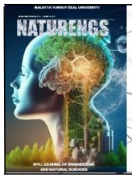

NATURENGS
E-ISSN 2717-8013
https://dergipark.org.tr/en/pub/naturengs

Decision AHP Based Decision Support System: E-Commerce Site Selection

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ARTICLE INFO

Received 04.05.2024
Accepted 27.05.2024

Doi: 10.46572/naturengs.1478408

ABSTRACT

The increase in the use of e-commerce websites has made the design and performance criteria of these sites important. Designed e-commerce sites are preferred as long as they can meet user requirements. The main motivation of the study is to determine the set of criteria to be used in the evaluation of e-commerce sites and to design a decision support system based on Analytical Hierarchy Process (AHP), one of the multi-criteria decision-making (MCDM) methods that will ensure the selection of the best e-commerce site. For this purpose, 5 main 27 sub-criteria were determined by the expert team as a result of literature review, examination of product catalogs of online shopping sites and evaluation of surveys. 4 e-commerce sites, where users have high demand and have high site traffic, were analyzed based on the determined criteria and the preference rankings of the e-commerce sites were found. According to the analysis carried out, on the basis of main criteria, technical features and user-friendly features are more decisive, and on the basis of sub-criteria, users; It has been observed that the page is important to open quickly, have an SSL certificate, be responsive and have an application option. As a result of the study, EC1 site was determined as the optimum e-commerce site.

Keywords: Analytical Hierarchy Process (AHP), E-Commerce Site, Decision Support System

1. Introduction

The Internet was previously used mostly for communication and security reasons. The emergence of e-commerce has brought a new dimension to the internet. E-commerce or electronic commerce is the carrying out of promotion, sales, payment and marketing transactions of products and services over the internet, that is, computer networks [1]. With the rapid development of technology, the increase in transactions made in the digital environment, differences have occurred in the communication between businesses and consumers. Consumers have started to make many purchases for their needs frequently through e-commerce sites.

The internet economy, which has reached a critical point in terms of growth and competition in companies and SMEs, has offered companies large market share opportunities with e-commerce [2]. Developing virtual commerce environments, unlike the traditional commerce approach, have offered the opportunity to shop online anytime, anywhere, at any time [3].

Additionally, the benefits of e-commerce include 24-hour availability, speed of access, wide availability of goods and services, and easy accessibility. Frequent use of important e-commerce sites such as Amazon and eBay in the last twenty years has contributed to the growth and development of this sector and its market share increasing day by day.

The importance of using the internet to reach customers is increasing for businesses. An increasing number of customers are using their phones and tablets for online shopping as a result of the development of mobile technology. With the advancement of mobile technology, more and more consumers are buying online with their phones and tablets [4]. So much so that consumers who want to meet their expectations are faced with more than one online shopping site for the same product when they enter the online environment, and the presence of multiple criteria affecting consumers' decisions makes the online shopping process of consumers complicated [5]. This has revealed the need for companies to design and use the most appropriate online shopping sites that can meet user needs and demands.

In this study, e-commerce sites providing online services were analyzed and evaluated using the AHP method, one of the multi-criteria decision-making

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methods. MCDM consists of analytical methods that provide the opportunity to evaluate many measurable or unmeasurable strategic factors simultaneously [6]. AHP, on the other hand, is a method based on mathematical foundations that can evaluate qualitative and quantitative variables together and is used in the decision-making process by taking into account the priorities of the group or individual [7]. In this context, the 4 most preferred e-commerce sites in Turkey were evaluated and ranked in the light of 5 main and 27 sub-criteria determined by expert opinions and the optimum e-commerce site was determined.

The main contributions of this study can be summarized as follows:

- To determine the set of criteria in e-commerce site selection and to contribute to the literature.
- Designing an AHP-based decision support system that will enable the selection of the most useful and reliable e-Commerce sites for users.
- Contributing to the development and innovation of e-commerce sites.

