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APPLYING FUZZY ANALYTIC HIERARCHY PROCESS FOR EVALUATING SERVICE QUALITY OF PRIVATE SHOPPING WEBSITE QUALITY: A CASE STUDY IN TURKEY

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ABSTRACT

The e-commerce is one of the most significant developments in Internet application. In order to be successful in the e-commerce, marketplace organizations will require to provide high quality web sites that attract and retain users. Usability is one of the most crucial factors for evaluating the quality of the website. Hence, the evaluation methods for the effectiveness of the e-commerce web sites are critical issues in both practice and research. Private shopping is one of the concepts that serve as a members-only online shopping platform with deep discounts and well-known brands. The study has investigated four private shopping web sites which are the most famous private shopping web sites in Turkey with proposed method. In this paper, a fuzzy analytic hierarchy process (FAHP) approach is employed for evaluating the e-commerce websites, which can tolerate vagueness and uncertainty of judgment. Therefore, the insufficiency and imprecision problems associated with the conventional AHP can be solved. Hence, websites can be evaluated more reasonably. To do so, experts' opinions and literature are considered. Totally 50 qualitative factors are identified. Only 22 of the most important factors are included in the questionnaires provided for interview in the research.

1. INTRODUCTION

The world is changing rapidly in order that business transactions, negotiation, settlement and business deals are changing excessively. Electronic buying and selling replace traditional commerce. The e-commerce has a potential to alter channels in the whole structure of businesses such as increasing business efficiency, enhancing information flows, improving transaction speed, wider geographical spread and etc (Harrison and Waite, 2006, 1002-1003). A gate to exhibit our identification in this virtual place is websites, because of this reason the number of brick and mortar organization selling costly and complex goods that are launching online initiatives to compete with pure-play online retailers' increase more and more every day (Ethier vd., 2006, 627) Customer has a significant role in B2C and allocated as a part of it. Nowadays the creation of customer-centered website becomes more crucial. Trying to comprehend customer expectation and values about the websites become essential indeed (Zhang and von Dran, 2001, 9).

Many companies investigate a great deal of money on their commercial websites. It is principal for companies to apprehend more about their websites for instance, how many visitors they have or how often they purchase and etc. Lots of companies lose great deal of budget just because they do not apprehend how their websites should be qualified.

Today with this huge amount of competitors, all companies should have qualified websites since it is somehow essential to perceive that companies who benefit their websites for transaction, website quality may have a major impact on the number of visitors (Auger, 2005, 119-123). Today, companies have to have high quality websites since the website quality may positively influence on the number of customers in present competitive market (Auger, 2005,123-124). Now this question shall be replied that "what causes customer satisfaction in a website?" the response is quality or in the better structure, the website quality not only can have a major impact on number of visitors (Auger, 2005, 119) but also can cause customer satisfaction. The higher website quality is, the higher business performance will be (Lee and Kozar, 2006, 1383). Loiacono el al 2002; Aladwani and Palvia 2002; Ranganathan and Ganapathy 2002; Liu and Arnett 2000 focus on the technical quality of the Web site. Some define the Web site quality in terms of the service quality provided to the consumers (Zeithaml et al. 2002, 364-365). Key dimensions investigated for the web site quality include: design, content, entertainment, usability, reliability, interactivity, security, and privacy (Song and Zinkhan, 2003, 106).

The intention of this paper is to expose the entire interpretation of the website quality and to clarify the parameters which affect it just to light upon a way to increase it and in follow to reserve a higher position for companies in the e-commerce.

The private shopping business model has flourished and thrived in a short time and become one of the most outstanding electronic commerce models. Some of the private shopping sites are Markafoni, Limango, Trendyol, Morhipo, to name but a few. The number and variety of private shopping platforms increased progressively reaching above 17 as of today.

Making sales format that goes in paralel with the world via the website has ganined a new direction in Turkey, too."Private shopping" conceptualized by the Turkish private shopping club private shopping or selling on the internet in an accelerating system has soared. With approximately 6.5 million users online shop in 2013 and foreseen that this number will reach to 22 million. Private shopping system started with Markafoni, Limango and has continued with Trendyol in Turkey. According to the Economist magazine, the largest companies in the field of these three large companies, Vipdukkan, the Bingomingo, Clubboon, Alamarka, Markalonga, Bedava.com, Bankomarka.com private shopping sites also initiated operations. This private shopping site of intense interest by the users. Shopping sites also have to make a new entry to the sector (Ekonomist, 2011, 46).

Paper organized as follows: Section 2 summarizes existing literature related with web site selection and evaluation. Section 3 describes fuzzy set theory and fuzzy AHP method. Section 4 presents and interprets the empirical findings on the evaluation of private shopping web site quality. In the last section presents conclusion of the study and suggestions for the future research.

2. LITERATURE REVIEW

When reviewing the literature regarding the evaluation of the websites and designating the best website, it is seen that fuzzy AHP approach is used frequently.

Deng and Wang (2008) analyzed the characters of the E-commerce information system, and built up an evaluation indices which can be divided into 3 levels, 4 aspects, includes 20 detail indices After that, it designated AHP and fuzzy evaluation method, carried out an integrative evaluation.

Liu, Kwon and Kang (2007) a fuzzy analytic hierarchy process (FAHP) approach was designated to evaluate the e-commerce websites, which can tolerate vagueness and uncertainty of judgment. Authors divided a website's quality into four aspects as follows: Website basic technique, Web page design, Website information/content, Website function/service.

