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Examining Competitive Strategies in Growing Coffee Industry with Game Theory

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ABSTRACT

The coffee market in Türkiye is growing rapidly, leading to fierce competition between international, national, and local coffee shops. It has become extremely crucial for the local economy that local businesses can compete and survive against these more institutionalized structures that also have brand advantages in competition. In this study, game theory was used to analyze the competitive strategies of companies operating in the coffee market by designing both zero-sum and non-zero-sum games. Considering that the expectations, tastes, preferences, and consumption habits of the generations may be different, 1530 people were surveyed in Erzurum province by grouping them as Generation X, Y, and Z according to their year of birth. Different game matrices were created with the data obtained from the surveys. The games were designed to identify the prominent strategies among coffee shops for each generation. The results showed that, regardless of generation, local coffee shops stand out from international and national coffee chains in terms of space comfort. In addition, local shops also stand out meeting consumer expectations. It is also observed that Generation Z has higher expectations in all strategies compared to other generations.

Keywords: Game Theory, Zero-Sum Game, Non-Zero- Sum Game, Competition, Coffee Studies

Büyüyen Kahve Endüstrisinde Rekabet Stratejilerinin Oyun Teorisi ile İncelenmesi

Süreç

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ÖZ

Türkiye'deki kahve pazarı hızla büyümekte, bu durum uluslararası, ulusal ve yerel kahve işletmeleri arasında kıyasıya bir rekabetin yaşanmasına neden olmaktadır. Yerel işletmelerin rekabette marka avantajına sahip daha kurumsal bu yapılarla rekabet edebilmesi ve varlığını sürdürebilmesi yerel ekonomiler için son derece önem kazanmıştır. Bu çalışmada kahve pazarında faaliyet gösteren şirketleri rekabet stratejileri açısından incelemek amacıyla oyun teorisi bir araç olarak kullanılmış hem sıfır toplamlı hem de sıfır toplamlı olmayan oyunlar tasarlanmıştır. Bunu yaparken kuşakların beklentilerinin, beğenilerinin, zevk ve tercihlerinin ve dolayısı ile tüketim alışkanlıklarının farklı olabileceği düşünülerek doğdukları yıllara göre X, Y ve Z kuşağı olmak üzere gruplandırma yapılarak Erzurum ilinde 1530 kişiye anket yapılmıştır. Yapılan anketlerden elde edilen verilerle farklı oyun matrisleri oluşturulmuştur. Oyunlar her kuşak için kahve işletmeleri arasında öne çıkan stratejilerin belirlenmesi üzerine kurgulanmıştır. Sonuçlar kuşak fark etmeksizin yerel kahve işletmesinin uluslararası ve ulusal kahve zincirleri karşısında mekân konforu ile öne çıktığını ortaya koymuştur. Ayrıca tüketici beklentilerini karşılama açısından da yerel işletmelerin yine mekân konforu ile öne çıktığı görülmektedir. Ayrıca Z kuşağının tüm stratejilerde diğer kuşaklara kıyasla daha yüksek beklentilere sahip olduğu görülmüştür.

Anahtar Kelimeler: Oyun Teorisi, Sıfır Toplamlı Oyun, Sıfır Toplamlı Olmayan Oyun, Rekabet, Kahve Çalışmaları

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Introduction

The significance of competition for firms has grown with globalization, population growth, improved living standards, and technological advancements. When making decisions about the price, quantity, and characteristics of goods to be produced, firms must consider the potential reactions of their competitors. Due to changes in consumer preferences, product characteristics have become increasingly important in purchasing decisions, surpassing product prices. Therefore, firms are now taking non-price competition factors into account. Especially in oligopoly markets, firms compete on factors other than price. One of the main methods used by firms to increase their sales and profits is through advertising campaigns. A successful advertising campaign can help a firm sell more products at the same price and attract consumers to their brand (Yaylalı, 2004). Companies aim to gain an advantage over their competitors by highlighting specific product features. Therefore, it is crucial for companies to develop strategies that consider their competitors' actions to make optimal decisions.

Game theory is a mathematical tool used to determine competitive strategies. It has been widely applied in the field of microeconomics, particularly in competitive oligopoly markets. Studies analyzing zero-sum games in highly competitive markets are prevalent in the literature. Zero-sum games determine the best strategies for two competing firms, while non-zero-sum games reveal the extent to which firms meet consumers' expectations. Studies have investigated zero-sum and non-zero-sum games in microeconomics and oligopoly markets for smartphone companies (Doğan et al., 2015; Polat & Akan, 2020), laptop companies (Koçer et al., 2014), taxis, and municipal buses (Rençber, 2012), as well as airline companies (Uysal et al., 2017). In macroeconomic terms, research has been conducted, particularly on tax and investment incentives (Turnbull, 1987; Chirinko & Wilson, 2008; Bunker, 2013; Corrado, 2015). Strategies for wireless sensor networks (Reddy, 2009; Shi et al., 2012; Shen et al., 2017; Abdalzaher et al., 2019), technology management (Chen & Larbani, 2006), military decisions, and operations (Cantwell, 2003) have been investigated. Additionally, this issue has been examined in terms of social norms (Norton & Sommers, 2011; Różycka-Tran et al., 2015). Evyapan (2009) conducted a sectoral research in the Istanbul Stock Exchange using game theory. The study examines how game theory is utilized in the presence of competition and conflict and suggests to investors which stocks should be purchased from the shares traded in the Istanbul Stock Exchange using a two-person zero-sum game. Biçici (2009) analyzed competition in oligopoly markets through game theory. The study analyzed the market equilibrium using Cournat, Bertnard, and Stachelberg models, as well as various mathematical models, with a focus on Nash equilibrium. The results showed that the Bertnard model had the highest equilibrium and profit. In another study, Songchoo & Suriya (2012) used behavioral game theory to find a policy to discourage illegal logging in Thailand. The study examines two distinct scenarios and concludes that illegal logging is more appealing to lawbreakers, particularly when there is competition. However, the study also finds that lawbreakers are deterred when the police offer a high arrest reward. Tarım (2012) compared the competitive advantages of information technology firms in terms of innovation with game theory. The study analyzed firms using bilateral gain-loss matrices and identified the leading firm. It was found that the firms applied imitative and dependent strategies. Therefore, the study argues that competition between firms is not significant and presents various suggestions to the relevant firms. Rençber (2012) constructed a zero-sum game to analyze the competition between public transportation vehicles and taxis and revealed the optimal strategies for both parties. In their 2014 study, Koçer et al. identified the two laptop computer companies most preferred by university students through a survey. They constructed and analyzed a zero-sum game to examine the situations of rival companies relative to each other with the aim of providing suggestions to companies on the strategies required for a sales campaign to university students. They constructed a non-zero-sum game and analyzed the situation of laptop computer companies in relation to students' expectations Doğan et al. (2015) identified the two most preferred mobile phone brands among students, compared the strategies of these companies in a zero-sum game, and identified the dominant and weak strategies of mobile phone companies in a study based on a questionnaire applied to university students. Additionally, they analyzed the extent to which mobile phone companies meet the expectations of students by constructing a non-zero-sum game. Uysal et al. (2017) analyzed a zero-sum game for two national airlines to determine their optimal pricing policies. The study found that competition led to a significant decrease in ticket prices. The authors concluded that cooperation between the firms would increase their profits. Polat and Akan (2020) analyzed the strategies of the three most preferred smartphone brands among university academic and administrative staff by constructing a zero-sum game. They also evaluated the extent to which these brands meet consumers' expectations using a non-zero-sum game. Karabacak and Akdeve (2021) explored the advantages of game theory in the competitive intelligence process for strategy formulation. The study suggests that this process can assist businesses in identifying the most profitable strategies for their operating conditions.

With the changing living conditions, coffee has become a significant consumer good. Coffee businesses are facing increasing competition in this market due to the rise in the number of companies. After water, coffee is the most preferred beverage worldwide, consumed by more than one-third of the world's population (Gaascht et al., 2015; Arslan, 2019). Coffee is not only a beverage but also a means of socialization (Heise, 2001). New-generation coffee shops are popular among all age groups due to

their good quality coffee, service, social atmosphere, prestige, and sophisticated interior design (Lin, 2012). With the proliferation of global coffee establishments, coffee habits, which are an important part of Turkish culture, have changed. Coffee shops, which offer a variety of coffee types, flavors, and presentations to meet consumer preferences, have replaced traditional coffee establishments. As a result, there has been a considerable increase in the number of coffee shops.

The expansion of global and domestic coffee chains poses a threat to the viability and profitability of local coffee businesses. This study examines the competition of local firms with international and national coffee chains in terms of different strategies. The study focuses on these three competitors operating in Erzurum province. In the province of Erzurum, the opening of a second university has led to the emergence of numerous coffee shops along the route connecting the two institutions, which has had a significant impact on the regional economy. Local coffee houses in the province are in competition with national and international coffee chains. In this rapidly growing sector, firms must make optimal decisions to stay competitve.