The organization of this study is as follows: Section 2 describes related work. Section 3 presents the criteria set and the AHP method. Section 4 explains the proposed AHP-based decision system. Section 5 presents experimental results. The study concludes in Section 6.

2. Related Works

There are studies in the literature on e-commerce site analysis and selection, and it is important that these studies are renewed frequently. Changing social and technological developments also affect businesses that provide e-commerce services, and businesses have to make continuous improvements in order not to lose their competitive advantage. For this reason, it is important to include studies on e-commerce website analysis, design and selection in the literature because they require the evaluation of complex features such as security, technical, payment, delivery and user-friendliness. Some studies carried out in this context;

Ömürbek and Şimşek, the results of AHP and Analytical Network Process (ANP) methods were compared to determine the importance of the criteria they consider when shopping online and the optimum e-commerce sites. 4 main criteria were determined in e-commerce site selection: positive features, negative features, payment options and product range. According to the ANP method, the most important criterion in e-commerce site selection is determined as product range, while according to the AHP method, the most important criterion is positive features [8].

Arora and Gupta, in their study to find the main factors affecting the e-commerce business: Product assurance was found to be the most important criterion taken into account in the selection of the e-commerce website, while pricing was found to be the second most important criterion [9].

Kahraman et al., a hesitant fuzzy language hierarchy process method was proposed for selection among B2C companies. The e-marketplaces of 5 international B2C companies were compared according to the main and sub-criteria sets by considering the 7 main criteria and 21 sub-criteria determined as a result of the research conducted in the databases. Sensitivity analysis showed that the resulting rankings were robust to changes in criterion weights [10].

Roy et al., developed the AHP-based usability assessment method to calculate a website's usability score. It has been noted that the outcome produced by the suggested method agrees with the outcome found in the WAMMI report. Validated by WAMMI, considering the same dataset used for the accuracy approach [11].

Özkan and Yavuz, suggested a comparison that is believed to require improvement through the use of various criteria, adjustments to weighting schemes, expert assessments, and novelties in the literature. The second alternative is always ranked number one, but the positions of the first and third alternatives vary between the two TOPSIS procedures based on their proximity coefficients. It has been discovered that different expectations and varied criterion weights lead to variances in the rankings, even though the ranking changes between the first and third alternatives can be assessed in terms of variations in the behavior of designers and buyers [12].

Aziz et al., conducted a study aiming to determine the priority of website quality criteria and combine the determined criteria to measure the quality of 10 e-commerce websites in Indonesia using AHP. Additionally, this study reveals that the most important criterion for website quality in the context of a C2C website is usability, while the lowest priority is markup verification [13].

Erdebilli et al., presented a hybrid framework of AHP for measuring and evaluating e-commerce site performance and Intuitive Fuzzy Technique (IFT) for preference ranking by similarity to the ideal solution. With the proposed hybrid method, a model that evaluates three e-commerce sites in Turkey under fuzzy environments has been tested to take into account uncertainty and instability [14].

Adepoju et al., tried to identify trends in the literature regarding the application of MCDM approaches in the evaluation of the usability of websites. A total of 63 scientific articles obtained as a result of the literature review were analyzed and various individual and integrated methods were proposed for website usability evaluation. As a result, although the most important criteria in terms of usability are ease of use and navigability, the most popular criterion in terms of quality was determined to be usability [15].

Yağlı, proposed a quality-based model to evaluate the

website quality of technology stores. As a result of the results obtained by using the classical AHP, reliability is the most important criterion and reliability; It has been determined that content, functional suitability and usability are followed [16].

Lai et al., found in their study that the top five determinants for a website's success are its reputation, transaction security, usability, marketing, and variety of options. This information enables decision-makers to create websites that are effective in the present competitive business environment. They presented it as a map [17].