Lin (2010) evolved an evolution model that integrates triangular fuzzy numbers and analytic hierarchy process to evolve a fuzzy evaluation model which prioritized the relative weights of course website quality factors. Firstly, author conducted a review of the literature on course website quality to generate 16 sub-criteria along with four criterias applied to measure course website quality. Secondly, a fuzzy AHP approach was adopted to determine the relative weights linking the above criteria between high and low online learning experience groups.

Kong and Liu (2005) aimed to expose the key factors that affect achievement in the E-commerce employing fuzzy AHP, and convey an evaluation method for the E-commerce in order to support researches and managers to determine the drawbacks and opportunities. Trust, System quality, Content quality, Online service, Use criteria used to evaluate the E-commerce web site.

Li and Chen (2010) introduced an AHP-Fuzzy method. Six top B-to-B commercial websites were selected as models of evaluation. Authors set up an indicator system which included three main indicator systems and 10 sub-indicators.

Chen (2011) explored the digital capital measures of automated cargo clearance business website. The content analysis and fuzzy analytic hierarchy process were employed while collecting and analyzing the data. The research subject was TradeVan, a semi-government controlled web-based service provider. This study has identified four dimensions to measure the digital capital of business website that is Internet relational capital, Internet customer capital, Internet innovative capital, and Internet service capital.

Li and Chen (2009) proposed fuzzy analytical hierarchy process (FAHP) approach to evaluate online bookstores. Research consists of five major criteria that are identified to achieve the overall goal. Specifically, the five major criteria are price, reputation, website features, service and quality.

Ip et al. (2010) The aim of this research was to develop a scientific model that integrated a set of website evaluation dimensions for evaluating websites performance. Unlike previous studies, this research proposed a novel framework for evaluating the website performance by employing Fuzzy Analytic Hierarchy Process (Fuzzy AHP).

Ellatif and Saleh (2008) developed an assessment method to evaluate the critical achievement factors of E-bank portals employing Fuzzy AHP & VBA, and convey an evaluation method to analyse five quality dimensions: access, web site interface, trust, attention and credibility.

Fei and Yu (2009) presented a fuzzy multiple-criteria decision making method — Fuzzy Analytic Hierarchy Process based on trapezoidal fuzzy numbers as the evaluation method to evaluate the public satisfaction of e-government.

Wang, Li and Tian (2010) established an evaluation index system of food enterprise websites from the perspective of user's experience based on the website localization and the current literature, and employed analytic hierarchy process to determine the weight of each level index, and established the fuzzy comprehensive evaluation model of enterprise websites, and carried out a case study with the evaluation index system.

Jun and Yu (2008) presented fuzzy analytic hierarchy process model to measure the e-commerce web sites' performance. The study has investigated three web sites the relative significance of the site quality, information quality, transaction capability.

Ip, Law and Lee (2012) adopted a sophisticated approach that analyzes the weights of hotel website functionality. This approach involved triangular fuzzy numbers and an analytic hierarchy process to evolve a fuzzy analytic hierarchy process (AHP) model which prioritizes the relative signification of the hotel website functionality criteria. A fuzzy AHP approach was used to examine the relative significattion of the criteria and sub-criteria of the hotel website functionality evaluation.

Li and Pang (2011) proposed an AHP-based multi-level fuzzy comprehensive evaluation model for business website assessment. Effectiveness of business, Information of business, Design of business, Availability of system, efficiency of system as the first indexes in the study.

3. DATA AND METHODOLOGY

3.1. Fuzzy Sets

The concept of fuzzy set is introduced firstly by Zadeh (1965). According to Zadeh(1965) a fuzzy set is a class of objects with a continuum of grades of membership. Such a set is characterized by a membership function which assigns to each object a grade of membership ranging between zero and one (Zadeh, 1965, 338).

Fuzzy logic which is apprehended as multi-valued logic is employed to define and transformation to notable values of the human judgement under uncertainty and dynamic system modeling. Fuzzy logic is employed in many distinct fields such as house tools, robotics, automation, image service, space and defence. Since human judgement and behaviour are so complex and not be estimated in certain numerical values, usage of certain values to define service and production system in real-world do not convey appropriate outcomes (Zeydan and Çolpan, 2009). For this reason fuzzy set theory with linguistic variables are commonly employed to shape optimal decisions under the uncertainty environment.

Fuzzy sets were proposed to represent the degree of elements belonging to the specific sets. Instead of employing the characteristic function as a mapping function, a fuzzy subset;

$\tilde{A}$ of a universal set X can be defined by its membership function $\mu_{\tilde{A}}(x)$ as

$$\tilde{A} = \left\{ \left(x, \mu_{\tilde{A}}(x) \right) | x \in X \right\},$$

Where $x \in X$ denotes the elements belonging to the universal set, and

$\mu_{\tilde{A}}(x) : X \to [0,1]$ (Tzeng and Huang, 2011, 7).

Linguistic variables are the variables whose values are words or sentences in a ***natural*** or artificial language. Linguistic variables are stated with the effective values such as very high, very good, good, high, normal, very low and very bad (Cheng et al., 2005, 562). Linguistic idioms some like low, middle, high are natural representation of the judgments. These characteristics express the applicability of fuzzy set theory in constitution of preference structure of decision makers. Fuzzy set theory assists to measure uncertainity in concepts via subjective judgments of human being. Further to that, in group decision making, evaluation materialize as a result of evaluators'' view concerning the linguistic variables and this evaluation should be performed under the uncertain and fuzzy environment (Saghafian and Hejazi, 2005, 2).