When determining the optimal strategy, competitive firms should consider the age, gender, and expectations of their target customers. To reach a larger audience, firms can divide large markets into groups. Purchasing behavior is influenced by environmental, psychological, and cognitive factors, which may vary by age. Therefore, companies divide their target audience into generations (Yaşa & Bozyiğit, 2012) to better understand their customers Generations are groups of people who were born in the same years and experienced the social, political, historical, and economic conditions of their time together (Williams & Page, 2011). Generations are divided into 5 groups according to their birth years: the Silent Generation (1930-1945), Baby Boomers (1946-1964), Generation X (1965-1976), Generation Y (1977-1994), and Generation Z (1994 and later) (Williams & Page, 2011). The lifestyle, value judgments, consumption preferences, and habits of each generation differ. Generations exhibit consumption behavior in line with the conditions of the period they live in. While previous generations, who experienced war and famine, tended to be more frugal in their expenditures, today's generation, with easy access to everything, tends to be more liberal in their consumption behavior. Consumer expectations, tastes, preferences, attitudes, and saving habits vary across generations. Therefore, each generation's consumption behavior should be evaluated separately due to differences in the conditions of the periods in which they were born and lived. This study will analyze the characteristics of different generations and provide businesses with strategies to target their wishes, tastes, and preferences in campaigns, advertisements, promotions, and sales strategies. It is important to note that there is limited literature on competitive game theory to guide local businesses in this regard. Additionally, the studies focused solely on a general target group and neglected to consider the unique desires and preferences of each generation. This study is remarkable in that it examines local firms as well as national and international chains, uses game theory to identify optimal strategies, and treats generations separately.

Methodology

One of the methods used in determining the strategy of competitive firms is "game theory". The concept of the game mentioned in such studies is expressed as "the reflection of the conflict of interest or competition of the parties who have to make decisions in order to predict certain payments (outcomes) that will emerge over time" (Halaç, 1995: 72). Game theory can also defined as the science of the most strategic decisions (Karabacak & Akdeve, 2021: 341).

Game theory involves at least two players who interact with each other through their decisions. The decisions made by one player can affect the other player. Game theory can be categorized into cooperative and non-cooperative games. In cooperative games, players cooperate through binding agreements. Non-cooperative games are competitive and can be zero-sum games, as explained by Karabacak (2016). Zero-sum games are games in which one player's gain equals the other player's loss, resulting in a change in wealth or utility of zero (Zu et al., 2012). These games are used for decision-making in competitive situations where cooperation is not possible due to conflicting interests between individuals (Murphy, 1989; Winston, 1994). Not all competitive games are zero-sum games, but all zero-sum games are competitive. These games involve no cooperation or communication, as there is no benefit to be gained from either. In zero-sum games, one player's gain is equal to the other player's loss, making their interests directly opposed to each other. In a two-person zero-sum game, the players' strategy sets are defined as, S_1 and S_2 and their payoffs are defined as U_1 and U_2 then for all possible strategies in the game,

$G = \{(1,2),(S_1, S_2),(U_1, U_2)\}$ and

$U_1(s_1, s_2) + U_2(s_1, s_2) = 0$

is satisfied, this game is defined as a zero-sum game (Karabacak, 2016).

In non-cooperative two-person games, players can win, lose, or withdraw. The gain matrix shows the losses and gains resulting from the player's decisions based on their strategies (Esin, 2003). The payoff matrix is created by determining the players' goals and objectives. After gathering information on the strategies, positive values indicate gains and negative values indicate losses based on the decision maker's optimal strategy solution. If the value is zero, there is no loss or gain. The opponent pays the absolute value of the decision maker's gain. The payoff matrix consists of m rows and n columns (Yürüten, 2010).

Table 1: The Payoff Matrix
Çizelge 1: Ödemeler Matrisi

	Column Player's Strategy			
Row Player's Strategy	Column 1	Column 2	.	Column m
Row 1	a_{11}	a_{12}	.	a_{1n}
Row 2	a_{21}	a_{22}	.	a_{2n}
.	.	.	.	.
Row m	a_{m1}	a_{m2}	.	a_{mn}

Source: Taha, 1971

After constructing the payoff matrix, the maxmin and minmax values should be determined to find the outcome of the game and the best strategies. In the Minmax and Maxmin strategies, players do not cooperate. The Minmax strategy prescribes the most severe punishment when the other player does not cooperate. The non-cooperating player also adopts the best strategy for self-preservation, which is the maxmin strategy. In these two strategies, the focus is not on predicting the best responses of the players, but on how the strategies implemented by the players affect their utility (Yılmaz, 2009). In a two-player zero-sum game, the saddle point occurs when one player chooses a max-min strategy and the other chooses a min-max strategy, and these optimal strategies are equal. In this case, the players' optimal strategies intersect, which is also known as the game's value (Karabacak, 2016).

It is not always the case that the gains and losses of two players are equal. In this case, we are dealing with non-zero-sum games. In cases of strategic interaction, players make rational decisions. In non-zero-sum games, one player's gain does not equal the other player's loss. Non-zero-sum games may not always be competitive. These games have a dominant strategy equilibrium. If the dominance between players' strategies is insufficient to determine the equilibrium of the game, Nash equilibrium is investigated (Uysal et al., 2017).

In today's business environment, competition among firms is not solely based on price and costs, but also on non-price factors (Arıkan, 2003: 35). This study takes into account these non-price factors. The research methodology used in this study is based on quantitative data obtained through the questionnaire technique. The survey questions for the questionnaire form were developed by evaluating relevant literature studies. A pilot application was conducted with 100 participants, and necessary adjustments were made to obtain the final version of the questionnaire. The questionnaire form was prepared and the games were constructed and solved using an extensive literature review and the study by Koçer et al. (2014).

Defining Strategies

The study determined the main population size to be 758,279 which is the central population of Erzurum province as of 2020 (TUİK, 2020). A sample size of 384 was calculated with a 95% confidence interval at a 5% significance level to represent the main population (Karagöz, 2019). The study was designed to include a 1530 participants to ensure representative size and account for potential risks such as missing data or data loss, thus increasing the quality of the study. The questionnaires were administered to 3 different generations (X, Y, and Z) in 3 different coffee companies (international, national, and local). Each of the answers given to the questionnaire questions has a score and in order to evaluate these scores in a comparative way, an equal number of questionnaires were applied to each generation. The surveys were conducted by face-to-face questionnaires to the consumers who were present in the respective companies at the time. In each company, 170 questionnaires were used for each generation, for a total of 510 questionnaires. Thus, a total of 1530 questionnaires were applied to 3 companies.

The analysis was conducted on a sample of 1530 people, with 510 respondents from each of the following age groups: Generation Z (26 years old and younger), Generation Y (27-41 age range), and Generation X (42-61). The game is based on the competition of 3 players:

Player 1: International coffee chain
Player 2: National coffee chain
Player 3: Local coffee shops

Therefore, each generation group had 170 respondents from international, national, and local coffee businesses. The data obtained from the questionnaires created game matrices for coffee businesses of different generations.

In the questionnaire, consumers were asked different questions to represent each strategy. The questionnaire form is shown in Appendix 1. The questions in the questionnaire are divided into two groups. The first group (questions 8-24) was designed to assess consumers' expectations of coffee companies. Consumers were asked to rate the questions on a scale of 1 for "not at all important" and 5 for "very important". The second group (questions 25-41) was designed to determine the level of expectation fulfilment of the relevant companies, and consumers were asked to rate the companies on a scale of 1 for "very weak" and 5 for "very strong". The sum of these scores is the strategy score. Questions 8-10/25-27 represent Strategy 1, 11-15/28-32 Strategy 2, 16-17/33-34 Strategy 3, 18-22/35-39 Strategy 4 and 23-24/40-41 Strategy 5.

The games aimed to identify the prominent strategies among firms for each generation. By solving two types of games, zero-sum and non-zero-sum games, we obtained the equilibrium of the game and determined the most profitable strategy for each coffee business. In game theory, the saddle point is determined based on minmax and maxmin strategies in zero-sum games, while Nash equilibrium is found in non-zero-sum games.

The strategies that competing firms should implement against each other are analyzed in five groups.

Strategy 1: Coffee-related features

Strategy 2: Features related to space comfort

Strategy 3: Features related to the non-coffee menu of the business

Strategy 4: Presentation-related features

Strategy 5: Pricing.

When deciding on 'Strategy 1', the primary consideration was the purpose of visiting the establishment, which is to enjoy a cup of coffee. For coffee lovers who frequent this establishment, the taste, aroma, variety, availability of world coffees, and brewing methods that affect the flavor of the coffee are all crucial factors. Competitive companies can gain a significant advantage by increasing coffee variety, using quality beans, and offering popular world coffees with appropriate brewing methods. The characteristics of the venue are also crucial, in addition to the products offered. People may prefer a business based on its cleanliness, availability of WIFI and sockets, and suitability for sitting for long periods of time. These characteristics are part of 'Strategy 2' which focuses pn the features related to space comfort.'Strategy 3' includes menu characteristics beyond coffee. People visit coffee establishments not only to drink coffee but also to have a meal, socialize with friends, or enjoy chocolate, dessert, and confectionery that complement the taste of coffee. Offering such by-products helps the company attract different target groups, increase profits, and stand out from the competition. 'Strategy 4' pertains to presentation-related characteristics. Competitive businesses should consider the skill of their baristas and the availability of takeaway services as key strategies. These features can either propel a company forward or hold it back in the market.

In a highly competitive market, firms can win over consumers in ways other than price. By implementing these strategies, companies can gain an advantage over their competitors. Price is the most crucial factor in competitive markets. Therefore, 'Strategy 5' focuses on the product's price and promotions/campaigns.