Bayır used the content analysis method to examine the literature on Turkey's top 4 most preferred e-commerce sites and analyze the responses obtained from the surveys. The determined criteria were evaluated by 182 electronic commerce users in the next stage. The resulting data were examined using SPSS for descriptive, descriptive and reliability analysis and were also weighted using the AHP method [18].

Kulak, conducted a study examining the impact of the COVID-19 pandemic on e-commerce. This situation has caused behavioral changes in social and cultural areas in society. In this study, it was observed that the preference rate of e-commerce increased significantly after the pandemic [19].

3. Material and Method

3.1. Determination of Criteria and Criteria Set

In creating the hierarchical structure; Literature review, product catalogs of some online shopping sites, expert opinion and survey evaluations were used. The research team reviewed and analyzed all obtained criteria. They divided the obtained criteria into different categories and created a set of sub-criteria for each category. After various arrangements and improvements made in the categories, all criteria were divided into 5 main and 27 sub-criteria as in Table 1. Names of alternative websites to avoid unfair competition; Expressed as A1, A2, A3, and A4.

Table 1. Set of criteria for e-commerce site selection

Code	Main Criteria	Code	Subcriteria
A1	User Friendly Features	**A11**	Making the Website Responsive
		A12	Membership to the Site is Easy and Fast
		A13	Finding the Web Application
		A14	Site Design Complies with Standards
		A15	Cancellation/Return Conditions
		A16	Customer Support Services
A2	Payment Options	**A21**	Credit Card
		A22	Money Transfer / EFT
		A23	Shopping Feature Using Credit
		A24	Installment Option Special for Banks
A3	Technicial Specifications	**A31**	Search Engine Optimization (SEO)
		A32	SSL Certificate
		A33	Fast Opening of the Page
		A34	Advanced Site Search Engine
		A35	Advanced Filtering
A4	Delivery Options	**A41**	In-Store Pickup
		A42	Multiple Cargo Company Options
		A43	Free Shipping Option
		A44	Fast Delivery
A5	Factors Affecting Product Selection	**A51**	Detailed Product Description
		A52	Product Visual Clarity
		A53	Category and Product Variety
		A54	User Comments
		A55	TV/ Social Media/ Internet Advertisements
		A56	Influencer Studies
		A57	Mailing and SMS Campaign Notification
		A58	Brand awareness

3.2. Analytıcal Hıerarchy Process (AHP)

A variety of strategies are available to support MCDM in order to help decision makers who frequently have to make choices including making several, sometimes contradictory, assessments. The goal of MCDM is to recognize these inconsistencies, assess alternatives based on a range of criteria, and determine the optimal compromise solution through an open and honest process [20]. Since its development, AHP has been

successfully applied to solve MCDM problems, thus becoming an effective tool in the hands of decision makers and researchers. The selection, assessment, benefit-cost analysis, allocation, planning and development, priority and ranking, and decision making are the primary themes in a study looking at the application themes of AHP.

Lee et al., the six basic steps included in AHP are listed as follows [21]:

1) To solve the unstructured problem, the goals and consequences of the problem are clearly stated.
2) A hierarchical structure comprising decision elements—criteria, specific criteria, and alternatives—is used to break down a complex structure problem.
3) Decision elements are compared pairwise using comparison matrices.
4) The eigenvalue method is used to estimate the relative weight of decision elements.
5) To ensure that the decisions of decision makers are consistent, the matrices are checked by consistency analysis.
6) To get an overall grade for the alternatives, the respective weights of the choice criteria are added together.

Within the six steps, pairwise comparison matrices are of great importance because they are the key to transforming subjective priorities into calculable values in line with the evaluations of decision makers. Pairwise comparisons are generally obtained in line with the opinions of these experts.

A preference scale is used to assign numerical values to different preference levels indicated by linguistic expressions [22]. The preference scale used for AHP is generally from 1 to 9 to reflect the importance of one factor over another, and Saaty [23] recommends that comparisons of factors be made in the range of 1/9 to 9. The basic scale used for pairwise comparisons is shown in Table 2.