In the literature, it is seen that the most widely employed fuzzy numbers are triangular and trapezoidal ones. Especially the fuzzy numbers, which we employ in this study, is the most preferred one due to the ease of calculation. The triangular fuzzy numbers can be denoted by (l, m, u). Its membership function $\mu_M(x) : R \to [0,1]$ is equal to

$$\mu_M(x) = \begin{cases} \dfrac{x}{m-l} - \dfrac{l}{m-l}, & x \in [l, m], \\ \dfrac{x}{m-u} - \dfrac{u}{m-u}, & x \in [m, u], \\ 0, & otherwise, \end{cases} \quad (1)$$

Where $l \le m \le u$, l and u stand for the lower and upper value of the support of M respectively, and m for the modal value. Consider two triangular fuzzy numbers M_1 and M_2, $M_1=(l_1, m_1, u_1)$ and $M_2= (l_2, m_2, u_2)$. Their operational laws are as follows:

1. $$(l_1, m_1, u_1) \oplus (l_2, m_2, u_2) = (l_1 + l_2, m_1 + m_2, u_1 + u_2),$$

2. $$(l_1, m_1, u_1) \otimes (l_2, m_2, u_2) = (l_1 l_2, m_1 m_2, u_1 u_2) \quad (2)$$

3. $$(\lambda, \lambda, \lambda) \otimes (l_1, m_1, u_1) = (\lambda l_1, \lambda m_1, \lambda u_1) \quad \lambda > 0, \lambda \in R$$

4. $(l_1, m_1, u_1)^{-1} = (1/u_1, 1/m_1, 1/l_1)$ (Chang, 1996, 650).

AHP is the most commonly employed multi decision making methods in the literature. The main shortcoming of this method is the impact of the uncertainty on decision criteria. However, employing fuzzy set theory can overcome this problem.

3.2. Fuzzy AHP Method

In our study, we use Chang's (1996, 1999) extent analysis method to select and evaluate the web site quality. Chang's (1996, 1999) extent analysis can be portrayed as it follows:

$X = \{x_1, x_2, ...x_n\}$ be an object set, and $U = \{u_1, u_2, ..., u_m\}$ be a goal set.

In extent analysis, each subject is taken in order to accomplish a goal. By this way each subject has a m extent analysis value as the following:

$$M_{gi}^1, M_{gi}^2, ..., M_{gi}^m, \quad i = 1,2,....., n \quad (3)$$

Where all the $M_{gi}^j \ (j = 1,2,.., m)$ are triangular fuzzy numbers. Fuzzy synthetic extent value for i-th subject can be defined as:

1. Step: $$S_i = \sum_{j=1}^{m} M_{gi}^j \otimes \left[\sum_{i=1}^{n} \sum_{j=1}^{m} M_{gi}^i \right]^{-1} \quad (4)$$

Here S_i denotes synthesis value of i.th goal. To calculate $\sum_{j=1}^{m} M_{gi}^j$ value, m extent analysis values are calculated by employing fuzzy addition and then a matrix is obtained.

$$\sum_{j=1}^{m} M_{gi}^j = \left(\sum_{j=1}^{m} l_j, \sum_{j=1}^{m} m_j, \sum_{j=1}^{m} u_j \right) \quad (5)$$

From this point of view, to calculate $\left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{gi}^{j}\right]^{-1}$, $M_{gi}^{j}\ (j=1,2,..,m)$ values and then the transpose of this vector are calculated as:

$$\left[\sum_{i=1}^{n}\sum_{j=1}^{m} M_{gi}^{j}\right]^{-1} = \left[\frac{1}{\sum_{i=1}^{n} u_i}, \frac{1}{\sum_{i=1}^{n} m_i}, \frac{1}{\sum_{i=1}^{n} l_i}\right] \quad (6)$$

2. Step: While $\tilde{M}_1$ and $\tilde{M}_2$ are two triangular fuzzy numbers, the probability degree of following equation $\left[\left(\tilde{M}_1 = l_1, m_1, u_1\right) ve \left(\tilde{M}_2 = l_2, m_2, u_2\right)\right]$ $\tilde{M}_2 \geq \tilde{M}_1$ is defined as:

$$V\left(\tilde{M}_2 \geq \tilde{M}_1\right) = \sup_{y \geq x}\left[\min\left(\mu_{m1}(x), \mu_{m2}(y)\right)\right] \quad (7)$$

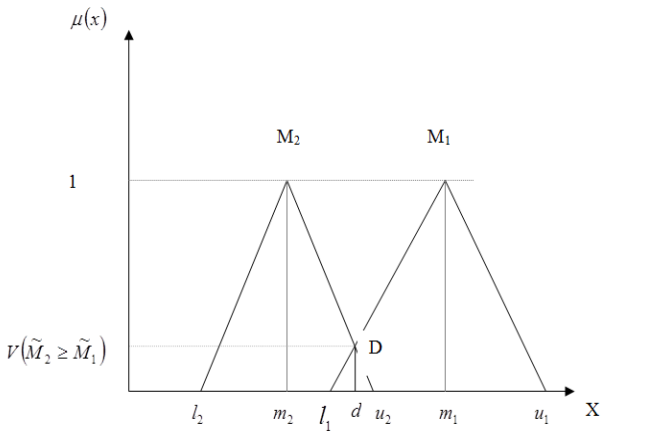
Between two fuzzy numbers like $\tilde{M}_1$ and $\tilde{M}_2$, the probability of the case in which $\tilde{M}_2$ is greater than $\tilde{M}_1$ and other cases can be displayed as:

$$V\left(\tilde{M}_2 \geq \tilde{M}_1\right) = hgt\left(\tilde{M}_1 \cap \tilde{M}_2\right) = \mu_m(d)$$

$$= \begin{cases} 1, & if\ m_2 \geq m_1 \\ 0, & if\ l_1 \geq u_2 \\ \dfrac{l_1 - u_2}{\left(m_2 - u_2\right) - \left(m_1 - l_1\right)}, & others \end{cases} \quad (8)$$

