



Determining and Ordering the Basic Evaluation Criteria in the Furniture Design Process

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Abstract

It is seen that the design-oriented criteria in the furniture product have been analyzed through consumer or user preferences until today. However, the design criteria determined or evaluated through user preferences are not sufficient for the development of products. For this reason, it is necessary to determine the criteria in the design process in the furniture industry from an expert point of view, to determine the importance and weights of these criteria, and to develop standards. In this context, the aim of this study is to determine the criteria and sub-criteria in the furniture design process, and to analyze the importance ratings and weights of these criteria relative to each other. AHP, which is one of the multiple decision-making methods, was applied for the literature review and the analysis of the importance and weights of the criteria and sub-criteria determined by five different experts in the field. A total of 4 main criteria and 25 sub-criteria were determined in order to evaluate the furniture design process with the opinion of experts. Accordingly, the main criterion that has the most importance when evaluating the furniture design process is functionality. This criterion is followed by technical, conceptual and aesthetic criteria, respectively. Planning in accordance with the intended use (functional), material quality (technical), sustainability (conceptual) and form / shape (aesthetic) are the most important sub-criteria under the basic criteria. The findings of the study have the potential to contribute to the objective evaluation of the instructors working in the institutions providing education in the field, to determine the evaluation criteria in national-international design competitions, or to make a joint group decision by multiple decision makers in the sector.

Keywords: Analytic hierarchy process (AHP), design criteria, expert evaluation, furniture design

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INTRODUCTION

The basis of the human-environment relationship is based on the space where the individual or society lives and the elements that define this space. Perception and use of the environment or space can be ensured by these elements that define the space. In a study analyzing the concept of home, furniture ranked first with 36% among the items defined as special or important by the individual (Csikszentmihalyi, 1991: 28). From this point of view, we can say that furniture is one of the most important elements in the relationship between environment and human. It can be said that furniture is very important in terms of the relationships it establishes for the individual or society, especially in a space surrounded by furniture.

We can say that the main basis of Csikszentmihalyi's (1991) finding on the importance of furniture by people is related to the communication and bonding established. This relationship can be formed through physical contact, as well as through sensory connection. Because the individual sees furniture as an expression of his identity and personality, is proud of owning the furniture and is emotionally affected by it (Ponder, 2013). For this reason, according to many studies on furniture preference, aesthetic criteria/values that stimulate the senses and emotions and give pleasure to the individual come to the fore more than technical or functional criteria (Crilly et al., 2004; Veryzer & Hutchinson, 1998; Barcic et al., 2021, Bloch, 1995). According to Er (2009), if people feel safer, more comfortable, efficient or happy when they relate to a product, they are more enthusiastic about buying that product. This result is associated with the success of the designer.

Each data in the physical and emotional communication process between the furniture and the user constitutes the reasons why the user prefers the furniture product. The data generated during communication can be associated with product features or user experience. The data associated with product features is generated by the skills of the designer and manufacturer, while the data associated with the user experience is generated by their personal history and perception process. The data from the user experience is evaluated within the framework of the user's relationship with the furniture, both during the process of purchasing the furniture and after the purchase (Tütüncü, 2011). The data associated with the product features, on the other hand, is shaped in the mind of the designer in the most basic sense. In general, there are some criteria for classifying and using this data. According to Tütüncü (2011: 42), these criteria decided by the designer are also important for influencing user perception. These criteria affect not only user perception, but also all inputs in the design activity, from the product's form, production, packaging to service.

Considering the criteria in the designer-furniture-user triangle, it seems that the studies conducted so far have mostly been examined on the reasons why users prefer or buy a furniture product. (Tütüncü, 2021;

Burdurlu et al., 2004; Öztürk, 2006; Andaç, 2008; Mosder, 2009; Dülgeroğlu, 2011; Akyüz, 1998; Göktaş, 2003; Erdinler & Koç, 2015; Çabuk et al., 2012; Okçu & Morkoç, 2017; Atılğan et al., 2018). One of the main reasons for focusing on user preferences is to attract their attention by identifying their preferences and purchasing habits. (Jost et al, 2020). As one of the sectors most affected by user behavior and preferences (Khosro et al., 2020), understanding the purchasing behavior of users in the furniture industry is crucial for companies to operate successfully and effectively (Oblak et al., 2020).