In the questionnaire, consumers were asked different questions to represent each strategy (Amindoust vd., 2020). The questionnaire form is shown in Appendix 1. The questions in the questionnaire are divided into two groups. The first group (questions 8-24) was designed to assess consumers' expectations of coffee companies. Consumers were asked to rate the questions on a scale of 1 for "not at all important" and 5 for "very important". The second group (questions 25-41) was designed to determine the level of expectation fulfilment of the relevant companies, and consumers were asked to rate the companies on a scale of 1 for "very weak" and 5 for "very strong". The sum of these scores is the strategy score. Questions 8-10/25-27 represent strategy 1, 11-15/28-32 strategy 2, 16-17/33-34 strategy 3, 18-22/35-39 strategy 4 and 23-24/40-41 strategy 5.

Findings

This study analyzes the competitive strategies of coffee businesses using game theory. The preferences of each generation are taken into account. A total of 1530 people were surveyed, including 510 for international coffee chains (Player 1), 510 for national coffee chains (Player 2), and 510 for local coffee businesses (Player 3). These 510 questionnaires were conducted with 170 from each generation. These respondents represented consumers who prefer international, national, and local coffee establishments. Before analyzing the data, we tested the questionnaire's reliability and found a Cronbach alpha value of 91%. This result indicates that the questionnaire was highly reliable.

Formulation and Solution of Game Problems

Zero-Sum and Non-Zero-Sum Games and Solutions for All Age Groups

Zero Sum Game

This study examines the competition between local coffee businesses and international and national coffee chains. The games were structured as a competition between an international coffee chain (Player 1), a local coffee business (Player 3), a national coffee chain (Player 2) and a local coffee business (Player 3).

The participant's scores for the criteria grouped under each strategy were summed to obtain the score of the relevant strategy in the zero-sum game. Table 2 presents scores given by participants for criteria under the 1st, 2nd, 3rd, 4th, and 5th strategies for each business. To ensure consistency, ratios were used instead of raw numbers due to varying numbers of criteria in each strategy. Percentages of scores for each strategy compared to the total score were calculated, and the percentage of players meeting expectations for each strategy was determined.

Table 2: Scores and Percentages of Businesses for Each Strategy According to Participants (All Age Groups)
Çizelge 2: Katılımcılara Göre Her Strateji için İşletmelerin Aldıkları Puanlar ve Yüzdeleri (Tüm Yaş Grupları)

Strategies	Player 1		Player 2		Player 3	
	Point	%	Point	%	Point	%
1	5571	0,258467	5601	0,263007	5427	0,249552
2	5619	0,260694	5508	0,258640	5755	0,264634
3	3659	0,169759	3620	0,1699849	3737	0,17184
4	3519	0,163264	3453	0,162143	3560	0,163701
5	3186	0,147814	3114	0,146224	3268	0,150274
Total	21554	1,000000	21296	1,000000	21747	1,000000

In the first zero-sum game established, the players were determined as Player 1, who is affiliated with an international coffee chain, and Player 3, who is a local coffee shop.

In this study, we consider payoffs as a performance measure and we treat consumer ratings of firms as a performance indicator. Differences in the scores that firms receive from consumers indicate the extent to which a firm's strategy is liked and preferred, and these differences represent a gain and strategic advantage for the firm. At the same time, these score differences are seen as an equivalent loss for competing firms. In game theory, gains are not only considered in financial terms but are also associated with other benefits such as strategic advantage and customer satisfaction (Osborne & Rubinstein, 1994; Morris, 2012).

The percentages of the players' total scores from the strategies were obtained and the differences in the percentage scores were calculated. The payoff matrix and the solution of the game are shown in Table 3. The bold box in the table shows the payoff matrix.

When organizing the matrix, the local firm is placed in the row, while the international and national firms are positioned in the columns (as seen in Tables 3 and 4). The game matrix is structured with a focus on the local firm. In this arrangement, positive values in the table indicate a gain for the local firm and a corresponding loss for the competitor, whereas negative values signify a loss for the local firm and a gain for the competitor. Thus, positive entries in the matrix represent scenarios that favor the local firm, while negative entries highlight situations where the other firm holds an advantage (Gökşen et al., 2009). Each element of the matrix, a_{ij},reflects the difference between the value of the i'th strategy of the local firm and the j'th strategy of the competing firm. For instance, P3 denotes player 3 (the local firm), and P1 denotes player 1 (the international firm).

$$a_{ij} = P3_i - P1_j$$

To illustrate, consider a cell in Table 3, a_{21} which displays the difference between the local firm's second strategy and the international firm's first strategy.

$$a_{21} = 0{,}264634 - 0{,}258467 = 0{,}006$$

A value of 0,006 in this cell indicates that the local firm's second strategy has a 0,006 point advantage over the first strategy of the international firm. Once all the data is entered into the matrix, the resulting game matrix, as depicted in Table 3, provides a clear comparison of the strategies.

To solve the game, first, the smallest values of the rows and the largest values of the columns were determined in the payment matrices. Then the largest value amongst the smallest values in the rows and the smallest value amongst the largest values in the columns (maxmin and minmax values) were calculated to obtain the value of the game. The solution of the first zero-sum game is presented in Table 3

To solve the first zero-sum game, we found the highest value among the smallest values in the rows to be **0,004**, and the lowest value among the largest values in the columns to be **0,004**. Therefore, the value of the game is **0,004**. Based on the results, it can be concluded that Player 3's strategy 2 is more profitable than any of the strategies employed by the other player. Strategy 2 is linked to the comfort of the space, indicating that Player 3 has superior space characteristics compared to the other player.

The second zero-sum game involves Player 2, a business affiliated with a national coffee chain, and Player 3, a local coffee business.

The percentages of the players' total scores from the strategies were obtained and the differences in the percentage scores were calculated. The payoff matrix and the solution of the game are shown in Table 4. The bold box in the table shows the payoff matrix.

The solution of the game followed the same steps as the first game and is presented in Table 4.

Table 3: Payoff Matrix and Solution of the First Zero-Sum Game (All Age Groups)
Çizelge 3: Ödemeler Matrisi ve Birinci Sıfır Toplamlı Oyunun Çözümü (Tüm Yaş Grupları)

		Player 1					
	Strategies	1	**2**	3	4	5	**Minimum**
Player 3	1	-0,009	-0,011	0,080	0,086	0,102	-0,011
	2	0,006	**0,004**	0,095	0,101	0,117	**0,004**
	3	-0,087	-0,089	0,002	0,009	0,024	-0,089
	4	-0,095	-0,097	-0,006	0,000	0,016	-0,097
	5	-0,108	-0,110	-0,019	-0,013	0,002	-0,110
	Maximum	0,006	**0,004**	0,095	0,101	0,117	

Table 4: Payoff Matrix and Solution of the Second Zero-Sum Game (All Age Groups)
Çizelge 4: Ödemeler Matrisi ve İkinci Sıfır Toplamlı Oyunun Çözümü (Tüm Yaş Grupları)

		Player 2					
	Strategies	**1**	**2**	**3**	**4**	**5**	**Minimum**
Player 3	**1**	-0,013	-0,009	0,080	0,087	0,103	-0,013
	2	**0,002**	0,006	0,095	0,102	0,118	**0,002**
	3	-0,091	-0,087	0,002	0,010	0,026	-0,091
	4	-0,099	-0,095	-0,006	0,002	0,017	-0,099
	5	-0,113	-0,108	-0,020	-0,012	0,004	-0,113
	Maximum	**0,002**	0,006	0,095	0,102	0,118	

In the second zero-sum game, the game value was **0,002**, which was the largest value among the smallest values of the rows and the smallest value among the largest values of the columns. It can be concluded that Strategy 2 is more profitable for the local coffee business (Player 3) against all strategies of both coffee chains. The strategy pertains to the comfort of the shop and it was observed that the local coffee shop stood out in terms of these characteristics.

Non-Zero-Sum Game

The second problem identified in the study concerns the criteria that consumers use when selecting a coffee shop. The survey scored the criteria people consider when choosing a coffee shop according to the strategies, and the scores for each strategy are shown in Table 5.

In the second zero-sum game, the game value was **0,002**, which was the largest value among the smallest values of the rows and the smallest value among the largest values of the columns. It can be concluded that Strategy 2 is more profitable for the local coffee business (Player 3) against all strategies of both coffee chains. The strategy pertains to the comfort of the shop and it was observed that the local coffee shop stood out in terms of these characteristics.

Non-Zero-Sum Game

The second problem identified in the study concerns the criteria that consumers use when selecting a coffee shop. The survey scored the criteria people consider when choosing a coffee shop according to the strategies, and the scores for each strategy are shown in Table 5.

To determine the extent to which players met consumer expectations, non-zero-sum game matrices were constructed. The matrix was created by comparing the percentages of the participants' ratings of the coffee businesses' strategies with their expectations. Negative differences indicate when the player's strategy falls below consumer expectations. Small positive differences suggest that the player is meeting consumer expectations, while large positive differences indicate that the player's strategy exceeds consumer expectations. Positive values represent the relative gains of the players, while negative values represent the relative losses of the players.

