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MEASURING CONSUMER BRAND PERCEPTIONS IN TERMS OF NEUROMARKETING BY USING THE EEG METHOD: AN EXPERIMENTAL STUDY ON THE AUTOMOTIVE INDUSTRY

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ÖZET

Amaç: Bu araştırmanın amacı, belirlediğimiz konfor, güvenlik, yakıt tasarrufu, şık tasarım, kaliteli hizmet, prestij, performans, dayanıklılık ve kalite değişkenlerine göre Electroencephalography- EEG cihazı kullanılarak tüketicilerin otomobil marka algılarının tespit edilmesidir.

Gereç ve Yöntem: Araştırmada 10 kanallı EEG cihazı kullanılmıştır. Tüketicilerin otomobil marka algılarını belirlemek amacıyla yaptığımız çalışmamız Fırat Üniversitesi'ndeki öğrenci ve akademisyenlerden oluşan 30 katılımcıya uygulanmıştır. Katılımcılar gönüllülük esasına göre belirlenmiş ve çalışmadan önce katılımcıların her birine çalışma ile ilgili gerekli bilgilendirmeler yapılmıştır. Araştırmada kullanılacak otomobil markalarının belirlenmesi amacıyla Türkiye'de en çok satılan 6 binek otomobil markası belirlenmiştir. Bu çalışmada tüketicilerin otomobil marka algıları incelenerek tüketicilerin otomobil markalarını nasıl algıladıkları tespit edilecektir. Katılımcılara 6 marka tespit edilen 9 boyut ile birlikte powerpoint sunusu şeklinde gösterilmiştir. Her bir deney toplam 180 saniye sürmüştür. Katılımcıların verdikleri tepkiler EEG cihazı vasıtasıyla tespit edilerek hangi marka ve boyuta hangi düzeyde tepki verdikleri hazırlanan forma işlenmiştir.

Bulgular: Bu araştırmanın sonuçlarına göre katılımcıların belirlenen boyutları en çok Volkswagen ve Toyota markaları ile eşleştirdiği görülmüştür.

Sonuç: Tüketicilerin rasyonellikten uzaklaştığı ve şık tasarım, kaliteli hizmet, prestij gibi daha duygusal ve soyut kavramların ön plana çıktığı tespit edilmiştir. Bu araştırmanın sonuçları, otomobil markalarının algılanması ile ilgili olarak genel bir yargı ya da hüküm doğurmasa da araştırmanın örneklemi çerçevesinde elde edilen sonuçların analiz ve yorumlanmasına dayandığından en azından bu konuda önemli ipuçları sunmaktadır. Tüketici davranış ve tercihleri birçok faktöre bağlı olarak ortaya çıktığından daha geniş örneklemlerde yada ekonomik, sosyal, psikolojik ve kültürel olarak farklı yer, zaman ve ülkeler boyutunda farklı sonuçların ortaya çıkması muhtemeldir. Bunlara bağlı olarak farklı algı düzeyleri ortaya çıkabilir.

Anahtar Kelimeler: Nöropazarlama, EEG, Tüketici Davranışı, Marka Algısı, Nöropazarlama Araştırması.

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MEASURING CONSUMER BRAND PERCEPTIONS IN TERMS OF NEUROMARKETING BY USING THE EEG METHOD: AN EXPERIMENTAL STUDY ON THE AUTOMOTIVE INDUSTRYABSTRACT

Objective: The aim of this research is to determine consumer's car brand perceptions by using Electroencephalography- EEG device according to the determined comfort, security, fuel saving, stylish design, quality service, prestige, performance, durability and quality variables.

Materials and Methods: The aim of this research is to determine consumer's car brand perceptions by using Electroencephalography- EEG device according to the determined comfort, security, fuel saving, stylish design, quality service, prestige, performance, durability and quality variables. A 10-channel EEG device was used in the study. The work we conducted to determine the automobile brand perceptions of consumers was applied to 30 participants from the students and academicians at Fırat University. Participants were determined on a voluntary basis and necessary information was provided to each participant before work. car brand will be used in research to determine the best-selling car brand in Turkey 6 passenger has been identified. In this study, it will be determined how consumers perceive car brands. Participants were presented with PowerPoint presentations along with 9 identified dimensions of 6 brands. Each experiment lasted a total of 180 seconds. The responses of the participants were determined with the EEG device and processed into the prepared form.