Table 2. Basic scale for pairwise comparisons [24]

Importance / Density	Describing	Explanation
1	Equal importance	Equal contributions from two elements result in objects.
3	Medium importance	A small amount of experience or judgment favors one component over another.
5	Strong importance	One element is greatly favored over another by experience or judgment.
7	Very strong importance	One component is clearly preferred over the other; this dominance has been demonstrated in actual use.
9	Extreme importance	Evidence with the highest possible order of verification is that which gives preference to one element over another.
Intermediate values can be expressed with intensities of 2, 4, 6, and 8. Densities like 1.1 and 1.2 can also be applied to items with very near relative importance.		

Lee et al., in the first two steps of AHP application, it is necessary to define the MCDM problem and create the hierarchical structure (Figure 1) [21].

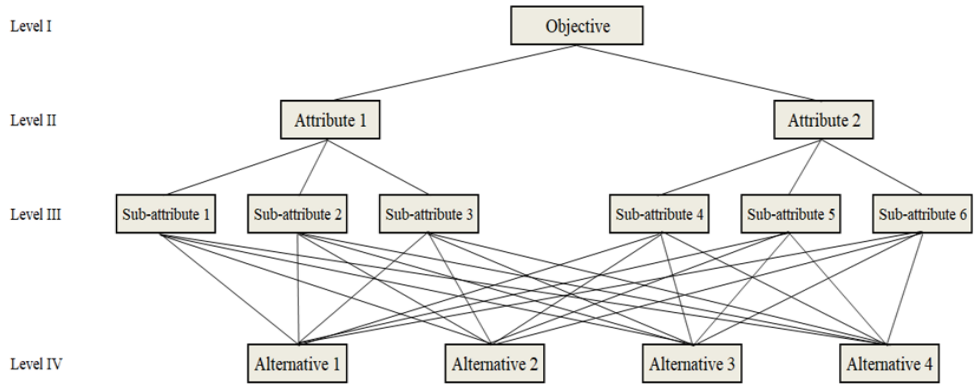

Figure 1. AHP hierarchical structure

Lee et al., for the pairwise comparisons specified in the third step, (n(n-1))/2 pairwise comparisons are made in a square matrix with n rows and columns, as shown in Table 3 [21]. The values on the diagonals of the pairwise comparison matrices are 1 (w_1/w_1=1, w_2/w_2=1, w_3/w_3.…w_n/w_n) [25].

Table 3. Pairwise comparison (A) matrix [25]

	Criterion 1	**Criterion 2**	**...**	**Criterion n**
Criterion 1	W_1/W_1	W_1/W_2	…	W_1/W_n
Criterion 2	W_2/W_1	W_2/W_2	…	W_2/W_n
Criterion 3	W_3/W_1	W_3/W_2	…	W_3/W_n
...	…	…	…	…
Criterion n	W_n/W_1	W_n/W_2	…	W_n/W_n

The fourth step states the calculation of the "relative weight of decision elements". For this, in an nxn square matrix, the values are first normalized with Equation 1.

$$a_{ij} = \frac{a_{ij}}{\sum_{k=1}^{n} a_{kj}} \qquad i=1,2,3,\ldots n \tag{1}$$

The a_{ij} in this expression indicates any value in the binary comparison matrix (A) and consists of the numerical values in Table 2 (values between 1 and 9). The normalization process provides a matrix in which the sum of each column is 1.