First, the competitors identified were Player 3 coffee and Player 1. The first non-zero-sum game matrix was constructed by considering the distance matrices of these two coffee businesses from expectations. The solution of the first non-zero-sum game (Nash equilibrium) is provided in Table 7

Table 5: Strategies for Coffee Business in Terms of Expected Criteria (All Age Groups)
Çizelge 5: Kahve İşletmesinden Beklenen Ölçütler Bakımından Stratejiler (Tüm Yaş Grupları)

Strategies	Point	%
Strategy 1	18003	25,4445
Strategy 2	18393	25,9957
Strategy 3	11007	15,55672
Strategy 4	11029	15,58781
Strategy 5	12322	17,41527
Total	70754	100

Table 6: Comparison of Companies Based on Ratings Received from Expectations (All Age Groups)
Çizelge 6: Beklentilerden Alınan Puanlara Göre Firma Karşılaştırması (Tüm Yaş Grupları)

	Expectations		Player 1		Player 2		Player 3	
	Point	**%**	**Point**	**%**	**Point**	**%**	**Point**	**%**
Strategy 1	18003	25,4445	5571	25,84671	5601	0,263007	5427	24,95517
Strategy 2	18393	25,9957	5619	26,06941	5508	0,25864	5755	26,46342
Strategy 3	11007	15,55672	3659	16,97597	3620	0,169985	3737	17,18398
Strategy 4	11029	15,58781	3519	16,32644	3453	0,162143	3560	16,37007
Strategy 5	12322	17,41527	3186	14,78148	3114	0,146225	3268	15,02736
Total	70754	100	21554	100	21296	100	21747	100

Table 7: Solution of the First Non-Zero-Sum Game (Nash Equilibrium) (All Age Groups)
Çizelge 7: Birinci Sıfır Toplamlı Olmayan Oyunun Çözümü (Nash Dengesi) (Tüm Yaş Grupları)

		Player 1				
Player 3	**Strategies**	1	2	**3**	4	5
	1	(-0,49;0,4)	(-1,04;-0,15)	**(9,4;10,29)**	(9,37;10,26)	(7,54;8,43)
	2	**(1,02;0,62)**	**(0,47;0,07)**	**(10,91;10,51)**	**(10,88;10,48)**	**(9,05;8,65)**
	3	(-8,26;-8,47)	(-8,81;-9,02)	**(1,63;1,42)**	(1,6;1,39)	(-0,23;-0,44)
	4	(-9,07;-9,12)	(-9,63;-9,67)	**(0,81;0,77)**	(0,78;0,74)	(-1,05;-1,09)
	5	(-10,42;-10,66)	(-10,97;-11,21)	**(-0,53;-0,78)**	(-0,56;-0,81)	(-2,39;-2,63)

When solving a non-zero-sum game matrix, it is important to determine the dominant strategies of the players. In this case, Strategy 3 is the strongest strategy for Player 1 against all strategies of Player 3, making it Player 1's dominant strategy. Similarly, Strategy 2 is the dominant strategy for Player 3. As a result, the value (10,91;10,51) in cells (2, 3) represents the dominant strategy equilibrium of the game. In strategically shaped games, the equilibrium strategy obtained by continuously eliminating certain doomed strategies is also the Nash equilibrium (Yılmaz, 2009). This equilibrium is also the Nash equilibrium of the game.

Then, Player 3 and Player 2 were identified as competitors and the second non-zero-sum game matrix was constructed by considering the distance matrices of these two coffee businesses from expectations. The solution of the second non-zero-sum game (Nash equilibrium) is given below.

The dominant strategies for solving the second zero-sum game, where Player 3 and Player 2 are opponents, are Strategy 2 for Player 2 and Strategy 3 for Player 3. Therefore, the value **(10,91;10,31)** in cells (2, 3) is determined as the dominant strategy equilibrium of the game, which is also the Nash equilibrium. This strategy is acceptable and profitable for both players.

Zero-Sum and Zero-Sum Games and Solutions for Generation X

Zero Sum Game

In the zero-sum game, the design and solution of the game, which was designed without making a generational distinction, was also made for Generation X. Scores and the percentage of players satisfying expectations for each strategy are provided in Table 9.

In the first zero-sum game designed for Player 1 and Player 3. The percentages of the players' total scores from the strategies were obtained and the differences in the percentage scores were calculated. The payoff matrix and the solution of the game are shown in Table 10. The bold box in the table shows the payoff matrix.

To solve the game, we first determine the smallest values of the rows and the largest values of the columns in the payoff matrices. Then, we calculate the largest value amongst the smallest values of the rows and the smallest value amongst the largest values of the columns (maxmin and minmax values) to obtain the value of the game. The solution to the first zero-sum game is presented in Table 10

Table 8: Solution of the Second Non-Zero-Sum Game (Nash Equilibrium) (All Age Groups)
Çizelge 8: İkinci Sıfır Toplamlı Olmayan Oyunun Çözümü (Nash Dengesi) (Tüm Yaş Grupları)

		Player 2				
		1	2	**3**	4	5
Player 3	1	(-0,49;0,86)	(-1,04;0,31)	**(9,4;10,74)**	(9,37;10,71)	(7,54;8,89)
	2	**(1,02;0,42)**	**(0,47;-0,13)**	**(10,91;10,31)**	**(10,88;10,28)**	**(9,05;8,45)**
	3	(-8,26;-8,45)	(-8,81;-9)	**(1,63;1,44)**	(1,6;1,41)	(-0,23;-0,42)
	4	(-9,07;-9,23)	(-9,63;-9,78)	**(0,81;0,66)**	(0,78;0,63)	(-1,05;-1,2)
	5	(-10,42;-10,82)	(-10,97;-11,37)	**(-0,53;-0,93)**	(-0,56;-0,97)	(-2,39;-2,79)

Table 9: Scores and Percentages of Businesses for Each Strategy According to Participants (Generation X)
Çizelge 9: Katılımcılara Göre Her Strateji için İşletmelerin Aldıkları Puanlar ve Yüzdeleri (X Kuşağı)

Strategies	**Player 1**		**Player 2**		**Player 3**	
	Point	**%**	**Point**	**%**	**Point**	**%**
1	1790	0,252968	1875	0,268817	1784	0,24668142
2	1856	0,262295	1799	0,257921	1925	0,2661781
3	1205	0,170294	1200	0,172043	1246	0,17228982
4	1149	0,16238	1104	0,15828	1206	0,16675885
5	1076	0,152063	997	0,142939	1071	0,14809181
Total	7076	1	6975	1	7232	1

Table 10: Payoff Matrix and Solution of the First Zero-Sum Game (Generation X)
Çizelge 10: Ödemeler Matrisi ve Birinci Sıfır Toplamlı Oyunun Çözümü (X Kuşağı)

		Player 1					
	Strategies	**1**	**2**	**3**	**4**	**5**	**Minimum**
Player 3	**1**	-0,006	-0,016	0,076	0,084	0,095	-0,016
	2	0,013	**0,004**	0,096	0,104	0,114	**0,004**
	3	-0,081	-0,090	0,002	0,010	0,020	-0,090
	4	-0,086	-0,096	-0,004	0,004	0,015	-0,096
	5	-0,105	-0,114	-0,022	-0,014	-0,004	-0,114
	Maximum	0,013	**0,004**	0,096	0,104	0,114	

To solve the first zero-sum game, we found the highest value among the smallest values in the rows to be **0,004** and the lowest value among the largest values in the columns to be **0,004**. Therefore, the value of the game is **0,004**. Based on this result, Player 3's second strategy is more profitable than any strategy of the other player. Strategy 2 pertains to the space comfort of the coffee shop and suggests that Player 3's space characteristics are superior to those of the other player.

The second zero-sum game designed for Player 2 and Player 3. The percentages of the players' total scores from the strategies were obtained and the differences in the percentage scores were calculated. The payoff matrix and the solution of the game are shown in Table 11. The bold box in the table shows the payoff matrix.

The same steps were taken to solve the game, and the solution is presented below.

In the second zero-sum game, the value of the game was determined to be **-0,003** by identifying the largest value among the smallest values of the rows and the smallest value among the largest values of the columns.

It was found that the Player 3 is more profitable in Strategy 2 against every strategy of both coffee chains.

Non-Zero-Sum Game

The survey scored the criteria people consider when choosing a coffee establishment according to strategies, and Table 12 shows the values that Gen-Xers assigned to each strategy.

First, Player 3 and Player 1 were identified as competitors and the first non-zero-sum game matrix was constructed by considering the distance matrices of these two coffee businesses from expectations. The solution of the first non-zero-sum game (Nash equilibrium) is given in Table 14

Table 11: Payoff Matrix and Solution of the Second Zero-Sum Game (Generation X)
Çizelge 11: Ödemeler Matrisi ve İkinci Sıfır Toplamlı Oyunun Çözümü (X Kuşağı)

		Player 2					
	Strategies	**1**	2	3	4	5	**En küçük**
Player 3	1	-0,022	-0,011	0,075	0,088	0,104	-0,022
	2	**-0,003**	0,008	0,094	0,108	0,123	**-0,003**
	3	-0,097	-0,086	0,000	0,014	0,029	-0,097
	4	-0,102	-0,091	-0,005	0,008	0,024	-0,102
	5	-0,121	-0,110	-0,024	-0,010	0,005	-0,121
	Maximum	**-0,003**	0,008	0,094	0,108	0,123	

Table 12: Strategies for Coffee Business in Terms of Expected Criteria (Generation X)
Çizelge 12: Kahve İşletmesinden Beklenen Ölçütler Bakımından Stratejiler (X Kuşağı)

Strategies	**Point**	**%**
Strategy 1	5938	25,67118
Strategy 2	5970	25,80952
Strategy 3	3605	15,58515
Strategy 4	3609	15,60244
Strategy 5	4009	17,33172
Total	23131	100

Table 13: Comparison of Companies Based on Ratings Received from Expectations (Generation X)
Çizelge 13: Beklentilerden Alınan Puanlara Göre Firma Karşılaştırması (X Kuşağı)