Where d is the ordinate of the highest intersection point D between μ_{m1} and μ_{m2}

Figure 1: Intersection point D between μ_{m1} and μ_{m2}



3. Step: The degree possibility for a convex fuzzy numbers to be greater than k convex fuzzy numbers $M_i(i=1,2,...,k)$ can be defined by

$$V(M \geq M_1, M_2, ..., M_k)$$
$$= V[(M \geq M_1) \text{ and } (M \geq M_2) \text{ and } .....(M \geq M_k)]$$
$$= \min V(M \geq M_i), \quad i = 1,2,....,k$$

(9)

Assume that

$$d'(A_i) = \min V(S_i \geq S_k)$$

(10)

for $k = 1,2,..., n;\ k \neq i$ then the weight vector is given by

$$W' = (d'(A_1), d'(A_2), ..., d'(A_n))^T$$

(11)

Where $A_i(i=1,2,..,n)$ are n elements.

4. Step: Via normalization, we get the normalized weight vectors

$$W = (d(A_1), d(A_2), ...d(A_n))^T$$

(12)

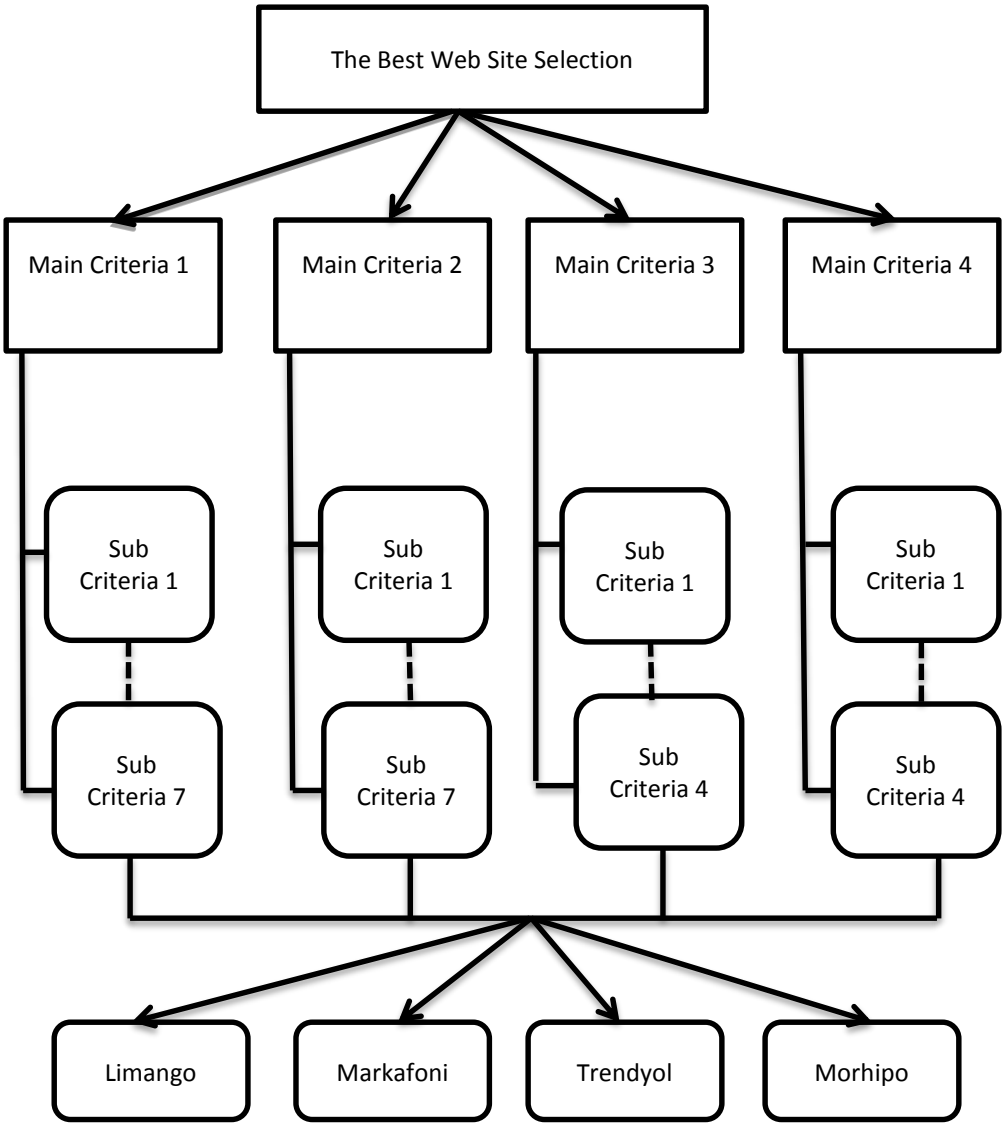
Where w is a nonfuzzy number.

4. RESULTS AND IMPLICATIONS

In the study,the service quality given via the largest four e-commerce sites inTurkey was evaluated by fuzzy AHP.In accordance with the opinions of the related literature and experts, four main and 22 sub evaluation criteria were determined. Evaluations criterias used in the study are summarized in Appendix 1.

In the context of the main and sub criterias, the hierarchical structure of study is as follows.

Figure 2: The Hierarchical Structure of the Study



Criterias are evaluated by a team of three persons of software professionals who are engaged in web site design and made shopping from relevant sites before based on the following scale (Wang and Chen, 2008, 3758).