Criteria containing user preferences and concerns are the most important data in the design process, and the user does not want to buy a product that does not take these criteria into account again (İlhan et al, 2022; Browne & Tobin, 2013). When the criteria addressed by companies and designers operating in this sector are in line with user expectations, success can be achieved. For this reason, user data can be taken as a basis for determining design criteria in furniture and for product features to reflect these criteria and communicate with user perception. The designer can reveal a design process that is integrated with both his own design philosophy and approach and the values of the user. However, user values, including user requirements, change according to the sector or field in which the design activity takes place, and the basic evaluation criteria change at the same time. For this reason, the designer should take into account not only the evaluation criteria of the user, but also different criteria, including the production-technical capacity of the sector in which he operates and the company, his own principled stance.

When the studies on determining or classifying the criteria in the design activity are examined, it is seen that a large number of criteria are analyzed and sometimes handled differently depending on the user or customer (sometimes also the manufacturer-subcontractor). Examples of such evaluation or preference criteria are; durable, functional, having more than one function, aesthetic, reliable, easy to clean, service, shape and form, economical, suitable for space and place, fashionable, easy to carry (Yıldırım & Aslan, 2022; Akyüz, 1998; Göktaş, 2003; Kalıncara, 2008; Arpacı, 2014; Atılğan et al., 2018; Çabuk et al., 2012; Burdurlu et al., 2004; Öztürk, 2006; Andaç, 2009; Dülgeroğlu, 2011; Erdinler & Koç, 2015; Okçu & Morkoç, 2017). In the study of Tütüncü (2011) user opinions are taken as basis to evaluate the furniture product. In this study, based on the evaluation criteria of national and international design competitions, user opinions are evaluated on five different criteria: functional, technical, economic, aesthetic and conceptual. However, until today, the research on determining the criteria or determining the priorities of these criteria in all the processes of design (concept, final design, production, reverse production, marketing, packaging, assembly plan, etc.) of the furniture product, starting from the conceptual level, has not been reached.

All of the criteria for furniture preferences examined in the literature are necessary and important to determine the design evaluation criteria. However, it is of great importance to determine what criteria are involved in the design inputs of the furniture product and to what extent these criteria will be effective in design evaluations. Understanding the criteria fully and using them correctly from the designer's point of view will help the product to establish a correct relationship with the user. However, since the literature evaluates and reveals the criteria mostly in the context of the user-furniture relationship, the research is based on developing a proposal on this subject in order to complete the lack of literature. In this sense, the criteria taken as a basis were selected based on literature studies and expert opinions, and the impact rates were determined by the Analytical Hierarchy Process (AHP) method, which is one of the multiple decision-making methods. The results obtained are aimed at determining the basic criteria in furniture design evaluations, and it should not be forgotten that the design criteria for other sectors and design areas may change depending on their internal dynamics and special conditions.

MATERIAL

The design criteria to be taken as a basis for determining the evaluation of furniture products include literature (Akyüz, 1998; Göktaş, 2003; Burdurlu et al., 2004; Öztürk, 2006; Andaç, 2008; Mosder, 2009; Dülgeroğlu, 2011; Tütüncü, 2011; Çabuk et al., 2012; Erdinler & Koç, 2015; Okçu & Morkoç, 2017; Atılgan et al, 2018), criteria of national and international design competitions (IDA Design Awards, A'Design Award & Competition, IF Design Award, Design Turkey) and expert opinions (5 expert opinions consisting of interior architects, industrial designers and woodworking engineers), 4 main criteria and 25 sub-criteria were selected and determined.