Results: According to the results of this research, it was seen that the participants matched the determined dimensions most with Volkswagen and Toyota brands.

Conclusion: By using neuromarketing methods, we found that consumers are moving away from rationality. Besides intangible and emotional concepts are becoming more prominent for the consumers. Even though it does not give a general judgment or conclusion of the perception of car brands, the results of this research provide important clues within the framework of the sample of the researcher. As consumer behaviors and preferences arise due to many factors, it is likely that different results will emerge in a wider range of economic, social, psychologically and culturally through different places, times and countries. Depending on these, different levels of perception may arise.

Keywords: Neuromarketing, EEG, Consumer Behaviour, Brand Perception, Neuromarketing Research.

INTRODUCTION

The answers given by consumers to the questionnaires in traditional marketing methods may mislead the researcher. With neuroimaging techniques, it is possible to achieve more accurate results through smaller samples. Today, automobiles are among the most important needs of consumers. The automotive sector is particularly well developed in our country and constitutes an important part of our country's exports Besides, the interest of consumers in automobiles has increased in recent years, and the automotive sector is growing day by day. The growth of the market also increases competition in the market. In a highly competitive environment, companies must analyze consumers well and design their products in line with consumers' desires in order to provide a competitive advantage. The companies that can respond to the consumer's demands will be ahead of the competition and will be able to increase their sales and profitability. When analyzing consumer preferences, automobile companies can achieve more accurate results and improve their strategies by using neuroimaging techniques besides conventional methods. In addition to this, brand perceptions of consumers also affect buying behaviors significantly. Even if a product meets consumer expectations, it is difficult for the consumer to choose the product with low brand perception.

The aim of this research is to determine the consumer's car brand by using the Electroencephalography- EEG device according to the variables that we have determined. The rest of the paper is organized as follows: literature review about neuromarketing studies which conducted with EEG device, research methodology, results, and conclusion.

1. LITERATURE REVIEW

The study of consumer behavior through neuroimaging techniques first began with the use of the fMRI device in marketing research at the end of the 1990s by Gerry Zaltman from Harvard University. The term neuromarketing was first used by Professor Ale Smidts in 2002. The first neuromarketing conference was held at the Baylor College of Medicine in Houston in 2004 (Lewis&Bridger,2005:36).

Traditional marketing methods are known to offer limited opportunities to determine consumer behavior. Traditional methods are also not sufficient to measure consumer motivations at the same time (Hammou et al.,2013:20). Neuromarketing allows us to obtain more accurate and accurate data on consumer preferences when compared with traditional methods. Especially for large organizations, it is not possible to carry out marketing research only with traditional methods (Sharma et al., 2014: 553). The application of neuroimaging methods in marketing has become increasingly popular in recent years. Ariely and Berns (2010) mentioned two main reasons for this popularity. First of all, neuroimaging techniques are expected to yield cheaper and faster results over time than other conventional methods. Secondly, neuroimaging techniques provide information that can not be obtained by conventional methods (Ariely and Berns, 2010: 284). Data obtained through neuroimaging techniques allow us to make better decisions in areas such as product development, branding, store atmosphere, and the creation of promotional activities (Aytekin and Kahraman,2014:48). One of the methods used in neuromarketing research is the EEG. In EEG research brain waves are divided into four main groups as beta, alpha, theta, and delta. Beta waves (>13 Hz) are low voltage and high-frequency waves. Alpha waves (8 to 13 Hz) that occur during more relaxed periods have a higher amplitude than beta waves. Theta waves are typical of even greater amplitude and slower frequency than alpha waves. Theta waves' frequency range is usually between 4-7Hz. Delta waves, slowest EEG rhythms, generally have the highest amplitude EEG waveforms. (Estrada et al., 2004). Some of the studies made with EEG device in the field of neuromarketing are;

Ohme et al. (2009) showed to the participants two different advertisements of the same skincare product, and the effects of the ad on the participants were monitored via the EEG. 45 female aged between 25 and 35 participated in the study. These two ads are exactly the same except for a small movement of the player in the ad. According to the result of the study, even a small difference that consumers can not notice is affecting consumer behavior.