Table 1: Fuzzy Linguistic Evaluation Scale

Linguistic Variables	Triangular Fuzzy Scale	Triangular Fuzzy Reciprocal Scale
Equally Important	(1,1,1)	(1/1, 1/1, 1/1)
Weakly Important	(1,3,5)	(1/5, 1/3, 1/1)
Essentially Important	(3,5,7)	(1/7, 1/5, 1/3)
Very Strong Important	(5,7,9)	(1/9, 1/7, 1/5)
Absolutely Important	(7,9,9)	(1/9, 1/9, 1/7)

In the study, the consistency of pairwise comparison matrices expresses in linguistic variables are evaluated via using Kwong and Bai (2003) 's approach. In this approach, the number of triangular fuzzy (4m + s + u) / 6 subjected to defuzzification by formula is converted to a number of not blurred and consistency check is performed. Cosnsistency control with Non-fuzzy numbers are done in the same way as Classical AHP. In this study, all created on the criteria and alternatives in matrix consistency rate is less than 0,10 and All matrices were consistent. The main criteria based on pairwise comparison of fuzzy evaluation matrix is the same as in table 2.

Table 2: Fuzzy Evaluation Matrix in terms of Main Purpose

	Inf. Qual.			Sys. Qual.			Serv.Qual.			Ven. Sp.Q.		
Inf. Qual.	1,000	1,000	1,000	0,342	0,693	1,710	0,135	0,189	0,342	0,231	0,251	0,281
Sys. Qual.	0,585	1,442	2,924	1,000	1,000	1,000	0,585	0,843	1,442	0,131	0,164	0,251
Serv. Qual.	2,924	5,278	7,399	0,693	1,186	1,710	1,000	1,000	1,000	0,164	0,231	0,523
Ven. Sp.Q	3,557	3,979	4,327	3,979	6,082	7,612	1,913	4,327	6,082	1,000	1,000	1,000

Weight vector of table 3 as a $W_{Aim} = \left(0.000 \quad 0.031 \quad 0.328 \quad 0.641\right)^T$ is calculated. Afterwards, the main criteria are evaluated in terms of their sub-criteria, sub-criteria weight vector is calculated.

Table 3: The Sub-criteria Weight Vectors in terms of Main Criterias

Main Criterias	Weight Vectors
Information Quality	$W_{Inf.Qual.} = (0.2031, 0.0458, 0.2051, 0.1572, 0.1179, 0.1380, 0.1330)^T$
System Quality	$W_{Syst.Qual.} = (0.0000, 0.0183, 0.0000, 0.7521, 0.0960, 0.1335, 0.0000)^T$
Service Quality	$W_{Serv.Qual.} = (0.4104, 0.0000, 0.3094, 0.2802)^T$
Vendor Specific Quality	$W_{Ven.Sp.Qual.} = (0.0000, 0.1554, 0.7025, 0.1421)^T$

When the main criteria are examined in terms of weight vector of the sub criteria, Legibility criteria in terms of Information Quality, Security criteria in terms of System Quality, Reliability criteria Service Quality, Price Saving criteria in terms of Vendor Specific Quality have the highest importance weights. After calculating the weights of sub-criteria, in terms of each sub-criteria evaluation of alternatives the pairwise comparison matrix is created. For instance, the pairwise comparison matrix in terms of coherence sub-criteria evaluation of alternatives is as follows.

Table 4: The Evaluation of the Alternatives in terms of the Coherence Sub-Criteria

	Liman.			Markaf.			Trend.			Morhi.		
Limango	1,000	1,000	1,000	0,4807	0,5228	0,5848	0,5228	0,5848	0,6934	1,000	1,422	1,100
Markafoni	1,7100	1,9129	2,0801	1,0000	1,0000	1,0000	1,0000	1,422	1,7100	1,7100	1,9129	2,0801
Trendyol	1,422	1,7100	1,9129	0,5848	0,6934	1,0000	1,0000	1,0000	1,0000	1,422	1,7100	1,9129
Morhipo	0,5848	0,6934	1,0000	0,4807	0,5228	0,5848	0,5228	0,5848	0,6934	1,000	1,000	1,000

Weight vector of table 4 as a $W_{Coherence} = (0.0000, 0.6185, 0.3815, 0.0000)^T$ is calculated.

Belonging to other sub-criteria evaluation of alternatives as a result of the weight vectors are as follows in Appendix 2.

Finally, weight vectors obtained by combining the weight values are calculated for each alternative in Appendix 3.

As a result of the analyses conducted ın accordance with expert opinions, vendor specific quality criteria (0.64064) has the highest weight was found in four main criteria affecting the quality of the website. Service quality (0.32819), system quality (0.03117) and information quality (0.00000) are followed in Appendix 3.

As a result of the evaluation of the alternatives, in terms of the website quality, Limango (0.27533) has the highest importance weight e-commerce site was found. Morhipo (0.26301), Markafoni (0.26299) and Trenyol (0.19867) are followed in Appendix 3.

5. CONCLUSION

The web is growing at a dramatic place and is significantly impacting customer and business market behaviors. As a result, most firms have initiated flourishing marketing strategies for the web. The best idea to improve the electronic commerce in Turkey is to uncover how to compose commercial website attractive enough to attract customers? The rapid growth of e-commerce in the 1990s was met with widespread adoption and acceptance by consumers and retailers alike (Kalakota & Whiston, 1997). Indeed, the rapid growth in e-commerce sales through the 2000s has remained strong as reflected by the total yearly sales through e-commerce channels that grew from $27.6 billion in 2000 to $143.4 billion in 2009 (White & Ariguzo, 2011).