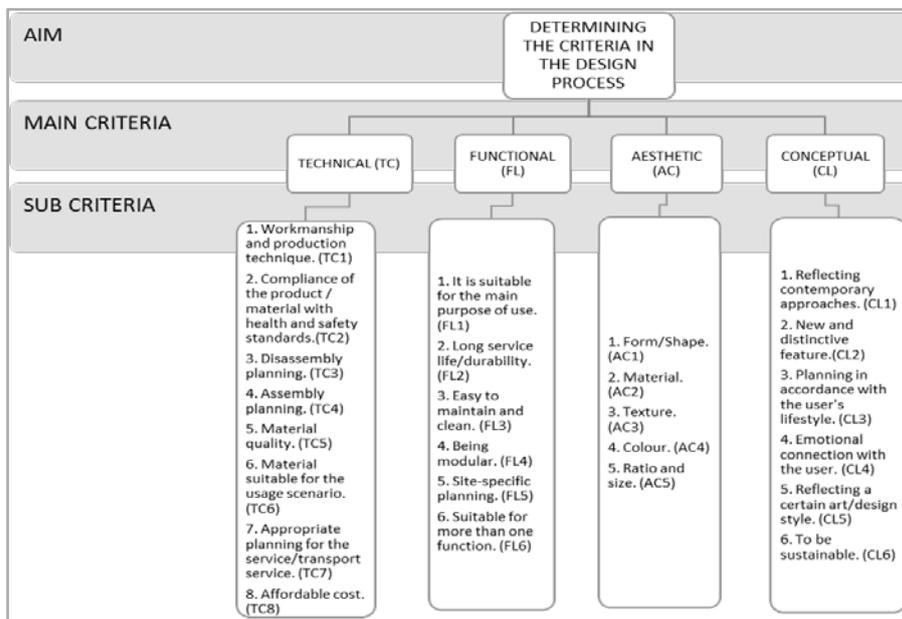


Figure 1. Analytic hierarchy process hierarchy structure.

The experts participating in the determination of the criteria for evaluation are a group of private sector employees and academicians with at least 5 years of experience in the field and qualified professional experience in the relevant sector. In this sense, it is considered that the competencies of determining and evaluating the furniture design criteria needed for research are sufficient.

Together with the expert opinions, the main criteria in the furniture design process were considered as technical (TK), functional (IL), aesthetic (EK) and conceptual (KL) as shown in Figure.1. The sub-criteria have been coded both to reduce the confusion in the analysis process and to make it more defined. Accordingly, sub-criteria workmanship and production technique (TC1), product/material, compliance with health and safety standards (TC2), disassembly planning (TC3), assembly planning (TC4), material quality (TC5), material selection suitable for the scenario used (TC6), planning suitable for service/transportation (TC7), cost-effective (TC8), suitable for the main purpose of use (FL1), long service life/durability (FL2), easy maintenance and cleaning (FL3), modular (FL4), site-specific planning (FL5), suitability for more than one function (FL6), form/shape (AC1), material (AC2), texture (AC3), color (AC4), ratio/size (AC5), reflecting contemporary approaches (CL1), having a new and distinctive feature (CL2), planning in accordance with the lifestyle of the user (CL3), establishing an emotional connection with the use (CL4), reflecting a certain art/design style (CL5) and sustainable (CL6) have been determined (Figure.1).

Technical Criteria

The technical criterion in the furniture design process deals with the details of all systems in the part-whole relationship such as planning the production process in the part and whole of the product, analyzing the details at different scales, and selecting the materials to be used. In these details, the competencies of the company-manufacturer are taken into consideration. Planning such as workmanship, the machine to be used and the production process are part of the technical issue. Technical features affect the formal and functional characteristics of the furniture (Tütüncü, 2011), as well as financial criteria such as cost and selling price, which directly affect the manufacturer and user. The decisions that the designer will make about production management and planning, the choice of materials to be used, the cost of the product, are the main factors that determine the sales prices.

Here, it is essential to plan not only the production process of the product, but also all the details so that the purchased product is ready for use. Accordingly, sub-criteria such as the service-shipping service of the product to the place where the product will be placed; the planning of information on how to assemble the parts in the place to be used may also be included in the technical issues within the decisions to be made by the designer.

The best assumption for evaluating the technical criterion is that the furniture design can be produced. This criterion needs to be evaluated with a holistic approach from imagination to reality; technology, workmanship, materials used and selected, cost, assembly and service.

Functional Criteria

Serving its purpose or fulfilling its purpose in its relationship with the individual (Beyazit, 2008) is the basic definition of the functional criteria we expect in furniture design. Accordingly, it can be said that the purpose of a furniture is to meet the needs of sitting, sleeping, listening, working and other similar needs. It must fulfill the needs or expectations it encounters in basic vital activities. For example, products such as desks, chairs, lighting suitable for working purposes, chairs, armchairs, bergere, etc. suitable for sitting purposes can take shape/form in accordance with these purposes.

The main purpose of furniture is to meet the basic expectations of the users. In this context, the user may want to see or meet more than one function in the same furniture. For example, an armchair suitable for a seating purpose may also need to meet the purpose of lying down and storage. For this reason, the designer can design furniture in accordance with the user's demands for furniture that can fulfill more than one function. Function is not only related to furniture; space and place also have their own specific functions. For example; the preliminary need that a product designed for a living room should meet is the need for sitting, resting, etc. For this reason, both the furniture and the space should have a harmony of function; the designer should identify the function of the product with the space he designs.

