Multiple Attribute Decision Making Methods and Applications. SpringerVerlag, Berlin, 1981.
- Lewis, R.C. and Booms, B., The marketing aspects of service quality, American Marketing Association Proceeding, pp. 99-104, Chicago, 1983.
- Li, Y.N., Tan, K.C., and Xie, M., "Measuring web service Quality", Total Quality Management, 13(5), pp. 685–700, 2002.
- Parasuraman, A., Zeithaml, V. and Berry, L.L., "A conceptual model of service quality and its implications for future research", Journal of Marketing, autumn, Vol. 49, pp. 41-50, 1985.
- Parasuraman, A., Zeithaml, V. A. and Berry, L.L., SERVQUAL: A multi-item scale for measuring consumer perceptions of service quality, Journal of Retailing, 64(1), pp. 12–37, 1988.
- Saaty, T.L., The Analytic Hierarchy Process, McGraw-Hill, New York, 1980
- Teas, R.K., Expectations, performance evaluation and consumer's perception of quality, Journal of Marketing, 57(4), pp. 18–34, 1993.
- Westbrook, K.W. and Peterson, R.M., Business-to-business selling determinants of quality, Industrial, Marketing Management 27, pp. 51-62, 1998.
- Zeithaml V.A., "How Consumer Evaluation Processes Differ between Goods and Services", Services Marketing, 2nd Edition, Upper Saddle River, New Jersey: Prentice Hall, 1981.
- Zeithaml, V.A., Berry, L.L. and Parasuraman, A., "The Behavioral Consequences of Service Quality," Journal of Marketing, pp. 31-46, April 1996.

Biography

Mehmet Goceri is a PhD candidate from Istanbul University, from Industrial Engineering Department. He was lecturing at Fatih University from 2014 to 2016 in Foreign Trade and Industrial Engineering Department. He earned B.S. in Industrial Engineering from Istanbul University, Masters from Fatih University in Industrial Engineering. He taught some courses in Santa Clara University in California. He has published journal and conference papers. His research interests include manufacturing, multi criteria decision making science, optimization, scheduling, usability, and user experience.

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