	Expectations		**Player 1**		**Player 2**		**Player 3**	
	Point	**%**	**Point**	**%**	**Point**	**%**	**Point**	**%**
Strategy 1	5938	25,67118	1790	25,29678	1875	26,88172	1784	24,66814
Strategy 2	5970	25,80952	1856	26,22951	1799	25,79211	1925	26,61781
Strategy 3	3605	15,58515	1205	17,0294	1200	17,2043	1246	17,22898
Strategy 4	3609	15,60244	1149	16,23799	1104	15,82796	1206	16,67588
Strategy 5	4009	17,33172	1076	15,20633	997	14,29391	1071	14,80918
Total	23131	100	7076	100	6975	100	7232	100

Table 14: Solution of the First Non-Zero-Sum Game (Nash Equilibrium) (Generation X)
Çizelge 14: Birinci Sıfır Toplamlı Olmayan Oyunun Çözümü (Nash Dengesi) (X Kuşağı)

		Player 1				
	Strategies	1	2	**3**	4	5
Player 3	1	(-1;-0,37)	(-1,14;-0,51)	**(9,08;9,71)**	(9,07;9,69)	(7,34;7,97)
	2	**(0,95;0,56)**	**(0,81;0,42)**	**(11,03;10,64)**	**(11,02;10,63)**	**(9,29;8,9)**
	3	(-8,44;-8,64)	(-8,58;-8,78)	**(1,64;1,44)**	(1,63;1,43)	(-0,1;-0,3)
	4	(-9;-9,43)	(-9,13;-9,57)	**(1,09;0,65)**	(1,07;0,64)	(-0,66;-1,09)
	5	(-10,86;-10,46)	(-11;-10,6)	**(-0,78;-0,38)**	(-0,79;-0,4)	(-2,52;-2,13)

According to the solution of the game, Strategy 3 is the strongest strategy for Player 1 against all strategies of Player 3, making it Player 1's dominant strategy. Player 1's dominant strategy is Strategy 3, while Player 3's dominant strategy is Strategy 2. Therefore, the value **(11,03;10,64)** in cells (2, 3) represents the Nash equilibrium of the game.

Then, Player 3 and Player were identified as competitors. The second non-zero-sum game matrix was constructed by considering the distance matrices of these two coffee businesses from expectations. The solution of the second non-zero-sum game (Nash equilibrium) is provided below

The dominant strategies for the solution of the second zero-sum game where Player 3 and Player 2 are the opponents are Strategy 2 for Player 2 and Strategy 3 for Player 3. Thus, the value **(11,03;10,21)** in cells (2, 3) is determined as the dominant strategy equilibrium of the game. This is also the Nash equilibrium of the game. This strategy is acceptable and profitable for both players.

Zero-Sum and Zero-Sum Games and Solutions for Generation Y

Zero-Sum Game

The game and solution were designed for the Y generation analysis in the same way as the previous zero-sum games. For each strategy, the percentage of points given by the Y generation participants in relation to the total score was found, and the percentage of all players satisfying expectations for each strategy was obtained and shown in Table 16

In the first zero-sum game designed for Player 1 and Player 3. The percentages of the players' total scores from the strategies were obtained and the differences in the percentage scores were calculated. The payoff matrix and the solution of the game are shown in Table 17. The bold box in the table shows the payoff matrix.

The solution to the first zero-sum game is presented in Table 17.

The first zero-sum game has a value of -0,003. This result indicates that Player 3's strategy 2 is more profitable than any strategy of the other player.

The second zero-sum game involved Player 2 and Player 3, and the same steps were followed to solve it. The percentages of the players' total scores from the strategies were obtained and the differences in the percentage scores were calculated. The payoff matrix and the solution of the game are shown in Table 18. The bold box in the table shows the payoff matrix.

The solution for the second zero-sum game is presented below

Table 15: Solution of the Second Non-Zero-Sum Game (Nash Equilibrium) (Generation X)
Çizelge 15: İkinci Sıfır Toplamlı Olmayan Oyunun Çözümü (Nash Dengesi) (X Kuşağı)

		Player 2				
	Strategies	1	2	**3**	4	5
Player 3	**1**	(-1;1,21)	(-1,14;1,07)	**(9,08;11,3)**	(9,07;11,28)	(7,34;9,55)
	2	**(0,95;0,12)**	**(0,81;-0,02)**	**(11,03;10,21)**	**(11,02;10,19)**	**(9,29;8,46)**
	3	(-8,44;-8,47)	(-8,58;-8,61)	**(1,64;1,62)**	(1,63;1,6)	(-0,1;-0,13)
	4	(-9;-9,84)	(-9,13;-9,98)	**(1,09;0,24)**	(1,07;0,23)	(-0,66;-1,5)
	5	(-10,86;-11,38)	(-11;-11,52)	**(-0,78;-1,29)**	(-0,79;-1,31)	(-2,52;-3,04)

Table 16: Scores and Percentages of Businesses for Each Strategy According to Participants (Generation Y)
Çizelge 16: Katılımcılara Göre Her Strateji için İşletmelerin Aldıkları Puanlar ve Yüzdeleri (Y Kuşağı)

Strategies	**Player 1**		**Player 2**		**Player 3**	
	Point	**%**	**Point**		**Point**	**%**
1	1922	0,263035	1885	0,263231	1784	0,24668142
2	1900	0,260025	1840	0,256947	1925	0,2661781
3	1245	0,170385	1219	0,170228	1246	0,17228982
4	1192	0,163131	1169	0,163245	1206	0,16675885
5	1048	0,143424	1048	0,146348	1071	0,14809181
Total	7307	1	7161	1	7232	1

Table 17: Payoff Matrix and Solution of the First Zero-Sum Game (Generation Y)
Çizelge 17: Ödemeler Matrisi ve Birinci Sıfır Toplamlı Oyunun Çözümü (Y Kuşağı)

		Player 1					
	Strategies	**1**	**2**	**3**	**4**	**5**	**Minimum**
Player 3	**1**	-0,013	-0,010	0,080	0,087	0,107	-0,013
	2	**-0,003**	0,000	0,090	0,097	0,117	**-0,003**
	3	-0,093	-0,090	0,000	0,007	0,027	-0,093
	4	-0,098	-0,095	-0,006	0,002	0,021	-0,098
	5	-0,109	-0,106	-0,016	-0,009	0,011	-0,109
	Maximum	**-0,003**	0,000	0,090	0,097	0,117	

Table 18: Payoff Matrix and Solution of the Second Zero-Sum Game (Generation Y)
Çizelge 18: Ödemeler Matrisi ve İkinci Sıfır Toplamlı Oyunun Çözümü (Y Kuşağı)

		Player 2					
	Strategies	**1**	**2**	**3**	**4**	**5**	**Minimum**
Player 3	**1**	-0,013	-0,007	0,080	0,087	0,104	-0,013
	2	**-0,003**	0,004	0,090	0,097	0,114	**-0,003**
	3	-0,093	-0,087	0,000	0,007	0,024	-0,093
	4	-0,098	-0,092	-0,005	0,002	0,018	-0,098
	5	-0,109	-0,103	-0,016	-0,009	0,008	-0,109
	Maximum	**-0,003**	0,004	0,090	0,097	0,114	

Table 19: Strategies for Coffee Business in Terms of Expected Criteria (Generation Y)
Çizelge 19: Kahve İşletmesinden Beklenen Ölçütler Bakımından Stratejiler (Y Kuşağı)

Strategies	**Point**	**%**
Strategy 1	5921	25,27102
Strategy 2	6094	26,00939
Strategy 3	3658	15,61246
Strategy 4	3666	15,64661
Strategy 5	4091	17,46052
Total	23430	100

Table 20: Comparison of Companies Based on Ratings Received from Expectations (Generation Y)
Çizelge 20: Beklentilerden Alınan Puanlara Göre Firma Karşılaştırması (Y Kuşağı)

	Expectations		**Player 1**		**Player 2**		**Player 3**	
	Point	**%**	**Point**	**%**	**Point**	**%**	**Point**	**%**
Strategy 1	5921	25,27102	1922	26,30354	1885	26,32314	1784	25,02396
Strategy 2	6094	26,00939	1900	26,00246	1840	25,69474	1925	26,05065
Strategy 3	3658	15,61246	1245	17,03846	1219	17,02276	1246	17,01574
Strategy 4	3666	15,64661	1192	16,31312	1169	16,32454	1206	16,48186
Strategy 5	4091	17,46052	1048	14,34241	1048	14,63483	1071	15,42779
Total	23430	100	7307	100	7161	100	7232	100

Table 21: Solution of the First Non-Zero-Sum Game (Nash Equilibrium) (Generation Y)
Çizelge 21: Birinci Sıfır Toplamlı Olmayan Oyunun Çözümü (Nash Dengesi) (Y Kuşağı)

		Player 1				
Player 3	Strategies	1	2	**3**	4	5
	1	(-0,25;1,03)	(-0,99;0,29)	**(9,41;10,69)**	(9,38;10,66)	(7,56;8,84)
	2	**(0,78;0,73)**	**(0,04;-0,01)**	**(10,44;10,39)**	**(10,4;10,36)**	**(8,59;8,54)**
	3	(-8,26;-8,23)	(-8,99;-8,97)	**(1,4;1,43)**	(1,37;1,39)	(-0,44;-0,42)
	4	(-8,79;-8,96)	(-9,53;-9,7)	**(0,87;0,7)**	(0,84;0,67)	(-0,98;-1,15)
	5	(-9,84;-10,93)	(-10,58;-11,67)	**(-0,18;-1,27)**	(-0,22;-1,3)	(-2,03;-3,12)

Table 22: Solution of the Second Non-Zero-Sum Game (Nash Equilibrium) (Generation Y)
Çizelge 22: İkinci Sıfır Toplamlı Olmayan Oyunun Çözümü (Nash Dengesi) (Y Kuşağı)

		Player 2				
Player 3	**Strategies**	1	2	**3**	4	5
	1	(-0,25;1,05)	(-0,99;0,31)	**(9,41;10,71)**	(9,38;10,68)	(7,56;8,86)
	2	**(0,78;0,42)**	**(0,04;-0,31)**	**(10,44;10,08)**	**(10,4;10,05)**	**(8,59;8,23)**
	3	(-8,26;-8,25)	(-8,99;-8,99)	**(1,4;1,41)**	(1,37;1,38)	(-0,44;-0,44)
	4	(-8,79;-8,95)	(-9,53;-9,68)	**(0,87;0,71)**	(0,84;0,68)	(-0,98;-1,14)
	5	(-9,84;-10,64)	(-10,58;-11,37)	**(-0,18;-0,98)**	(-0,22;-1,01)	(-2,03;-2,83)

The value of the second zero-sum game is **-0,003**. Player 3 is more profitable in Strategy 2 against each strategy of both coffee chains.