The furniture product should meet the basic physical needs of individuals such as sitting, listening and sleeping etc. in a durable way. (Üst, 2015). This criterion also includes a technical issue and is evaluated only within the scope of long-term use and its ability to fulfill its function for a long time. Along with the longevity of the product, one of the important criteria sought in furniture is that it is easy to maintain and clean. According to Atılğan et al. (2018), classic furniture is less preferred by consumers. Maintenance and cleaning criteria is an important factor on the reasons for purchase or preference. This may be related to the shape/form decisions made by the designer, as well as the surface materials or coatings to be used. However, furniture that meets the criterion of cleanliness, which is an important vital need of the user's daily life, is one of the functional criteria that the designer should evaluate.

Aesthetic Criteria

Aesthetic features can become defined when other criteria in furniture are analyzed in a meaningful integrity and perceived by the user. In other words, in aesthetic perception; qualities are comprehended holistically without being classified according to product parts (Yüksel, 2008). In

aesthetic perception, for example, the surface material used and the quality of workmanship may cause the user to make a holistic inference in the perception of color, material or texture. In this sense, when evaluated through the example given, the results formed by the technical and functional criteria together create an aesthetic perception.

In order for the designed product to be perceived by the target user, in addition to meeting the social, economic and technological expectations of the users, aesthetic decisions such as material, texture, color and form that provide the expression of the product must be presented correctly (Usal, 2004; Tütüncü, 2011). According to this definition; aesthetic criteria, which are directly related to an external reality and user perception, use the color, material and texture, proportions and dimensions, form and shape of the furniture. The perception of form and shape can be achieved through the components of proportion-size, color, material and texture decisions. These decisions are an external reality seen, felt or perceived by the user and can change instantly according to the individual and society.

Conceptual Criteria

Conceptual criteria include decisions where designer decisions and competencies are more prominent. We can also say that this criterion is one of the most powerful criteria that enables the interaction of the designer's intellectual competencies and user perception. The most influential data in terms of user perception or reasons for preference include the abstract and concrete decisions made by the designer when the product is in draft form. The criterion of reflecting the user's lifestyle and establishing an emotional connection with him/her may be the conceptual evaluation expected by the user, or it may be the designer's first starting point or main theme.

The first starting point or conceptual data of the designer can be any art/design style. In this context, the designer may not want a design product to be evaluated only as a technical or functional product, as a result of his principled decisions. Designers may want to meet the changing demands they foresee in the future beyond today's expectations in their decisions. For this reason, the designer is expected to have the competence to anticipate what will happen in the future or to evaluate the present with a different perspective. With his/her predictions and point of view, he/she should be different, new and distinctive (original) than what exists today or in the past.

METHOD

Analytical Hierarchy Process (AHP), one of the multiple decision making methods, was developed by Thomas L. Saaty in 1977 (An et al., 2007; Anderson et al., 2008). The method is a mathematical technique that takes into account the priorities of the group and the individual in the decision process and can evaluate qualitative and quantitative variables together (Dağdeviren et al., 2004; Lin et al., 2008). It is assumed

that there are n decision options in AHP and that the people who will evaluate these decision options are experts at a level that can make relative comparisons with each other and qualitatively rate the criteria. (Saaty, 1980; Anderson et al., 2008). Decision makers or experts should consist of people who know the subject, are interested in the subject and have experience in the subject (Kuruüzüm & Atsan, 2001).

The criteria are compared among themselves and scored according to the AHP preference scale proposed by Saaty (1990) and a comparison matrix ($n(n-1)/2$ for n units) is formed. The general form of pairwise comparison matrices is shown in Table 1. While it shows the w_i/w_j ratio in the relevant matrix, it shows how many times the criterion i . is more important than the j . criteria. The criteria given in Table.2 are based on which their importance levels are determined (Saaty, 1980). In this way, the relative importance of each criterion according to the target and the relative importance of the decision option according to the relevant criterion are determined.

Table 1. Pairwise comparison scale (Saaty, 1980).

$$W = \begin{bmatrix} w_1/w_1 & w_1/w_2 & \dots & w_1/w_n \\ w_2/w_1 & w_2/w_2 & \dots & w_2/w_n \\ \dots & \dots & \dots & \dots \\ w_n/w_1 & w_n/w_2 & \dots & w_n/w_n \end{bmatrix}$$

Table 2. Significance rating scale used in the pairwise comparison matrix (Saaty, 1980).