In the study, the quality of four e-commerce company web sites which operate in Turkey and have the highest sales volume have been analyzed with fuzzy AHP approach.
In this study, the reason of the fuzzy set theory utilization, dealing with uncertainty in the absolute values (crisp values) instead of working with discrete values (interval values) are more efficient and accurate results. When evaluating the quality of Web sites, the utilization of the relevant literature and expert opinions 4 main and 22 sub-criterias were identified. The main criteria affecting the quality of the Web siteare determined as the information quality, system quality, service quality, and vendor specific quality.
As a result of the analysis of the main criteria, the most significant factor affecting the quality of the website is the vendor specific quality. Service quality, system quality and information quality are followed. despite the fact that Morhipo is the most crowned company in terms of the main criteria Service quality, system quality and information quality, Limango has been detected as the most crowned company in terms of four main criteria. As mentioned earlier, the reason of this is the high significance weights of the vendor specific quality criteria. Limango, morhipo, markafoni and Trendyol ae followed. Companies having low weight score in the context of the main and sub-criteria should overcome their shortcomings.

In the study, four e-commerce company web sites which have the highest sales volume and operate in Turkey have been analyzed. Studies can be performed on a greater number of e-commerce companies. Fuzzy AHP approach is proposed to assess the quality of service of websites. In future studies, TOPSIS (Technique for Order Preference by Similarity to Ideal Solutions), DEA (Data Envelopment Analysis), ELECTRE (Elimination et Choix Traduisant la Realite), VIKOR (Vise Kriterijumska Optimizacija I Kompromisno Resenjc) etc. multi-criteria decision making methods can be employed individually or integrated perspective. It could be possible for further research to compare affected parameters on website quality both in Turkey with the advanced countries that purchasing thought the web is somehow the easiest way of purchasing, to find how to increase the quality of commercial website in Turkey. Also it is possible to compare two of the most important private shopping websites in Turkey in order to comprehend which factors may cause accomplishment or which factors may encourage people to purchase through the internet. Further research is to

measure the parameters of website quality of Turkish private shopping websites in order to increase them and in follow to get progress in sale as accomplished websites like advanced countries.

REFERENCES

- Aladwani, A.M. and Prashant C. P. (2002), Developing and Validating and Instrument for Measuring User-perceived Web Quality, Information and Management, Vol.39, pp.467-476.

- Auger, P. (2005), The Impact of Interactivity and Design Sophistication on the Performance of Commercial Websites for Small Businesses, Journal of Small Business Management, Vol.43, No.2, pp.119–137

- Chang, D.Y. (1996), Application of the Extent Analysis Method on Fuzzy AHP, European Journal of Operational Research, Vol.95, pp.649-655

- Chang, D.Y., Zhu, K.J. and Jing, Y. (1999), A Discussion on Extent Analysis Method and Applications of Fuzzy AHP, European Journal of Operational Research, Vol.116, No.2, pp.450-456

- Chen, S.Y. (2011), Exploring Digital Capital of Automated Cargo Clearance Business Websites, Expert Systems with Applications, Vol.38, pp.3590–3599.

- Cheng, J. Z., Chen, P.T. and Yu, H. C. D. (2005), Establishing a Man Access Strategy for Future Broadband Service: A Fuzzy MCDM Analysis of SONET/SDH and Gigabit Ethernet, Technovation, Vol.25, pp.557-567

- Deng, J. and Wang, M. (2008), Fuzzy Integrated Evaluation of E-commerce Information System. Computer Science and Computational Technology, ISCSCT '08. International Symposium on (Volume:2), 20-22 Dec. pp.513 – 516.

- E´thier, J., Pierre, H., Talbot, J. and Cadieux, J. (2006), B2C Web Site Quality and Emotions During Online Shopping Episodes: An Empirical Study, Information & Management, Vol.43, pp. 627–639

- Ekonomist Dergisi. E-ticarette Yeni Trend Tek Ürüne Odaklanmak, 27 Mart 2011.

- Ellatif, A. and Saleh, M. (2008), Measuring Critical Success Factors of E-Bank Portals Using Fuzzy AHP & VBA. Social Science Research Network, Retrieved 18.06.2014, from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1130123

- Fei, J. and Yu, L. (2009), Public Satisfaction Evaluation of E-government with Fuzzy AHP. Fuzzy Systems and Knowledge Discovery, FSKD '09. Sixth International Conference on (Volume:3), 14-16 Aug. Pp. 480 – 484.

- Harrison, T. and Waite, K. (2006), A Time-Based Assessment of the Influences, Uses and Benefits of Intermediary Website Adoption, Information & Management, Vol.43, No.8, pp. 1002-1013

- Ip, C., Qi, S., Leung, R. And Law, R. (2010), Hotel Website Performance Evaluation: A Fuzzy Analytic Hierarchy Process Approach, International Conference on E-Business and E-Government, E-Business and E-Government (ICEE), 2010 International Conference on,7-9 May 2010, pp. 2443–2446.

- Ip, C., Law, R. and Lee, H.A. (2012), The Evaluation of Hotel Website Functionality by Fuzzy Analytic Hierarchy Process, Journal of Travel & Tourism Marketing, Vol.29, No.3, pp.263-278

- Jun, F. and Yu, L. (2008), The Evaluation of B2C E-Commerce Web Sites Based on Fuzzy AHP. Computer Science and Computational Technology, ISCSCT '08. International Symposium on (Volume:2), 20-22 Dec. pp.792 – 795.