Non-Zero-Sum Game

The chart below shows the scores given to each strategy used by coffee establishments, in line with the criteria considered by Generation Y when choosing a coffee shop. Table 20 shows the scores of each strategy of the players according to the expectations of Generation Y.

The competitors were identified as Player 3 and Player 1. A non-zero-sum game matrix was constructed by considering the distance matrices of these two coffee businesses from expectations. The solution of the first non-zero-sum game (Nash equilibrium) is provided below.

For Player 1, Strategy 3 is their strongest strategy against all strategies of Player 3, making it their dominant strategy. Conversely, Strategy 2 is Player 3's dominant strategy. Therefore, the value **(10,44;10,39)** in cells (2, 3) represents the dominant strategy equilibrium of the game.

Player 3 and Player 2 were identified as competitors, and the second non-zero-sum game matrix was constructed by considering the distance matrices of these two coffee businesses from expectations. The solution of the second non-zero-sum game (Nash equilibrium) is provided below.

The dominant strategies for the solution of the second zero-sum game where Player 3 and Player 2 are the opponents are Strategy 2 for Player 2 and Strategy 3 for Player 3. Thus, the value **(10,44;10,08)** in cells (2, 3) is determined as the dominant strategy equilibrium of the game. This is also the Nash equilibrium of the game. This strategy is acceptable and profitable for both players.

Zero-Sum and Zero-Sum Games and Solutions for Generation Z

Zero-Sum Game

The game and solution were designed for analysis of the Z generation, similar to previous zero-sum games. We calculated the percentage of points given by Y generation participants for each strategy, as well as the percentage of all players who met expectations for each strategy. These results are presented in Table 23.

In the first zero-sum game designed for Player 1 and Player 3. The percentages of the players' total scores from the strategies were obtained and the differences in the percentage scores were calculated. The payoff matrix and the solution of the game are shown in Table 24. The bold box in the table shows the payoff matrix.

The solution to the first zero-sum game is presented in Table 24.

The first zero-sum game has a value of **0,007**. This result indicates that Player 3's strategy 2 is more profitable than any strategy of the other player.

The second zero-sum game involved Player 2 and Player 3, and the same steps were followed to solve it. The percentages of the players' total scores from the strategies were obtained and the differences in the percentage scores were calculated. The payoff matrix and the solution of the game are shown in Table 25. The bold box in the table shows the payoff matrix.

The solution for the second zero-sum game is presented below

The value of the second zero-sum game is **0,006**. Player 3 is more profitable in Strategy 2 against each strategy of both coffee chains

Table 23: Scores and Percentages of Businesses for Each Strategy According to Participants (Generation Z)
Çizelge 23: Katılımcılara Göre Her Strateji için İşletmelerin Aldıkları Puanlar ve Yüzdeleri (Z Kuşağı)

Strategies	Player 1		Player 2		Player 3	
	Point	%	Point	Point	%	Point
1	1859	0,259239	1841	0,257123	1815	0,2517337
2	1863	0,259796	1869	0,261034	1927	0,2672677
3	1209	0,168596	1201	0,167737	1248	0,1730929
4	1178	0,164273	1180	0,164804	1150	0,1595007
5	1062	0,148096	1069	0,149302	1070	0,148405
Total	7171	1	7160	1	7210	1

Table 24: Payoff Matrix and Solution of the First Zero-Sum Game (Generation Z)
Çizelge 24: Ödemeler Matrisi ve Birinci Sıfır Toplamlı Oyunun Çözümü (Z Kuşağı)

		Player 1					
	Strategies	1	**2**	3	4	5	**Minimum**
Player 3	1	-0,008	-0,008	0,083	0,087	0,104	-0,008
	2	0,008	**0,007**	0,099	0,103	0,119	**0,007**
	3	-0,086	-0,087	0,004	0,009	0,025	-0,087
	4	-0,100	-0,100	-0,009	-0,005	0,011	-0,100
	5	-0,111	-0,111	-0,020	-0,016	0,000	-0,111
	Maximum	0,008	**0,007**	0,099	0,103	0,119	

Table 25: Payoff Matrix and Solution of the Second Zero-Sum Game (Generation Z)
Çizelge 25: Ödemeler Matrisi ve İkinci Sıfır Toplamlı Oyunun Çözümü (Z Kuşağı)

		Player 2					
	Strategies	**1**	**2**	**3**	**4**	**5**	**Minimum**
Player 3	**1**	-0,005	-0,009	0,084	0,087	0,102	-0,009
	2	0,010	**0,006**	0,100	0,102	0,118	**0,006**
	3	-0,084	-0,088	0,005	0,008	0,024	-0,088
	4	-0,098	-0,102	-0,008	-0,005	0,010	-0,102
	5	-0,109	-0,113	-0,019	-0,016	-0,001	-0,113
	Maximum	0,010	**0,006**	0,100	0,102	0,118	

Table 26: Strategies for Coffee Business in Terms of Expected Criteria (Generation Z)
Çizelge 26: Kahve İşletmesinden Beklenen Ölçütler Bakımından Stratejiler (Z Kuşağı)

Strategies	**Point**	**%**
Strategy 1	6144	25,39578
Strategy 2	6329	26,16046
Strategy 3	3744	15,47555
Strategy 4	3754	15,51689
Strategy 5	4222	17,45133
Total	24193	100

Table 27: Comparison of Companies Based on Ratings Received from Expectations (Generation Z)
Çizelge 27: Beklentilerden Alınan Puanlara Göre Firma Karşılaştırması (Z Kuşağı)

	Expectations		**Player 1**		**Player 2**		**Player 3**	
	Point	**%**	**Point**	**%**	**Point**	**%**	**Point**	**%**
Strategy 1	6144	25,39578	1859	25,92386	1841	25,71229	1815	25,17337
Strategy 2	6329	26,16046	1863	25,97964	1869	26,10335	1927	26,72677
Strategy 3	3744	15,47555	1209	16,85957	1201	16,77374	1248	17,30929
Strategy 4	3754	15,51689	1178	16,42728	1180	16,48045	1150	15,95007
Strategy 5	4222	17,45133	1062	14,80965	1069	14,93017	1070	14,8405
Total	24193	100	7171	100	7160	100	7210	100

Table 28: Solution of the First Non-Zero-Sum Game (Nash Equilibrium) (Generation Z)
Çizelge 28: Birinci Sıfır Toplamlı Olmayan Oyunun Çözümü (Nash Dengesi) (Z Kuşağı)

		Player 1				
	Strategies	1	2	**3**	4	5
Player 3	1	(-0,22;0,53)	(-0,99;-0,24)	**(9,7;10,45)**	(9,66;10,41)	(7,72;8,47)
	2	**(1,33;0,58)**	**(0,57;-0,18)**	**(11,25;10,5)**	**(11,21;10,46)**	**(9,28;8,53)**
	3	(-8,09;-8,54)	(-8,85;-9,3)	**(1,83;1,38)**	(1,79;1,34)	(-0,14;-0,59)
	4	(-9,45;-8,97)	(-10,21;-9,73)	**(0,47;0,95)**	(0,43;0,91)	(-1,5;-1,02)
	5	(-10,56;-10,59)	(-11,32;-11,35)	**(-0,64;-0,67)**	(-0,68;-0,71)	(-2,61;-2,64)

Table 29: Solution of the Second Non-Zero-Sum Game (Nash Equilibrium) (Generation Z)
Çizelge29: İkinci Sıfır Toplamlı Olmayan Oyunun Çözümü (Nash Dengesi) (Z Kuşağı)

		Player 2				
	Strategies	1	2	**3**	4	5
Player 3	1	(-0,22;0,32)	(-0,99;-0,45)	**(9,7;10,24)**	(9,66;10,2)	(7,72;8,26)
	2	**(1,33;0,71)**	**(0,57;-0,06)**	**(11,25;10,63)**	**(11,21;10,59)**	**(9,28;8,65)**
	3	(-8,09;-8,62)	(-8,85;-9,39)	**(1,83;1,3)**	(1,79;1,26)	(-0,14;-0,68)
	4	(-9,45;-8,92)	(-10,21;-9,68)	**(0,47;1)**	(0,43;0,96)	(-1,5;-0,97)
	5	(-10,56;-10,47)	(-11,32;-11,23)	**(-0,64;-0,55)**	(-0,68;-0,59)	(-2,61;-2,52)

Table 30: Comparison of Average Scores Given by Each Generation to Strategies
Çizelge 30: Her Bir Kuşağın Stratejilere Verdikleri Ortalama Puanların Karşılaştırması

	Strategy 1	**Strategy 2**	**Strategy 3**	**Strategy 4**	**Strategy 5**
Generation X	1979	1990	1803	1805	2005
Generation Y	1974	2031	1829	1833	2046
Generation Z	2048	2110	1872	1877	2111

Table 31: Comparison of Total Scores Given by Each Generation to Strategies
Çizelge 31: Kuşakların Stratejilere Verdikleri Toplam Puanların Karşılaştırması

	Generation X	Generation Y	Generation Z
Strategy 1	5938	5921	6144
Strategy 2	5970	6094	6329
Strategy 3	3605	3658	3744
Strategy 4	3609	3666	3754
Strategy 5	4009	4091	4222

Non-Zero-Sum Game

The table presented below displays the scores assigned to each strategy employed by coffee shops, based on the criteria that Generation Z considers when selecting a coffee establishment. Table 27 illustrates the scores of each strategy used by the players, in accordance with the expectations of Generation Z.