In the fourth step, for the relative weight calculation, the w_i value, which represents the weight vector of each element, is calculated by taking the row averages of the normalized matrix. Weight calculation is made according to Equation 2.

$$w_i = \frac{\sum_{j=1}^{n} a_{ij}}{n} \tag{2}$$

"Consistency analysis" is performed to check the consistency situation specified in the fifth step. Two different calculation methods for consistency analysis have been encountered in the literature. While one of these methods uses the expression n_{max} [22], the other uses the expression λ_{max} [26]. The pairwise comparison matrix is deemed consistent if the consistency ratio (CR) derived from these computations is less than 0.1. The calculation formula for both is provided here. In both calculations, first the multiplication of the binary comparison matrix A with the vector of w_i (weight) values is performed. The operations continue with the resulting matrix of size nx1, which will be called A_w.

The sum of the elements of the column vector A_w gives the value n_{max}, and the consistency index (CI) is calculated with Equation 3 and the random consistency index (RI) is calculated with Equation 4 [22].

$$CI=(n\_max-n)/(n-1) \tag{3}$$

$$RI=(1{,}98\ (n-2))/n \tag{4}$$

When the sum of the ratios of the elements of the column vector A_w to the elements of the vector w, respectively, is multiplied by 1/n, the λ_{max} value is obtained. While the CI value is calculated with Equation 3, the λ_{max} value is calculated with Equation 5 [26].

$$\lambda_{max} = \frac{1}{n}\sum_{i=1}^{i=n} \frac{i\text{th element of vector } Aw}{i\text{th element of vector } w} \tag{5}$$

Table 4 is used for RI values in the calculation made using the λ_{max} value.

Table 4. Random consistency index values [26]

n	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
RI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49

When using n_{max} or λ_{max}, CR is defined as the ratio of CI value to RI value (CI/RI) [25].

In the last step of AHP, scores are calculated for the alternatives. Accordingly, the ranking score of the A_k alternative is calculated with Equation 6 [25].

$$\sum_{i=1}^{n} a_{ki}\ X\ W_i \tag{6}$$

W_i= Global precedence of i'th character

A_{ki}= It shows the priority values of the kth alternative according to the criteria.

Table 5. AHP pseudocode

Step 1:	Calculate column sum of weighted values as A1,A2,…A_n where 'n' is the number of elements.
Step 2:	Divide each weight in column by its sum i.e. divide every Weighted is nth columnt by A_n and store as X_n to get n*n X values
Step 3:	Calculate normalised Priority Vector Matrix 1/n*[X_1+X_2+…+X_n]
Step 4:	Calculate Eigen value i.e. λmax which is a single value for i=1 to n do addition of (A_i* value of Priorty Vector from ith row Priorty Vector Matrix)
Step 5:	Calculate Consistency Index (CI) CI=(λmax-n)/(n-1)
Step 6:	Random Consistency Index (RI) if n=5 RI= 1,12
Step 7:	Calculate Consistency Ratio (CR) CR=CI/RI where CR<=0.1

4. The Proposed Model

In this study, it is aimed to analyze and evaluate online e-commerce sites using the AHP method, one of the multi-criteria decision-making methods. For this purpose, based on 5 main 27 sub-criteria presented in Table 1, obtained from 4 e-commerce sites with high demand from users and high site traffic, literature review, product catalogs of online shopping sites, expert opinion and survey evaluations and determined

by experts. has been analyzed. The block diagram of the designed AHP-based decision support system is presented in Figure 2.