- Kalakota, R. and Whinston, A.B. (1997), Electronic Commerce: A Manager's Guide, Reading, MA: Addison-Wesley

- Kong, F. and Liu, H. (2005), Applying Fuzzy Analytic Hierarchy Process To Evaluate Success Factors Of E-Commerce, International Journal of Information and Systems Sciences, Vol.1, No.3/4, pp.406-412

- Kwong, C.K. and Bai, H. (2003), Determining the Importance Weights for the Customer Requirements in QFD Using a Fuzzy AHP with a Extent Analysis Approach, IEE Transactions, Vol.35, pp.619-626

- Lee, Y. and Kozar, K. A. (2006), Investigating the Effect of Website Quality on E-Business Success: An Analytic Hierarchy Process (AHP) Approach, Decision Support Systems, Vol.42, pp.1383-1401

- Li, J. and Chen, S. (2009), Fuzzy Analytical Hierarchy Process for Evaluating Online Bookstores, Management and Service Science, MASS '09. International Conference on, 20-22 Sept. pp.1 – 4.

- Li, T. and Chen, L. (2010), Evaluation of China-Based Top B-to-B Commercial Websites Based on AHP-Fuzzy, International Conference on Artificial Intelligence and Computational Intelligence, Artificial Intelligence and Computational Intelligence (AICI), 2010 International Conference on (Volume:2), 23-24 Oct. pp.520 – 524.

- Li, W. and Pang, Y. (2011), Improved Fuzzy Comprehensive Evaluation Model of Business Website. Remote Sensing, Environment and Transportation Engineering (RSETE), 2011 International Conference on, 24-26 June. pp.8310 – 8314.

- Lin, H.F. (2010), An Application of Fuzzy AHP for Evaluating Course Website Quality, Computers & Education, Vol.54, pp.877–888.

- Liu, C. and Arnett, K.P. (2000), Exploring the Factors Associated with Web Site Success in the Context of Electronic Commerce, Information and Management, Vol.38, pp.23-33.

- Liu, Y.W., Kwon, Y.J. and Kang, B.D. (2007), A Fuzzy AHP Approach to Evaluating E-Commerce Websites, Software Engineering Research, Management & Applications. SERA 2007. 5th ACIS International Conference on, 20-22 Aug. pp.114 – 124.

- Loiacono, E., Watson, R., and Goodhue, D. (2002), WebQual(tm): A Web Site Quality Instrument, American Marketing Association: Winter Marketing Educators' Conference, Austin, Texas.

- Parasuraman, A., Zeithaml, V.A., and Malhotra, A. (2002), Service Quality Delivery Through Web Sites: A Critical Review of Extant Knowledge, Academy of Marketing Science, Vol.30, No.4, pp.362-376.

- Ranganathan C. and Ganapathy, S. (2002), Key Dimensions of Business-to Consumer Web Sites, Information and Management, Vol.30, pp.457-465.

- Saghafian, S. and Hejazi, R. (2005), Multi Criteria Group Decision Making Using A Modified Fuzzy TOPSİS Procedure, CIMCA-IAWTIC'05, IEEE

- Song, J.H. and Zinkhan, G.M. (2003), Features Of Web Site Design, Perceptions Of Web Site Quality, and Patronage Behavior, ACME 2003 Proceedings, pp.106-114.

- Tzeng, G.H. and Huang, J.J. (2011), Multiple Attribute Decision Making Methods and Applications, CRC Pres Taylor and Francis Group, A Chapman and Hall Book, Boca Raton

- Wang, T.C. and Chen, Y.H. (2008), Applying Fuzzy Linguistic Preference Relations to the Improvement of Consistency of Fuzzy AHP, Information Sciences, Vol.178, pp.3755-3765

- Wang, X., Li, L. and Tian, L. (2010), Research on Fuzzy Comprehensive Evaluation of Enterprise Websites, Information Theory and Information Security (ICITIS), 2010 IEEE International Conference on, 17-19 Dec. pp.937 – 940.

- White, D. and Ariguzo, G. (2011), A Time-Series Analysis of US E-Commerce Sales, Review of Business Research, Vol.11, No.4, pp.134-140.

- Zadeh, L.A. (1965), Fuzzy Sets, Information and Control, Vol.8, pp.338-353

- Zeydan, M. and Çolpan, C. (2009), A New Decision Support System for Performance Measurement Using Combined Fuzzy TOPSİS/DEA Approach, International Journal of Production Research, Vol.47, pp.4327-4349

- Zhang, P. and Von Dran, G.M. (2001), User Expectations and Rankings of Quality Factors in Different Web Site Domains, International Journal of Electronic Commerce, Vol.6, No.2, pp.9-33.

Appendix 1: Evaluation Criterias

Main Criterias	Sub Criterias
Information Quality: The quality of the information that the system produces and delivers	- Coherence (Refers to the degree to which the environmental landscape hangs together, easy to understand & clear) - Complexity (Richness of the elements in a setting) - Legibility (Distinctiveness, by possessing a memorable component, a landmark, a scene facilitates finding one's way) - Mystery (Enhances one's desire to explore a space by conveying the feeling that much more can be found if one keeps on going) - Relevance (Relevant depth and scope, and completeness of the information) - Usefulness (Website has lots of benefits for users) - Specialization (Adjusted Related information)
System Quality: System performance in delivering information, also has been recognized as a critical achievement factor influencing technology use and user satisfaction	- Website navigation (Website's capability to provide alternative interaction and navigating techniques) - Personalization (Making personal files for customers) - Currency (The state of being in common or general use) - Security (Quality or state of being secure) - Classification of needs (Basic , performance or excitement needs) - Technical efficiency (Do the right things) - Web design (Architecture of the website)
Service Quality: The overall support delivered by internet retailers & become more critical in e-business since online customers transact with unseen retailers	- Reliability (Ability to perform the promised service dependably and accurately) - Responsiveness (To be able to response to customer needs) - Trust (Customer should have confidence to the website) - Customer expectations and Satisfaction (What customers really want)
Vendor Specific Quality: The awareness of Internet vendors and their reputation and price Competitiveness	- Awareness (Existence of a critical mass who knows and experiences the website) - Reputation (Overall quality as seen or judged by online consumers) - Price saving (Lower the cost of online purchasing) - Comparative Performance (Pay attention to performance of competitors)