Importance Values	Value Definitions	Criteria Explanations
1	Equally important	Both criteria are equally important
3	Moderately important	One criterion is slightly more important than the other
5	Strongly important	One criterion is strongly more important than the other
7	Very strongly important	One criterion is very important than the other criterion
9	Extremely important	One criterion is definitely more important than the other criterion.
2, 4, 6, 8	Intermediate value	Used when compromise is required

The first step of the AHP method is to determine the target, criteria, sub-criteria and alternative options, if any, that differ according to each problem. In the second stage, the pairwise comparisons of the criteria

with each other are determined by means of the criteria in Table.2 and their contribution to the purpose of the study is determined. Normalization is performed on the generated pairwise comparison matrix (Saaty, 1980). In this way, the priorities of the criteria and sub-criteria are determined. In the third stage, the contribution of the criteria and sub-criteria to the study target is determined. The priorities of the criteria and sub-criteria are determined by performing operations on the pairwise comparisons matrix described in the second step.

In the fourth stage, pairwise comparison evaluations are subjected to consistency analysis. Purpose of this; “X is more important than Y; If Y is more important than Z, X is more important than Z”, but also “If X is 2 times more important than Y, Y is 3 times more important than Z, then X is 6 times more important than Z” in the form of proportional consistency (Saaty & Özdemir, 2003: 236). The consistency rate (CR) in AHP shows the consistency of the decision made by the decision makers (Ülger & Tosunoğlu, 2020). CR is expected to be less than 0.10. If the ratio is less than 0.10, the pairwise comparison matrices are consistent and the method continues to be applied. If the ratio is not consistent, decision makers are expected to reconsider their values until pairwise comparisons are consistent. The consistency indicator and the consistency analysis calculation are shown in Table.3.

Table 3. Consistency indicator (CI) and consistency analysis (CR) calculation

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad CR = \frac{CI}{RI}$$

The randomness index (RI) in Table 2. is the indicator that corresponds to the number of criteria in the matrix. The randomness indicator changes according to the number of criteria. By using the random consistency index given in Table.4, reciprocal matrices are created and evaluated together with the results in the formula.

Table 4. Random value index (Saaty, 1980)

n	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49	1,51	1,48	1,56	1,57	1,59

The large number of criteria in the problems addressed reduces the possibility of obtaining consistent results when evaluated together with all the criteria (Kwiesielewicz & Uden, 2004). The relative importance levels given by the decision makers were converted into a single group decision by taking the geometric mean. The results to be analyzed by the single group decision AHP method were obtained. The importance levels given by the participants were analyzed using the Super Decisions program, which supports the AHP method.

RESULTS

The AHP method was applied to determine the priorities and impact ratios of the main criteria and sub-criteria that the designer is expected to take as basis. In the literature, it is seen that in the studies where the criteria of furniture product preference or furniture design evaluation are examined and analyzed, it is seen that many different criteria belonging to the design are considered from one or more aspects. All of the criteria in the studies can play a role in the design process or can ensure that the design process proceeds in a more qualified process. However, determining the importance weights and degrees of the criteria to be taken as basis is important for the correct and qualified organization of the design inputs that will take place in the design process and guide the design decisions.

Table 5. Pairwise comparisons of design evaluation main criteria

MAIN CRITERIA	Technical	Aesthetic	Conceptual	Functional	WEIGHT
Technical	1	3	4	1/3	0.285
Aesthetic	1/3	1	1/2	1/5	0.081
Conceptual	1/4	2	1	1/3	0.125
Functional	3	5	3	1	0.509
Consistency Rate (CR) = 0.079					

The scale given by the expert decision makers to the relative importance of the design evaluation criteria was transformed into a single group decision by taking the geometric mean and the findings in Table.5 were obtained. According to this; the criterion that designers should concentrate on the most in the furniture design process is functional criteria with a rate of 50.9%. Functional criteria have the highest rate among the evaluations in the design process. The functional criterion, which has a higher ratio than the total ratio of the other three criteria, may be directly related to the effort to meet the basic needs of the users. In this sense, we can say that the most important criterion for evaluating the furniture product by experts is function. Function is followed by technical, conceptual and aesthetic criteria with 28.5%, 12.5% and 8.1% respectively. Designers should focus on functional furniture design for a successful design process. Consistency analysis was performed for the pairwise comparison matrices of the main criteria in design evaluation and the consistency ratio was found to be 0.079. Since the consistency ratio is below 0.10, the pairwise comparison matrix is consistent.

Table 6. Pairwise comparisons of sub-criteria by technical criteria.