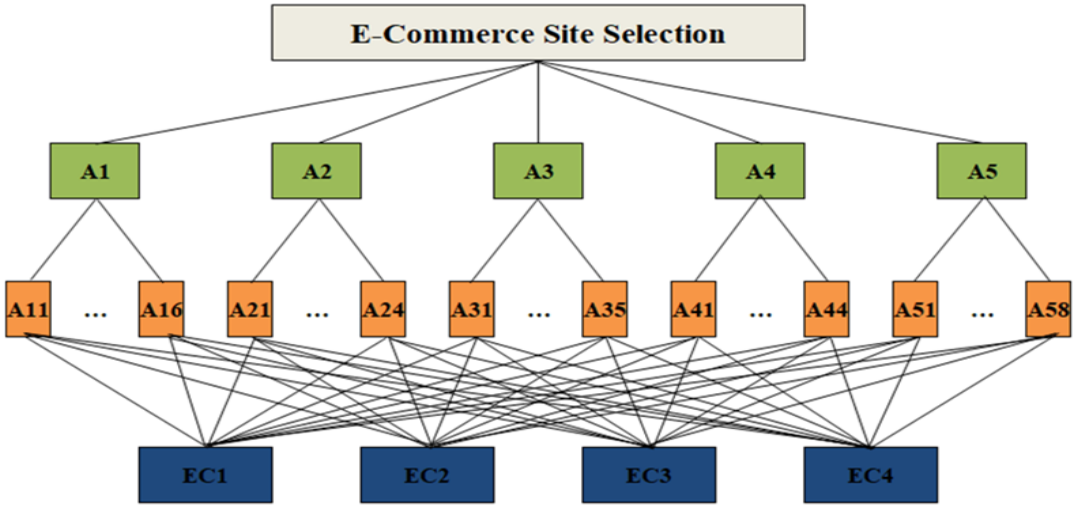

Figure 2. Block diagram of the AHP-based method

With the AHP method, pairwise comparison matrices for 5 main and 27 sub-criteria, these matrices need to be normalized and consistency analyzes need to be calculated. The importance levels of the criteria will be determined with the created pairwise comparison matrices. In this context, the binary comparison matrix obtained as a result of expert opinions regarding the main criteria determined for the best e-commerce selection is presented in Table 6.

Table 6. Pairwise comparison matrix of main criteria

	A1	A2	A3	A4	A5
A1	**1**	3	1/3	3	3
A2	1/3	**1**	1/2	2	2
A3	3	2	**1**	3	4
A4	1/3	1/2	1/3	**1**	2
A5	1/3	1/2	1/4	1/2	**1**
Column Total	**5**	**7**	**29/12**	**19/2**	**12**

In determining the values of the diagonal elements in the pairwise comparison matrix, it is assumed that the judgment to be made when comparing any alternative with itself is "equally preferred". The normalization values obtained by dividing each value in the pairwise comparison matrix by the total of its column and the calculated priority vector matrix are presented in Table 7.

Table 7. Priority vector of main criteria

	A1	A2	A3	A4	A5	Weights
A1	0,20	0,42	0,13	0,31	0,25	**0,26537**
A2	0,15	0,19	0,41	0,19	0,18	**0,15238**
A3	0,06	0,03	0,07	0,29	0,36	**0,40248**
A4	0,11	0,10	0,02	0,10	0,18	**0,10515**
A5	0,23	0,10	0,02	0,05	0,09	**0,07460**
Consistency Rate: 0.04						

Consistency analysis of the pairwise comparison matrix created to test the reliability of the results obtained and the final decision;

$$\begin{bmatrix} 1 & 3 & 1/3 & 3 & 3 \\ 1/3 & 1 & 1/2 & 2 & 2 \\ 3 & 2 & 1 & 3 & 3 \\ 1/3 & 1/2 & 1/3 & 1 & 1 \\ 1/3 & 1/2 & 1/4 & 1/2 & 1/2 \end{bmatrix} X \begin{bmatrix} 0.26 \\ 0.15 \\ 0.40 \\ 0.10 \\ 0.07 \end{bmatrix} = \begin{bmatrix} 1.37 \\ 0.78 \\ 1.88 \\ 0.86 \\ 0.16 \end{bmatrix} => \begin{bmatrix} 1.37/0.26 \\ 0.78/0.15 \\ 1.88/0.40 \\ 0.86/0.10 \\ 0.16/0.07 \end{bmatrix} => \begin{bmatrix} 5.26 \\ 5.20 \\ 4.70 \\ 8.60 \\ 2.28 \end{bmatrix}$$

$$\lambda max=(5.26+5.20+4.70+8.60+2.28)/5=5.20 \quad (7)$$

In the Randomness table in Table 4, the Randomness Indicator (RI) = 1.12 for n = 5.