Brown et al. (2012) studied consumers' desire to switch from a brand they prefer to a private label brand when their tastes are identical, using the EEG device and self-reported data. 8 female and 4 male participated in the study. It was found that the participants were more likely to switch to cheaper brands when the tastes were identical.

Khushbaba et al. (2013) used a 14 channel EEG device and an eye-tracking device in their study with 18 participants. It was found that various cracker flavors and toppings of the crackers were more important factors affecting the buying decision than the shapes of the crackers.

Adhami (2013) used EEG and Eye-Tracking device in the study with 30 young Professional participants aged between 25-45. According to the results that consumers do not always say what they really think and their emotional and attentional engagement suggests is far from what they said.

Rocha et al. (2013) conduct a study of aesthetical dermatological treatment with 33 women between the ages of 30 and 55 years. It was found that EEG is a valid method for neuropsychological studies.

Balconi et al. (2014) showed 5 different ads to 34 participants and followed the participant's brain activities with EEG device. As a result of this study, a strong relationship between favorite advertisements of consumers and brain activities was determined.

Murugappan et al. (2014) carried out a study on the most preferred car brands in Malaysia using EEG device. As a result of research conducted with 9 males and 3 females between the ages of 22 and 24 who were watching car ads, it was found that the Toyota brand was preferred over other brands.

Horská et al. (2014) investigated the effect of lighting on food markets on consumers' purchasing decisions and perceptions. The results of the study using EEG devices with 6 males and 9 females showed that lighting was a significant effect on the conscious and unconscious consumer response and also it has been revealed that lighting is a necessary marketing element in increasing sales.

Lee et al. (2014) conducted a study with 19 participants on green consumers using EEG device. the study concluded that consumers who defined themselves as green consumers had a more intense response to brainwave messages in green product messages than other consumers.

Yılmaz et al. (2014) conducted a study using 15 participants with EEG device. The results showed that female participants needed more time than male participants in the decision-making process.

Dimpfel (2015) were shown five different bank advertisements to 10 male participants and they found that when using EEG and eye-tracking devices in advertising research, participants gave valid information about their cognitive and emotional responses.

Nomura et al. (2015) in their study of EEG, the award-winning and non-awarded advertisements in Japan were viewed by the participants and examined the effects of these advertisements on the participants in the short, medium and long-term with EEG device. According to the results, 15-second ads were found to increase stress more than 30-second ads.This shows that 15-second advertisements have more influence on consumers and 30-second advertisements have a more emotional connection with consumers.

Bastiansen et al. (2016) found that the EEG method was a useful tool for the effectiveness of destination marketing when working with 8 men and 22 women between the ages of 18-26, and that popular films influenced the destination image positively.

Taskin et al. (2017) conducted a study on tourist areas in Turkey with 21 participants between 20 and 53 years of age using EEG and Eye-Tracking devices together. According to the results of the study, tourists tend to take less risk when discovering new places.

2. METHODOLOGY

In order to determine the car brand perceptions of the consumers, a preliminary study was conducted for 25 car users, whose ages ranged from 21 to 50. This preliminary study was aimed at determining the dimensions to be used during the experiment phase by asking the participants "what are the 5 properties that you think should be in a car?". A total of 125 responses were received from 25 car users. The answers were divided into 12 groups according to their similarities and dimensions were determined as comfort, safety, fuel saving, design, service quality, prestige, performance, durability, and quality.