Appendix 2: The Weight vectors of the alternatives in terms of sub-criteria

Main Criteria	Sub Criteria	Weight Vector
Information Quality	Coherence	$W = (0.0000, 0.6185, 0.3815, 0.0000)^T$
	Complexity	$W = (0.1716, 0.0000, 0.0000, 0.8284)^T$
	Legibility	$W = (0.2857, 0.2298, 0.0000, 0.4845)^T$
	Mystery	$W = (0.3936, 0.0406, 0.0000, 0.5658)^T$
	Relavance	$W = (0.0556, 0.2792, 0.0000, 0.6652)^T$
	Usefulness	$W = (0.4399, 0.0994, 0.0000, 0.4606)^T$
	Specialization	$W = (0.2658, 0.2834, 0.0000, 0.4508)^T$
System Quality	Navigation	$W = (0.3521, 0.0000, 0.0000, 0.6479)^T$
	Personalization	$W = (0.0000, 0.0000, 0.0000, 1.0000)^T$
	Currency	$W = (0.0000, 0.6251, 0.0053, 0.3696)^T$
	Security	$W = (0.2335, 0.1623, 0.1526, 0.4516)^T$
	Classification	$W = (0.2936, 0.3034, 0.0748, 0.3282)^T$
	Tech. Efficiency	$W = (0.1443, 0.3540, 0.0000, 0.5016)^T$
	Web Design	$W = (0.1592, 0.0111, 0.0000, 0.8297)^T$
Service Quality	Reliability	$W = (0.2591, 0.1691, 0.1521, 0.4197)^T$
	Responsiveness	$W = (0.1924, 0.1503, 0.0000, 0.6573)^T$
	Trust	$W = (0.0000, 0.0000, 0.0000, 1.0000)^T$
	Cus. Expectations	$W = (0.4936, 0.1314, 0.0000, 0.3750)^T$
Vendor Specific Quality	Awareness	$W = (0.2189, 0.2855, 0.1478, 0.3479)^T$
	Reputation	$W = (0.1389, 0.4361, 0.0470, 0.3780)^T$
	Price Saving	$W = (0.3333, 0.3333, 0.3333, 0.0000)^T$
	Com. Performance	$W = (0.2663, 0.3131, 0.2163, 0.2043)^T$

Appendix 3: The Integration of Priority Weights

	Coher.	Compl.	Legib.	Mystery	Relevance	Useful.	Specializ.	
Weight	0,2031	0,0458	0,2051	0,1572	0,1179	0,1380	0,1330	
Alternat.								Main Pri.Weigh.
Limango	0,0000	0,1716	0,2857	0,3936	0,0556	0,4399	0,2658	0,2310
Markafoni	0,6185	0,0000	0,2298	0,0406	0,2792	0,0994	0,2834	0,2634
Trendyol	0,3815	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0775
Morhipo	0,0000	0,8284	0,4845	0,5658	0,6652	0,4606	0,4508	0,4282
	Navig.	Person.	Curre.	Security	Classific.	Tech.E.	Web Desi.	
Weight	0,0000	0,0183	0,0000	0,7521	0,0960	0,1335	0,0000	
Alternat.								Main Pri.Weigh.
Limango	0,3521	0,0000	0,0000	0,2335	0,2936	0,1443	0,1592	0,2231
Markafoni	0,0000	0,0000	0,6251	0,1623	0,3034	0,3540	0,0111	0,1984
Trendyol	0,0000	0,0000	0,0053	0,1526	0,0748	0,0000	0,0000	0,1220
Morhipo	0,6479	1,0000	0,3696	0,4516	0,3282	0,5016	0,8297	0,4565
	Reliabi.	Respon.	Trust	Cus.Exp.				
Weight	0,4104	0,0000	0,3094	0,2802				
Alternatives					Main Pri.Weigh.			
Limango	0,2591	0,1924	0,0000	0,4936	0,2446			
Markafoni	0,1691	0,1503	0,0000	0,1314	0,1062			
Trendyol	0,1521	0,0000	0,0000	0,0000	0,0624			
Morhipo	0,4197	0,6573	1,0000	0,3750	0,5867			
	Aware.	Reputat.	Pric.S.	Com.Per.				
Weight	0,0000	0,1554	0,7025	0,1421				
Alternat.					Main Pri.Weigh.			
Limango	0,2189	0,1389	0,3333	0,2663	0,2936			
Markafoni	0,2855	0,4361	0,3333	0,3131	0,3464			
Trendyol	0,1478	0,0470	0,3333	0,2163	0,2722			
Morhipo	0,3479	0,3780	0,0000	0,2043	0,0878			
	Inf.Qua.	Syst.Q.	Ser.Q.	V.Sp.Q.				
Weight	0,00000	0,03117	0,32819	0,64064				
Alternat.					Main Pri.Weigh.	Ranking		
Limango	0,23095	0,22311	0,24464	0,29359	0,27533	1,00000		
Markafoni	0,26342	0,19844	0,10624	0,34644	0,26299	3,00000		
Trendyol	0,07747	0,12200	0,06242	0,27220	0,19867	4,00000		
Morhipo	0,42816	0,45646	0,58671	0,08777	0,26301	2,00000		