$$\text{Consistency Indicator} = \frac{\lambda \max - n}{n-1} = \frac{5.20-5}{4} = 0.05 \quad (8)$$

$$\text{Consistency Ratio} = \frac{\text{Consistency Indicator}}{\text{Randomness Indicator}} = \frac{0.05}{1.12} = 0.04 \quad (9)$$

The consistency rate was calculated as 4%. If this ratio is lower than 10%, it shows that the matrix is consistent. Pairwise comparison matrix, normalization of matrices and consistency analyzes were performed for all 27 sub-criteria. The calculated weights of the sub-criteria are presented in black in Table 8, and the product of the weights obtained from the main criteria and the weights obtained from the sub-criteria are presented in red.

Table 8. Priority vector of subcriteria

Weights	0.26537	0.15238	0.40248	0.10515	0.07460
	A1	A2	A3	A4	A5
A11	0.43781 **0,1161**				
A12	0.12615 **0,0334**				
A13	0.05790 **0,1560**				
A14	0.17941 **0,0476**				
A15	0.10220 **0,0271**				
A16	0.09650 **0,0256**				
A21		0.53827 **0,0820**			
A22		0.14916 **0,0227**			
A23		0.08984 **0,0137**			
A24		0.22271 **0,0339**			
A31			0.13046 **0,0525**		
A32			0.25357 **0,1021**		
A33			0.46121 **0,1856**		
A34			0.08797 **0,0354**		
A35			0.06676 **0,0269**		
A41				0.19477 **0,0205**	
A42				0.12850 **0,0135**	
A43				0.59775 **0,0629**	
A44				0.07896 **0,0083**	
A51					0.03559 **0,0027**
A52					0.05539 **0,0041**
A53					0.02556 **0,0019**
A54					0.26678 **0,0199**
A55					0.13825 **0,0103**
A56					0.12250 **0,0091**
A57					0.06195 **0,0046**
A58					0.29395 **0,0219**

The largest values in each column from the multiplication table of the main criteria and sub-criteria for the selection of the best e-commerce site are collected as shown in Table 8. This collected value is divided by the maximum value of each column to obtain the weight values shown in red in Table 9.

Table 9. Selection and sum of max values

	A1	A2	A3	A4	A5	Total
Max Values	0,1560 / 0,4249 **0.3687**	0,0820 / 0,4249 **0.1929**	0,1021 / 0.4249 **0.2402**	0,0629 / 0.4249 **0.1480**	0,0219 / 0.4249 **0.0515**	**0,4249**

The values obtained in Table 9 are multiplied by the weight values of the alternatives in Table 10 to calculate the ranking of the candidates.

Table 10. Ranking of alternatives

Weights	0,3687	0,1929	0,2402	0,1480	0,0515
	A1	A2	A3	A4	A5
EC1	0.489961	0.198312	0.476051	0.43115	0.469198
EC2	0.307539	0.087375	0.252299	0.22405	0.252392
EC3	0.089658	0.056255	0.154697	0.2066	0.084237
EC4	0.112842	0.658058	0.116953	0.1382	0.194173

The ranking of the candidates evaluated in e-commerce site selection is shown in Table 11. The graph of this ranking is shown in Figure 3.