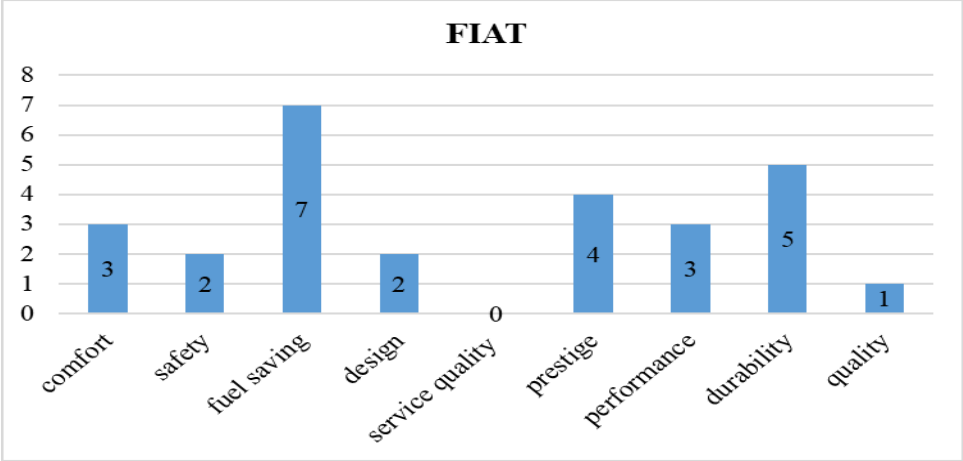
It is possible to reach the conclusion with a 1% error margin when the sample group is at least 30 in the research with EEG device which is one of the neuromarketing research methods. Sands stated that in the EEG studies, the number of samples from 30 to 40 for each group would be correct with an error margin of 1%. In addition, the margin error will be lower if studies applied to larger sample groups. Erdemir (2015) stated that a neurosurgical research should be applied to at least 30 participants, otherwise the error margin will increase exponentially. For this reason, the minimum number of participants for neuro search studies in the whole world was set at 30.

A 10-channel EEG device was used in the study. The work we conducted to determine the automobile brand perceptions of consumers was applied to 30 students and academicians at Fırat University. Participants were determined on a voluntary basis, and each participant was provided with necessary information about the study. Because the EEG device is not portable, the scope of the research is limited to academics and students (Şimşek:2016).

3. RESULTS

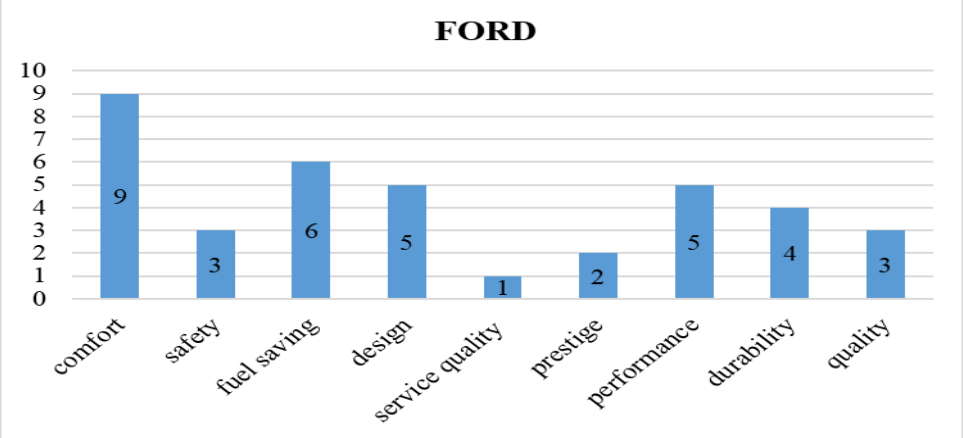
According to the results of the work carried out in order to determine the car brand perceptions of the car users;

Table 1: EEG Results of FIAT



It was observed in Table 1 that 10% of the participants matched Fiat with the comfort dimension. While 6.7% of the participants matched Fiat with safety dimension, 23.3% of the participants matched Fiat with fuel saving. 6.7% of the participants matched Fiat with the design. It was observed that none of the participants matched Fiat with the service quality dimension. Fiat brand and the prestige dimension were matched 13.3% of participants and 10% of participants matched Fiat with performance dimension. 16.7% of the participants have matched Fiat with durability dimension. Only 3.3% of the participants matched Fiat with quality dimension. For the Fiat brand, it was observed that the participants matched the most fuel-saving dimension while none of the participants matched the Fiat brand with quality service dimension.