The competitors were identified as Player 3 and Player 1. A non-zero-sum game matrix was constructed by considering the distance matrices of these two coffee businesses from expectations. The solution of the first non-zero-sum game (Nash equilibrium) is provided below.

For Player 1, Strategy 3 is their strongest strategy against all strategies of Player 3, making it their dominant strategy. Strategy 3 is the dominant strategy for Player 1, while Strategy 2 is the dominant strategy for Player 3. Therefore, the value **(11,25;10,5)** in cells (2, 3) represents the dominant strategy equilibrium of the game, which is also the Nash equilibrium.

Next, we consider Player 3 and Player 2 as competitors and obtain the second zero-sum equilibrium by analyzing the distance from the expectations matrices of these two coffee businesses.

The dominant strategies for the solution of the second zero-sum game where Player 3 and Player 2 are the opponents are Strategy 2 for Player 2 and Strategy 3 for Player 3. Thus, the value **(11,25;10,63)** in cells (2, 3) is determined as the dominant strategy equilibrium of the game. This is also the Nash equilibrium of the game. This strategy is acceptable and profitable for both players.

Comparing Generations in Terms of Strategy Expectations

Table 30 shows the average scores of each generation for the strategies. The importance of strategies for all generations is ranked as follows: Strategy 5, Strategy 2, Strategy 1, Strategy 4, and Strategy 3, in descending order of importance.

Table 31 shows the total scores given by each generation to the strategies in terms of expectations. It is evident that Generation Z has higher expectations than the other generations, while the expectation levels of Generations X and Y are similar.

Conclusion

Coffee consumption habits have changed due to the influence of popular culture. Coffee places are now frequented by coffee lovers for various reasons beyond just consuming coffee. This preference for specific brands has further increased coffee consumption. Some visit these places to report their location on social media, buy coffee, or even show off by carrying cups of certain brands. In accordance with these preferences, consumers are increasingly patronizing global coffee chains, which diminishes the competitiveness of local coffee businesses. As a result, local coffee businesses must adopt competitive strategies.

In today's globalized and highly competitive business environment, it is essential for companies to develop effective strategies that consider the actions of their competitors. Game theory, a mathematical tool, can be used to determine these strategies. This study utilized game theory to construct both zero-sum and non-zero-sum games, for the purpose of identifying the most effective strategies for local firms competing against national and international firms. The study compared competitors based on five strategies: Strategy 1- Coffee-related features, Strategy 2- Space comfort-related features, Strategy 3- Non-coffee menu-related features, Strategy 4- Presentation-related features, and Strategy 5- Pricing. The analysis considered all age groups together in the first stage, followed by separate analyses for each generation.

Zero-sum games and non-zero-sum games were designed and analyzed for all age groups before making a generational distinction. According to the solution of the first zero-sum game, strategy 2 of the local coffee business, which refers to the features related to space comfort, is more profitable than each strategy of both the international and the national coffee chain. The analysis of the non-zero-sum game designed for all age groups revealed the level of meeting consumer expectations. The results indicate that the local coffee business outperforms both international and national coffee chains in meeting consumer expectations with Strategy 2, which focuses on the comfort of the place. This strategy includes features related to the comfort of the place. On the other hand, international and national coffee chains excel in Strategy 3, which pertains to the menu offerings beyond coffee, in meeting consumer expectations compared to local coffee businesses.

The analysis of games designed for all age groups was separated by Generations X, Y, and Z due to potential differences in expectations, tastes, and preferences. For Generation X, both zero-sum and non-zero-sum games were analyzed. Based on the solution of the first zero-sum game, the local coffee business's second strategy, which focuses on providing a comfortable atmosphere, is more

profitable than any strategy employed by both the international and national coffee chains. The non-zero-sum game designed for Generation X analyzed the level of meeting consumer expectations and its results. The results indicate that the local coffee business outperforms both international and national coffee chains in terms of meeting consumer expectations related to the comfort of the place (Strategy 2). Conversely, international and national coffee chains perform better on strategy 3, which refers to the menu other than coffee, in terms of meeting consumer expectations.

For Generation Y, first zero-sum games and then non-zero-sum games were analyzed. According to the solution of the first zero-sum game, the local coffee business is more profitable in terms of space comfort features against both international and national coffee chains. According to the results of the non-zero-sum game designed for Generation Y, the level of meeting consumer expectations was analyzed. The results indicate that local coffee businesses perform better in terms of meeting consumer expectations with Strategy 2, which refers to space comfort features, compared to both international and national coffee chains. The results indicate that local coffee businesses perform better than international and national coffee chains in meeting consumer expectations with strategy 3, which refers to non-coffee menu items.

Similarly, the analysis of zero-sum and non-zero-sum games for Generation Z was conducted. Based on the solution of the first zero-sum game, it was found that the local coffee business is more profitable in terms of space and comfort features compared to both international and national coffee chains. The non-zero-sum game results were used to analyze the level of meeting consumer expectations for Generation Z. The results indicate that the local coffee business performs better with strategy 2, which refers to the features related to the comfort of the space, in terms of meeting consumer expectations against both international and national coffee chains. However, in terms of meeting consumer expectations for menu items other than coffee, international and national coffee chains perform better on strategy 3.

Both zero-sum game and non-zero-sum game results showed significant similarities across all age groups and generations X, Y, and Z. Based on the zero-sum game results, local coffee establishments were found to be more profitable than both international and national coffee chains in terms of place comfort attributes such as cleanliness, hygiene, availability of wifi and sockets, and convenience for long-term sitting. Analysis of the non-zero-sum game results shows that the local coffee shop performs better than both international and national coffee chains in meeting consumer expectations in terms of the comfort of the place. International and national coffee chains stand out in Strategy 3, which reflects the menu beyond coffee. They offer other food and beverages, as well as packaged by-products such as chocolate and confectionery. This allows the firms to attract different target groups and increase profits through the sale of by-products. Based on these results, it can be concluded that local firms meet the target group's expectations regarding space comfort. It is recommended that local firms continue to implement Strategy 2 and focus on developing Strategy 1, which includes coffee-related features; Strategy 3, which includes non-coffee menu-related features; Strategy 4, which includes presentation-related features; and Strategy 5, which includes pricing and promotions.

Upon analyzing the expectation levels of different generations, it becomes evident that the most crucial strategy for each generation is Strategy 5, which encompasses price and promotions. Following this, the next significant strategy for each generation is Strategy 2, which includes features related to venue comfort, followed by Strategy 1, which includes features related to coffee, Strategy 4, which includes features related to presentation, and finally, Strategy 3, which includes features related to non-coffee menu. Upon analyzing the expectation levels of each generation for different strategies, it is evident that Generation Z has higher expectations than other generations. Meanwhile, the expectation levels of Generations X and Y are similar. To remain competitive in the market, companies should consider these generational expectations and customer profiles when determining their strategies.

This study employs game theory, a crucial mathematical tool for determining the optimal strategy by considering competitors' decisions. It proposes strategies for coffee businesses to differentiate themselves from other companies based on generational differences, identify new product groups, and develop new products. The study determined the tastes and preferences of three different generations, namely Generation X, Generation Y, and Generation Z, regarding coffee consumption habits and reasons for preferring certain places. Various suggestions were presented for business strategies. Additionally, our study determines the standout and weak features of the companies in comparison to their rivals and presents optimal strategy suggestions. This study is valuable as it contributes to the future of local businesses, the employment opportunities they create in the region, and the development of the regional economy.

Extended Abstract

Introduction: With the impact of globalization, competition is increasing in many sectors. One of the markets where competition is increasing is the coffee market. The coffee market in Türkiye is growing rapidly, leading to fierce competition between international, national and local coffee companies. The ability of local companies to compete with these more institutionalized structures, which also have a brand advantage in competition, has become extremely important for the local economy. This study uses game theory to analyze the competition between local firms and international and national coffee chains in terms of different strategies. The study focuses on coffee companies operating in Erzurum province. It is noteworthy that there are few studies in the competitive game theory literature that guide local

businesses in terms of strategies. Therefore, our study will contribute to the literature. Competitive firms should consider the age, gender, and expectations of their target customers while determining the optimal strategy. Consumers' expectations, tastes and preferences, consumption behaviors and attitudes, and savings habits differ across generations due to the different conditions of the periods in which they were born and live. Therefore, each generation's consumption behavior should be evaluated separately. This study will address the generations separately and give companies an idea in terms of strategies for the wishes, tastes, and preferences of the target generations in their campaigns, advertisements, promotions, and in determining sales strategies that will increase their profits.