TECHNICAL	TC1	TC2	TC3	TC4	TC5	TC6	TC7	TC8	WEIGHT
TC1	1	1/3	1/2	1	1/3	1	3	1	0.083
TC2	3	1	4	3	1	2	3	2	0.218
TC3	2	1/4	1	2	1/3	1/2	4	1/3	0.091
TC4	1	1/3	1/2	1	1/4	1/3	3	1/3	0.062
TC5	3	1	3	4	1	3	5	3	0.253
TC6	1	1/2	2	3	1/3	1	1/2	1/3	0.096
TC7	1/3	1/3	1/4	1/3	1/5	2	1	1/4	0.042
TC8	1	1/2	3	3	1/3	3	4	1	0.155
Consistency Rate (CR) = 0.072									

Pairwise comparison matrices of experts' design evaluation priorities in technical sub-criteria are given in Table.6. According to this, the top three criteria that the designer should focus on the most in technical issues are material quality with 25.3% (T5), compliance with health and safety standards in products and materials with 21.8% (T2) and cost planning with 15.5% (T8). The total weight of the first two criteria is close to the total weight of the other criteria. In this sense, the first two criteria, which are related to the material and the product itself, are directly related to the physical contact of the user with the product. In this way, designers can provide users with faster communication with the product. Criteria such as the selection of the material used in the furniture in accordance with the usage scenario (T6) 9.6%, the disassembly and assembly plan (T3) 9.1%, careful choices in workmanship and production technique (T1) 8.3%, the assembly plan of the furniture (T4) 6.2% and the planning of the service / transportation service (T7) 4.2% were identified as criteria that could be taken into consideration later. Since the consistency ratio in the pairwise comparison matrices of the technical sub-criteria was 0.072, the comparison is consistent.

Table 7. Pairwise comparisons of sub-criteria by aesthetic criteria

AESTHETIC	AC1	AC2	AC3	AC4	AC5	WEIGHT
AC1	1	3	4	2	3	0.398
AC2	1/3	1	5	3	3	0.278
AC3	1/4	1/5	1	1/3	1/3	0.056
AC4	1/2	1/3	3	1	2	0.122

AC5	1/3	1/3	3	1/2	1	0.146
Consistency Rate (CR) = 0.082						

When the sub-components of aesthetic values were examined, it was observed that the form/shape (AC1) criteria was dominant at a rate of 39.8% in the evaluation of the design. It is estimated to be the best way to communicate with the user in general terms of the product. In user perception, the perceived form/shape is seen as a dominant criterion along with other aesthetic decisions. After form/shape decisions, the second most important criterion that experts consider in furniture design is material (AC2) with 27.8%. The first two most important criteria under the technical criteria are directly related to the material. However, in aesthetic criteria, the material is less important for the designer than the external contours of the product. Among these criteria, the texture criterion (AC3) was found to be the least important criterion with 5.6%. The consistency ratio of the matrices in the aesthetic sub-criteria was 0.082, indicating that the comparison was consistent (Table.7).

Table 8. Pairwise comparisons of sub-criteria by conceptual criteria

CONCEPTUAL	CL1	CL2	CL3	CL4	CL5	CL6	WEIGHT
CL1	1	1/3	1/3	1/2	1/3	1/5	0.054
CL2	3	1	1/3	1/2	2	1/3	0.110
CL3	3	3	1	3	4	1	0.284
CL4	2	2	1/3	1	2	1/5	0.121
CL5	3	1/2	1/4	1/2	1	1/5	0.078
CL6	5	3	1	5	5	1	0.352
Consistency Rate (CR) = 0.057							

In Table.8, the joint group decision of the decision makers is seen in the conceptual criteria that the designer handles in the furniture design process. According to experts, the criterion that the designer should consider and evaluate most intensively is that the furniture is sustainable (CL6) with a rate of 35.2%. For designers, recyclability of all materials in the product, minimizing the damage to nature or reusing the materials in the product are important criteria. In addition, the second criterion that the designer should pay attention to is the furniture design process suitable for the user's lifestyle (CL3) with 28.4%. For this reason, it is an important criterion for the designer to constantly take into account the wishes and needs of the users, to follow the design process that focuses on the user, to constantly update and develop himself according to the

changing and developing lifestyles. The third criterion to be considered in the design process was found to be establishing an emotional bond with the user (CL4) with 12.1%. When we consider the first three criteria, it is seen that the designers focus more on the user and nature or environmental factors. According to experts, the effort to reflect today's trend or contemporary approaches (CL1) is the criterion that affects the least with a relative rate of 5.4%. Since the consistency ratio is 0.057, we can say that the comparative matrix is consistent.