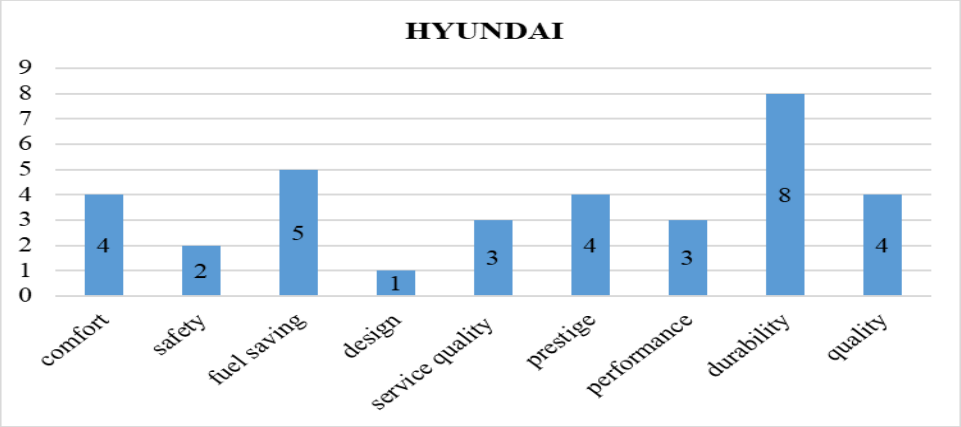
Table 2:EEG Results of FORD



It was observed in Table 2 that 30% of the participants matched Ford with the comfort dimension. While 10% of the participants matched Ford with safety dimension, 20% of the participants matched Ford with fuel saving. While 16.7% of the participants matched Ford with design dimension, only 3.3% of the participants matched Ford with quality service. While 6.7% of the participants matched Ford with prestige dimension, 16.7% of the participants matched Ford with performance. 13.3% of the participants matched Ford with the durability. It has been observed that 10% of the participants matched Ford with a quality dimension. For the Ford brand, the dimension that respondents most react to is the dimension

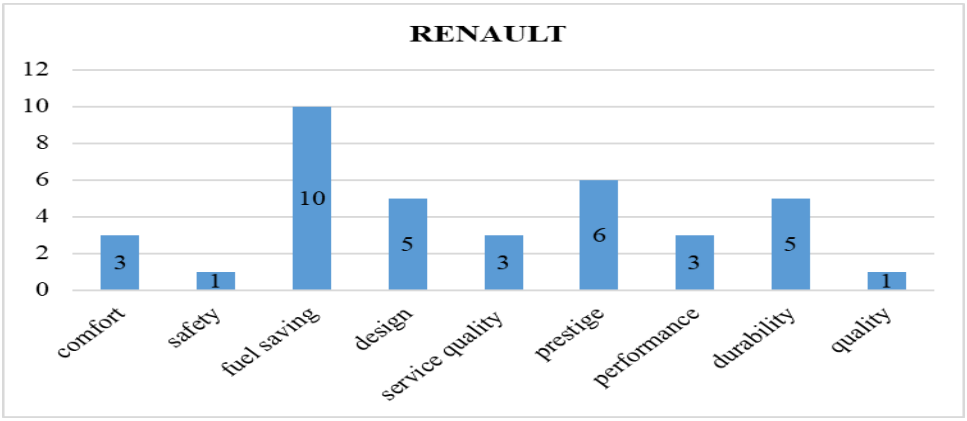
of comfort.) It is observed that only 3.3% of the respondents matched Ford brand with quality service dimension.