Table 11. Ranking of evaluated candidates

	A1	A2	A3	A4	A5	
EC1	0,18064	0,03825	0,11434	0,06381	0,02416	**0,42122**
EC2	0,11338	0,01685	0,06060	0,03315	0,01299	0,23700
EC3	0,03305	0,01085	0,03715	0,03057	0,00433	0,11598
EC4	0,04160	0,12693	0,02809	0,02045	0,00999	0,22708

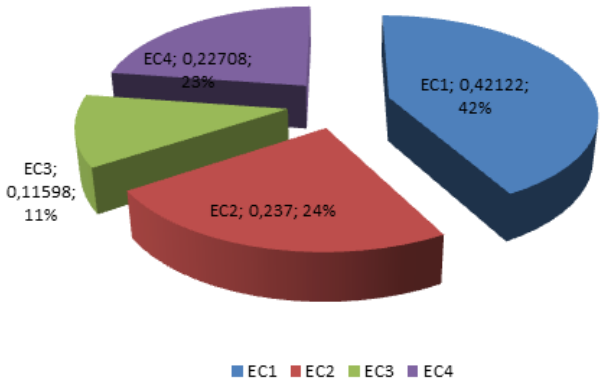

Figure 3. E-commerce site ranking according to users preferences

5. Experimental Results

As a result of the evaluation of the set of criteria determined for the evaluation of e-commerce sites, detailed results based on the main criteria and sub-criteria that determine the optimum e-commerce site selection or preference rankings of e-commerce sites are as follows:

Based on the main criteria in choosing an e-commerce site; It was found that technical features ranked first with 40.24%, User Friendly features ranked second with 26.53%, and payment options ranked third with 15.23%.

Based on the main criterion of User Friendly, the first place for users is that the website is responsive with 43.78%, the second place is that the site design is simple, easy and in compliance with the standards with 17.94%, and the third place is that site membership is easy and fast with 12.61%. It has been observed that the criteria are important.

Based on the main criterion of payment options, it has been seen that users give importance to the credit card option in the first place with 53.82%, the bank-specific installment option in the second place with 22.27% and the money transfer/EFT criterion in the third place with 14.91%.

Based on the main criterion of technical features, it has been seen that users care about the fast opening of the page with 46.12% in the first place, the presence of an SSL certificate in the second place with 25.35%, and search engine optimization (SEO) criteria with 13.04% in the third place.

Based on the main criterion of delivery option, it has been seen that users attach importance to free shipping option in the first place with 59.77%, in-store delivery option in the second place with 19.47% and more than one cargo company criteria in the third place with 12.85%.

Based on the main criteria of factors affecting product selection, it has been seen that users care about brand awareness in the first place with 29.39%, user comments in the second place with 26.67% and TV / social media / internet advertisements in the third place with 13.82.

6. Conclusions

In this study, an AHP-based decision support system was designed to compare existing e-commerce sites and determine the most optimum e-commerce site for users. 4 e-commerce sites, which are in high demand by users, have high site traffic, and are considered user friendly in design, were identified and the criteria that users base their shopping on when shopping from these sites were 5 main criteria (User-friendly features, payment options, technical specifications, delivery options, product selection). affecting factors) and analyzed through 27 sub-criteria. Specific results of the study:

- Expert opinions and customer expectations were decisive in designing the AHP-based decision support system.
- As a result of the study, the ranking of alternative e-commerce sites was EC1 > EC2 > EC4 > EC3. The EC1 site, which received the highest score in the ranking, was determined as the most optimum e-commerce site in the evaluation of 5 main and 27 sub-criteria.
- In the evaluation based on the main criteria, it was determined that Technical Specifications (A3) and User Friendly Features (A1) were decisive.
- As a result of the evaluation of the sub-criteria, users; When choosing a site, the most important factors are that the page opens quickly (A33), that there is an SSL certificate (A32), that the website is responsive (A11), and that there is an application option (A13).

If an e-commerce company wants to gain a good place in the market, it must be reliable, technically fast and user-friendly. In addition, they need to regularly update their e-commerce sites by following customer feedback and new technologies. In addition, the integration of artificial intelligence into e-commerce site applications will help make the e-commerce experience more efficient and secure for both customers and e-commerce businesses by personalizing customer experiences, providing targeted marketing, automating customer service tasks and providing more accurate product recommendations. Additionally, blockchain technology can be used to secure payments and protect customer data.

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