Table 9. Pairwise comparisons of sub-criteria by functional criteria

FUNCTIONAL	FL1	FL2	FL3	FL4	FL5	FL6	WEIGHT
FL1	1	3	3	5	2	5	0.358
FL2	1/3	1	3	7	3	5	0.275
FL3	1/3	1/3	1	2	1/3	2	0.086
FL4	1/5	1/7	1/2	1	1/5	1/2	0.041
FL5	1/2	1/3	3	5	1	5	0.186
FL6	1/5	1/5	1/2	2	1/5	1	0.054
Consistency Rate (CR) = 0.061							

In the furniture design process, designing the product in accordance with its intended use (FL1) or planning a product compatible with its function is the criteria that the designer should focus on the most. Experts attach more importance to this criterion than other criteria by 35.8%, drawing the attention of designers to this criterion. Long-term use of the product, lifetime or durability (FL2) is the second most important criteria for designers with 27.5%. Accordingly, it has been determined that it is necessary to focus on material selection, production technology, workmanship and detail solution used in the design process. Although these details seem to fall within the scope of a technical issue, they ultimately affect how long the user can use the product or how much he or she can trust the product. The spatial planning criterion (FL5), which is in the third place proportionally with 18.6%, which should be included in the design process, shows the importance of the space-furniture relationship. The important thing here is that the furniture is compatible with the function or size of the space. The user should be able to use the furniture he/she chooses easily wherever he/she wants to use it, and place the furniture he/she chooses in the place he/she needs with peace of mind. When evaluated from the designer's point of view, the last three criteria to be considered in the furniture design process are, respectively, being easy to maintain and clean (FL3) with 8.6%, responding to more than one function (FL6) with 5.4%, and modular (FL4) with 4.1%. When the comparative matrix table of all criteria under the functional was

examined, it was determined that the consistency ratio was 0.061. The pairwise comparison matrix is consistent because the consistency ratio is below 0.10 (Table.9).

CONCLUSION AND RECOMMENDATIONS

In the study, it was tried to determine the criteria and sub-criteria that should be included in the design process. In this context, the relative importance rankings and weights of the criteria and sub-criteria in the design process were analyzed by the AHP method. Problems such as the inability to clearly reveal the criteria in the evaluation of the design in the furniture industry and related academic fields constitute the main reason for the method in this study. Determining and grading the criteria that should be included in the design process, in what proportion and to what extent, is of great importance in terms of the quality of the design process. Problems such as how important the criteria are compared to each other, especially in the process until the final decision for the design product, and reaching a common and objective decision in the group evaluation process can be minimized with the AHP method.

The criteria and sub-criteria that should be considered in the design activity in the furniture sector were determined with the expert opinions and the data obtained from the literature. In the design process, the main criterion that the designer should focus on the most is functionality. Accordingly, the functionality criterion should be handled effectively in a furniture product. Functionality mostly includes sub-criteria that can be directly perceived with concrete data. It is thought that the influence of the designer's personal experience and subjective decisions on functionality is quite low. Because the most important task of a furniture is to fulfill its function and to be suitable for its function. One of the most important goals of the designer is to ensure that the product is understood by the user or the consumer quickly and accurately. In the furniture product, the function is known as the criterion that the user can understand and interpret even without physical contact with the product. In other words, it can be said that the function is one of the criteria that provides the fastest communication between the designer and the user.

The function sub-criterion that follows the design of the furniture in accordance with its intended use is that its useful life is long and durable. In this case, the designer is looking for answers to the questions of how long the users who buy the product can use the product and how long the product's useful life will be. For the solution of this, technical criteria can be applied. However, its long-term functionality and durability can form the basis of trust between the user and the designer. The fact that it is easy to maintain and clean, is modular and has more than one function is of low importance in terms of functionality. These listed features are criteria that should be evaluated and given importance for designers. Especially during the Covid-19 pandemic period, these features have become increasingly important as the working life is more involved in life. The fact that products that meet functions such as sitting and resting

can also meet functions such as working can be one of the most important reasons for furniture preferences. Similarly, the increase in daily cleaning actions under pandemic conditions reveals the need for easier cleaning of products. Designing furniture that can be easily cleaned and wiped and not damaged by these actions constitutes an important situation in terms of the importance that the consumer attaches to hygiene.