Table 3: EEG Results of HYUNDAI



It was observed in Table 3 that 13.3% of the participants matched Hyundai with the comfort dimension. While 6.7% of the participants matched Hyundai with safety dimension, 16.7% of the participants matched Hyundai with fuel saving 3.3% of the participants matched Hyundai with design dimension, 16.7% of the participants matched Hyundai with quality service. 13.3% of the participants matched Hyundai with prestige dimension, 10% of the participants matched Hyundai with performance. 26.7% of the participants matched Hyundai with durability dimension and 13.3% of participants matched Hyundai with quality. For the Hyundai brand, the dimension that respondents most react to is the dimension of durability and also only 3.3% of the respondents matched the Hyundai brand with design dimension.

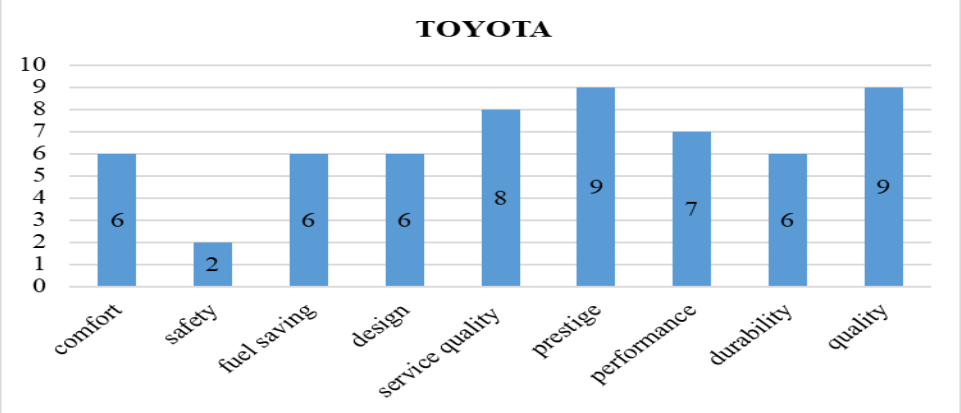
Table 4: EEG Results of RENAULT



It was observed in Table 4 that 10% of the participants matched Renault with the comfort dimension. While 3.3% of the participants matched Renault with safety dimension, 33.3% of the participants matched Renault with fuel saving. 16.7% of the participants matched Renault with design dimension, 10% of the participants matched Renault with quality service 20% of the participants matched Renault with prestige dimension, 10% of the participants matched Renault with performance. 16.7% of the participants matched Renault with durability dimension and only 3.3% of participants matched Renault with

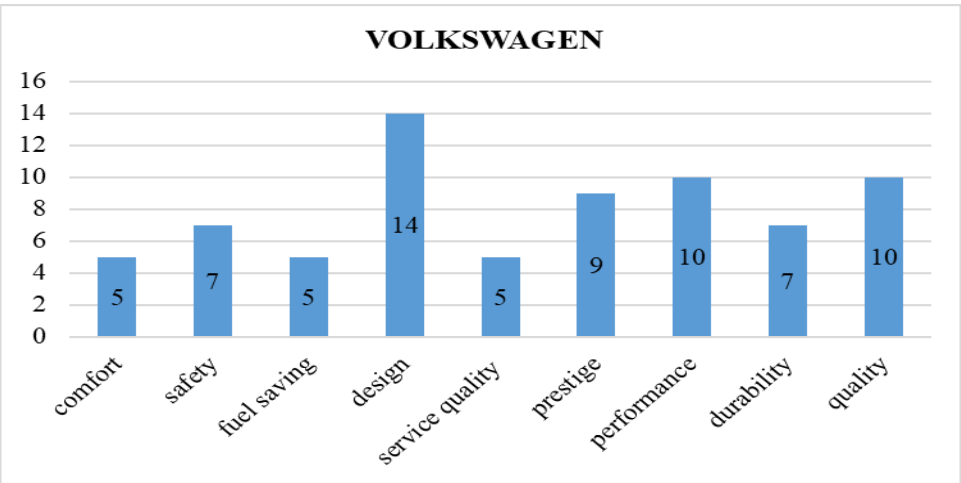
quality. For the Renault brand, the dimension that respondents most react to is the dimension of fuel saving and only 3.3% of the respondents matched the Renault brand with quality and safety dimension.