Methodology: This study uses game theory as a tool to analyze the competitive strategies of companies operating in the coffee market by designing both zero-sum and non-zero-sum games. The analysis was conducted with a total sample of 1530 people, 510 for Generation Z (26 years old and younger), 510 for Generation Y (27-41 years old) and 510 for Generation X (42-61 years old). The game is based on the competition of 3 players: Player 1 represents a business affiliated with an international coffee chain, Player 2 represents businesses affiliated with a national coffee chain, and Player 3 represents local coffee shops. The 510 questionnaires for each generation consisted of 170 respondents each from international, national, and local coffee companies. The data obtained from the questionnaires formed game matrices of coffee companies for different generations. The games were designed to identify the prominent strategies among the firms for each generation. By solving two different types of games, zero-sum and non-zero-sum games, the equilibrium of the game was obtained and the most profitable strategy for each coffee firm was determined. In zero-sum games, the saddle point was determined based on min-max and max-min strategies, and in non-zero-sum games, the Nash equilibrium was found.

The strategies that the competing firms should adopt against each other are analyzed in five groups: Strategy 1: Coffee related features, Strategy 2: Space comfort related features, Strategy 3: Presentation-related features, Strategy 4: Features related to the store's non-coffee menu, Strategy 5: Pricing.

Findings: Zero-sum and non-zero-sum game analysis was conducted for all age groups to determine the effectiveness of different strategies. Results from the first zero-sum game indicate that Strategy 2 of the local coffee shop, which focuses on space comfort, is more profitable than any strategy offered by international and national coffee chains. The analysis of the non-zero-sum game reveals that the local coffee shop outperforms both international and national chains in meeting consumer expectations with Strategy 2, which emphasizes comfort. Conversely, international and national coffee chains perform better in meeting consumer expectations with Strategy 3, which involves menu offerings beyond coffee. To account for potential differences in expectations, tastes, and preferences, the analysis of games was separated by Generations X, Y, and Z. For Generation X, both zero-sum and non-zero-sum games were analyzed. The results show that the local coffee shop performs better than international and national chains in meeting consumer expectations related to comfort (Strategy 2) and menu offerings beyond coffee (Strategy 3). For Generation Y, the analysis first focused on zero-sum games and then non-zero-sum games. In both cases, the local coffee shop outperformed international and national chains in terms of space comfort features and meeting consumer expectations with Strategy 2. Similar results were found for Generation Z, where the local coffee shop was more profitable in terms of space and comfort. Overall, these findings highlight the success of the local coffee shop in meeting consumer expectations, particularly in relation to comfort, while international and national coffee chains excel in offering a diverse menu beyond coffee.

Conclusion: Both zero-sum game and non-zero-sum game results showed significant similarities across all age groups and generations X, Y, and Z. Based on the zero-sum game results, local coffee establishments were found to be more profitable than both international and national coffee chains in terms of place comfort attributes such as cleanliness, hygiene, availability of wifi and sockets, and convenience for long-term sitting. Analysis of the non-zero-sum game results shows that the local coffee shop performs better than both international and national coffee chains in meeting consumer expectations in terms of the comfort of the place. International and national coffee chains stand out in Strategy 3, which reflects the menu beyond coffee. They offer other food and beverages, as well as packaged by-products such as chocolate and confectionery. This allows the firms to attract different target groups and increase profits through the sale of by-products. Based on these results, it can be concluded that local firms meet the target group's expectations regarding space comfort. It is recommended that local firms continue to implement Strategy 2 and focus on developing Strategy 1, which includes coffee-related features; Strategy 3, which includes non-coffee menu-related features; Strategy 4, which includes presentation-related features; and Strategy 5, which includes pricing and promotions.

Upon analyzing the expectation levels of different generations, it becomes evident that the most crucial strategy for each generation is Strategy 5, which encompasses price and promotions. Following this, the next significant strategy for each generation is Strategy 2, which includes features related to venue comfort, followed by Strategy 1, which includes features related to coffee, Strategy 4, which includes features related to presentation, and finally, Strategy 3, which includes features related to non-coffee menu. Upon analyzing the expectation levels of each generation for different strategies, it is evident that Generation Z has higher expectations than other generations. Meanwhile, the expectation levels of Generations X and Y are similar. To remain competitive in the market, companies should consider these generational expectations and customer profiles when determining their strategies.

Katkı Oranları ve Çıkar Çatışması / *Contribution Rates and Conflicts of Interest*

Etik Beyan	Bu çalışmanın hazırlanma sürecinde bilimsel ve etik ilkelere uyulduğu ve yararlanılan tüm çalışmaların kaynakçada belirtildiği beyan olunur.	**Ethical Statement**	It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited
Yazar Katkıları	Çalışmanın Tasarlanması: FO (%30), MA (%30), GÇ (%20), HD (%20) Veri Toplanması: FO (%30), MA (%30), GÇ (%20), HD (%20) Veri Analizi: FO (%30), MA (%30), GÇ (%20), HD (%20) Makalenin Yazımı: FO (%30), MA (%30), GÇ (%20), HD (%20) Makale Gönderimi ve Revizyonu: FO (%30), MA (%30), GÇ (%20), HD (%20)	**Author Contributions**	Research Design: FO (%30), MA (%30), GÇ (%20), HD (%20) Data Collection: FO (%30), MA (%30), GÇ (%20), HD (%20) Data Analysis: FO (%30), MA (%30), GÇ (%20), HD (%20) Writing the Article: FO (%30), MA (%30), GÇ (%20), HD (%20) Article Submission and Revision: FO (%30), MA (%30), GÇ (%20), HD (%20)
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Telif Hakkı & Lisans	Yazarlar dergide yayınlanan çalışmalarının telif hakkına sahiptirler ve çalışmaları **CC BY-NC 4.0** lisansı altında yayımlanmaktadır.	**Copyright & License**	Authors publishing with the journal retain the copyright to their work licensed under the **CC BY-NC 4.0**

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APPENDIX 1- QUESTIONNAIRE FORM

Dear Participant,

The purpose of this study is to determine the criteria that are considered when choosing a coffee shop. The success of this study depends primarily on the accuracy of the information you provide. Thank you for your patience and honesty in answering the questions.

1	Gender	□ Male □ Female
2	Age	……
3	Where did you grow up?	□ Village-County □ City-County □ Province □ Metropolis
4	Education Status	□ Illiterate □Primary Education □Secondary Education □Undergraduate □Postgraduate Education
5	Monthly Income (TL)	……TL
6	Marital status	□ Married □Single □ Divorced □Spouse deceased
7	Occupation	□ Retired □ Public Sector Employee □ Private Sector Employee □ Businessman □ Farmer □ Student □ Housewife □ Other

Please rate the following criteria in terms of what you think a coffee shop should have.

	Criteria	Not Important at all	Not Important	Neutral	Important	Very Important
8	Taste and aroma of the coffee	①	②	③	④	⑤
9	Coffee variety	①	②	③	④	⑤
10	Availability of world coffees and brewing methods	①	②	③	④	⑤
11	Spacious and airy venue	①	②	③	④	⑤
12	Visual appeal and attractiveness of the venue	①	②	③	④	⑤
13	Cleanliness and hygiene of the venue	①	②	③	④	⑤
14	Availability of Wi-Fi and power outlets	①	②	③	④	⑤
15	Suitability for long stays	①	②	③	④	⑤
16	Menu including other food and drink options	①	②	③	④	⑤
17	Sale of packaged side products (chocolates, candies)	①	②	③	④	⑤
18	Quality of the barista (person preparing the coffee)	①	②	③	④	⑤
19	Quality of the service staff	①	②	③	④	⑤
20	Speed of service	①	②	③	④	⑤
21	Delivery service	①	②	③	④	⑤
22	Takeaway service	①	②	③	④	⑤
23	Price	①	②	③	④	⑤
24	Promotions and campaigns	①	②	③	④	⑤

To what extent does the place you are currently at meet these criteria? Please answer the following questions with this in mind.

	Criteria	Not Important at all	Not Important	Neutral	Important	Very Important
25	Taste and aroma of the coffee	①	②	③	④	⑤
26	Coffee variety	①	②	③	④	⑤
27	Availability of world coffees and brewing methods	①	②	③	④	⑤
28	Spacious and airy venue	①	②	③	④	⑤
29	Visual appeal and attractiveness of the venue	①	②	③	④	⑤
30	Cleanliness and hygiene of the venue	①	②	③	④	⑤
31	Availability of Wi-Fi and power outlets	①	②	③	④	⑤
32	Suitability for long stays	①	②	③	④	⑤
33	Menu including other food and drink options	①	②	③	④	⑤
34	Sale of packaged side products (chocolates, candies)	①	②	③	④	⑤
35	Quality of the barista (person preparing the coffee)	①	②	③	④	⑤
36	Quality of the service staff	①	②	③	④	⑤
37	Speed of service	①	②	③	④	⑤
38	Delivery service	①	②	③	④	⑤
39	Takeaway service	①	②	③	④	⑤
40	Price	①	②	③	④	⑤
41	Promotions and campaigns	①	②	③	④	⑤