The technical criterion, which is seen as a factor in the preference reasons of the users, has been determined as the second most important criterion that should be included in the design process. In order for the furniture to fulfill its function, the designer must be able to analyze and apply technical details. The technical features of the product, which are perceived indirectly by the user, are directly affected by the decisions made by the designer. Details such as production technique and technology, workmanship capabilities and manufacturer competencies and technical details listed as solutions can vary greatly. Today, developing production techniques and technologies, increasing material types and details offer many technical alternatives for the designer. However, as the size and number of increasing diversity increases, the designer may experience indecision and loss of time in their choices. These problems that the designer may encounter may adversely affect the results such as the cost of the product and the quality of the material, depending on the decisions of the designer. The way to minimize these problems, which may be reflected in user preferences, depends on the competence and technical experience of the designer.

It is known that most of the injuries caused by the earthquakes in our country, which is located in the earthquake zone, are caused by the furniture-wall-floor relationship. Apart from fixing the furniture with the structure, technical solution alternatives due to the structure of the furniture can minimize these injuries, perhaps loss of life. Safety standards should be improved in terms of materials and structure used in furniture in all buildings, starting with public buildings. In this respect, legal regulations should be made and users, manufacturers and designers should be informed. In this context, for the designers of our country, which is in an earthquake zone, the design of furniture that is highly resistant to earthquakes, under the criteria of compliance with safety standards, should be considered as a necessity beyond expectation.

It has been determined that the conceptual criterion is the third most intensive criteria that designers should use. In terms of conceptual criteria, it has been seen that the most important sub-criterion to be addressed in the furniture design process is sustainability. Designers should consider the environmental impact and contribution to the natural environment, from the material selection to be used in the furniture design process, to the production technology, and consider the sustainable criteria in the most effective way in their decisions. In order to minimize environmental problems such as increasing air pollution, decreasing water resources and forest diversity, it should be sensitive. Indicating the sustainability principle in the product assembly or user

manual informing the user and enlightening the user should not only be a marketing and sales policy, but also a design strategy. After the conceptual criterion, it has been determined that the criterion that the designer should consider and which has the least importance is aesthetics. After solving the basic needs such as technical and functional, the designer wants to reflect his personal experience and perspective on the product. When the designer wants to reflect his own principled stance and line, he seeks answers to how the product will be perceived or experienced by the user. In this case, the criteria that the designer should focus on the most are form / shape and material. In particular, the relationship between form and form reveals ergonomic results for the user, and these results are mostly the equivalent of the user's experience in the process.

The importance ratings and weights obtained by the AHP method can provide an objective analysis of a single and common result in group decisions. It can contribute to the evaluation scale of multiple decision makers, especially in the evaluation of furniture-related vocational training such as exams and juries, or in national-international design competitions. For example, a design that will be evaluated out of 100 full points can have a maximum of 50 functional, technical 29, conceptual 13 and aesthetic 8 points, respectively, each of the criteria according to the data in the findings. In this scoring, which means that a product can get a maximum of 50 points from its functional criteria, the sub-criteria of each criterion can also be distributed according to the results in the finding. Again, to give an example from the functional criteria, the criterion suitable for the purpose of use can be scored 18 points, durability 14, planning according to the space 9, ease of maintenance and cleaning 4, having more than one function 3 and being modular can be scored over 2 points. The values given show the value that should be given at most. After these distributions are proportionally distributed within the sub-criteria of each criterion, the resulting values are added up and the total score obtained by the product is obtained after dividing by the number of decision makers. Although the highest score or value to be given to a product varies according to the decision makers, the important issue here is the importance weights and order of the criteria and sub-criteria.

The evaluation weights and order obtained by the AHP method are for the design process in the furniture product. Evaluation criteria in other sectors and fields may vary depending on the sector and its internal dynamics. In addition, the furniture industry is divided into some classifications within itself. Furniture groups in other classifications such as office furniture, home furniture and kitchen furniture may also have different design dynamics within themselves. For this reason, future studies can reveal the evaluation criteria of the designs according to the distinction within the furniture field, and determine the importance and weights of these criteria. In this way, objective and objective joint decisions can be made, such as how to make evaluations according to furniture types. These evaluations, on the other hand, will have the effect

of objective results, not subjective thoughts and approaches, which can help multiple decision makers of the design product take a joint and single group decision in the industry, education and competitions. Objective decisions will not only minimize indecision in design evaluations, but will also help to quickly select the qualified and appropriate one among many options. In this way, while the loss of time will decrease, there will be a quantitative increase in the qualified products that will reach the end user.

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