Table 5: EEG Results of TOYOTA



It was observed in Table 5 that 20% of the participants matched Toyota with the comfort dimension. While 6.7% of the participants matched Toyota with safety dimension; 20% of the participants matched Toyota with fuel saving. 20% of the participants matched Toyota with design dimension, 26.7% of the participants matched Toyota with quality service. 30% of the participants matched Toyota with prestige dimension, 23.3% of the participants matched Toyota with performance. 20% of the participants matched Toyota with durability dimension and 30% of participants matched Toyota with quality. For the Toyota brand, the dimensions that respondents most react to are prestige and quality dimension and only 6.7% of the respondents matched Toyota brand with safety dimension.

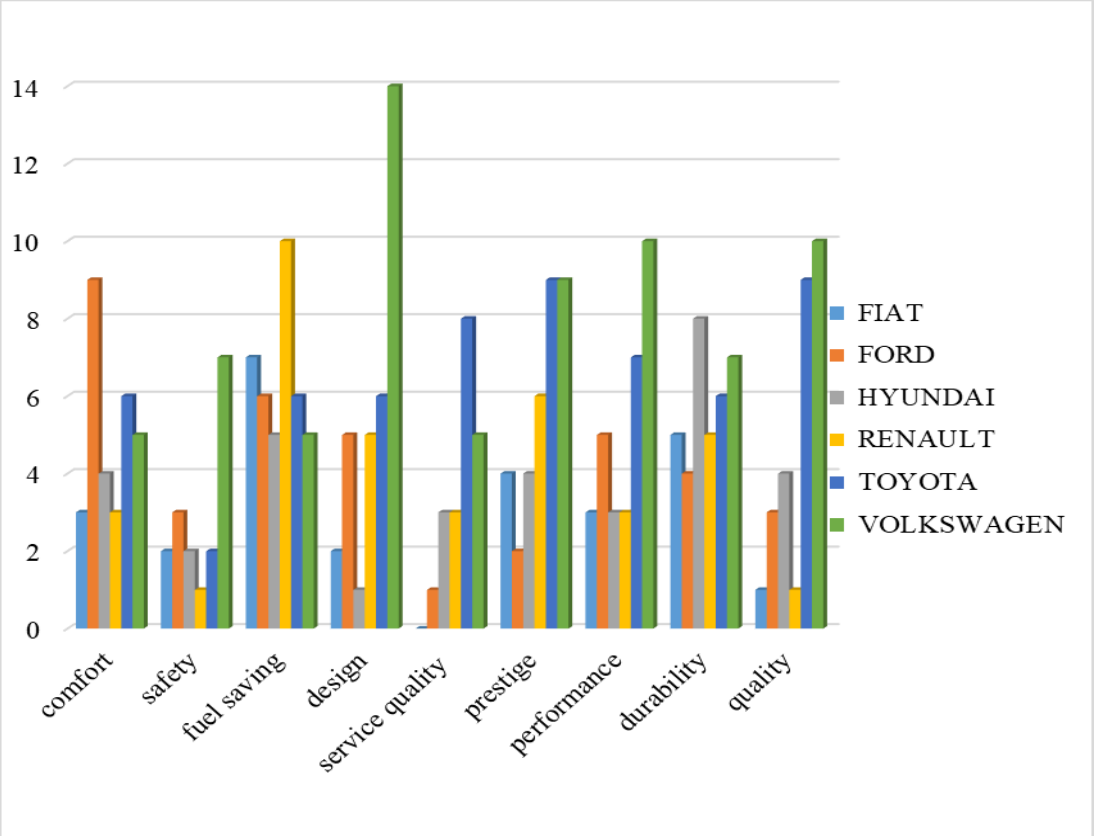
Table 6: EEG Results of VOLKSWAGEN



It was observed in Table 6 that 16.7% of the participants matched Volkswagen with the comfort dimension. While 23.3% of the participants matched Volkswagen with safety dimension, 16.7% of the participants matched Volkswagen with fuel saving. 46.7% of the participants matched Volkswagen with design dimension, 16.7% of the participants matched Volkswagen with quality service. 30% of the participants matched Volkswagen with prestige dimension, 33.3% of the participants matched Volkswagen with performance. 16.7%

of the participants matched Volkswagen with durability dimension and 33.3% of participants matched Volkswagen with quality. For the Volkswagen brand, the dimension that respondents most react to is the dimension of design with the 46.7 ratios. Besides, it has been observed that the dimensions of quality and performance are also significantly matched by participants. For the Volkswagen brand the comfort, fuel saving, and service quality dimensions have been matched by the participants to a lesser extent.

Table 7: Summarising Of The Results



As we can see in table 7; when the participants' reactions to the car brands were examined, it was observed that the participants matched the comfort dimension mostly with the Ford brand. After the Ford brand, it was observed that the other brands matched with the comfort dimension by the participants were Toyota and Volkswagen brands. It was observed that Renault and Fiat brands were the brands that the comfort dimension was matched at the lowest level by the participants. It has been observed that the most frequently matched brand with the safety dimension is the Volkswagen brand. It was observed that the Renault brand was the one that the participants matched the security dimension at the lowest level. According to participants, it was observed that the brand which was the most matched with the fuel-saving dimension is Renault. It was observed that Hyundai and Volkswagen brands were the brands that the fuel-saving dimension was matched by the participants at the lowest level. It was observed that the design dimension was the most often matched to the Volkswagen brand by the participants. It has been observed that the brand which the design dimension is matched by the participants at the lowest level is the Hyundai brand. It has been

observed that the quality service dimension is mostly matched to the Volkswagen brand. It has been observed that the Fiat brand is the brand which the quality service dimension is matched to the lowest level by the participants. It was observed that the participants matched the prestige dimension mostly with Toyota and Volkswagen brands. It was observed that the Ford brand was the brand that the prestige dimension was matched at the lowest level by the participants. The participants matched the performance dimension mostly with the Volkswagen brand. Fiat, Hyundai and Renault brands were observed to be the lowest level of performance dimension matching by the participants. The participants matched the durability dimension mostly with the Hyundai brand. Ford brand was observed to be the lowest level of durability dimension matching by the participants. The participants matched the quality dimension mostly with the Volkswagen brand. After the Volkswagen brand, Toyota brand is the most matching brand of quality dimension by the participants. Renault and Fiat brands were observed to be the lowest level of quality dimension matching by the participants.

CONCLUSION

The field of neuromarketing should be seen as a legal and important area in order to understand human behavior better. The application of neuroimaging techniques to the marketing field can help to understand better the effects of marketing techniques and, moreover, to gain a different perspective on some of the questions that have not been previously answered about business relationships. While Morin (2011) pointed out "Would neuromarketing be able to move consumer behavior studies into a different category or will be able to succeed in developing predictive models that explain why we buy" are ongoing discussions in the field of marketing. By using neuromarketing methods, we found that consumers are moving away from rationality. Besides intangible and emotional concepts are becoming more prominent for the consumers.

Even though it does not give a general judgment or conclusion of the perception of car brands, the results of this research provide important clues within the framework of the sample of the researcher. As consumer behaviors and preferences arise due to many factors, it is likely that different results will emerge in a wider range of economic, social, psychologically and culturally through different places, times and countries. Depending on these, different levels of perception may arise.

If this work is done by a portable EEG device, the data can be transferred directly to the computer and it will be possible to determine more clearly which area of the brain is activated. Besides the fact that the portable EEG device does not require any gel use during the experiment and that the location of the electrodes is obvious will also give a time advantage. With the portable EEG device, experiments can be done in different regions. In this way, the diversity of the sample can be increased. Different devices besides EEG can be used in neuromarketing studies. The FMRI device can be used since it allows for three-dimensional detection of activity areas in the brain and gives clearer results. But it is quite costly to establish and operate the equipment necessary for the device to be used in marketing research. The study of neuromarketing is quite extensive. Different dimensions for different products and services can be determined and investigations can be done in terms of different variables.

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