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EVALUATION OF DIGITAL PLATFORMS IN TURKEY IN TERMS OF USABILITY

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EVALUATION OF DIGITAL PLATFORMS IN TURKEY IN TERMS OF USABILITY

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M.Sc THESIS EXAMINATION RESULT FORM

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EVALUATION OF DIGITAL PLATFORMS IN TURKEY IN TERMS OF USABILITY

ABSTRACT

Globalization and the competition necessitate the user-oriented design today. In the last years, usability has become a very important research subject. Usability, considering user satisfaction along with the user performance, is one of the key factors in determining the success of a product in today's competitive market. Digital TV platforms are selected for this study since usability is highly important for them. Designing a usable Digital TV platform is extremely important for users who have close interaction with them. In this study, 3 different Digital TV platforms are selected and their usability is analyzed. Different Digital TV platforms are compared in terms of their usability. In this context, fourteen users (decision makers) evaluate three different Digital TV platforms. The usability criteria used in Digital TV platforms evaluation is created one category: performance expectations. The best alternative is determined with a robust multi-criteria decision making method that is Analytic Hierarchy Process (AHP).

Keywords: Usability, Usability Methods, Analytic Hierarchy Process (AHP)

TÜRKİYE'DEKİ DİJİTAL PLATFORMLARIN KULLANILABİLİRLİK AÇISINDAN DEĞERLENDİRİLMESİ

ÖZ

Günümüzde kürelleşme ve rekabet kullanıcı odaklı tasarımı gerektirmektedir. Son yıllarda kullanılabilirlik çok önemli bir konu haline gelmiştir. Kullanıcı perfomansı ile birlikte kullanıcı memnuniyeti düşünüldüğünde, kullanılabilirlik bugünün rekabetçi pazarında ürün başarasını belirleyen anahtarlardan birisidir. Bu çalışmada Dijital TV platformlarının seçilme nedeni kullanılabilirlik konusunun platformlar için de esas olmasıdır. Platformlarla yakın etkileşimde olan kullanıcılar için kullanılabilir bir dijital platform tasarlamak çok önemlidir. Bu çalışmada 3 farklı Dijital TV platformu seçilmiş ve onların kullanılabilirliği incelenmiştir. Farklı Digital TV platformlarının kullanılabilirliği karşılaştırılmıştır. Bu bağlamda, 14 kullanıcı (karar verici) bu platformları değerlendirmiştir. Dijital TV platformlarını değerlendirmede performans beklentileri kullanılmıştır. En iyi alternatif çok kriterli karar verme yöntemi olan Analitik Hiyerarşi Prosesi (AHP) ile belirlenmiştir

Anahtar Kelimeler: Kullanılabilirlik, Kullanılabilirlik Yöntemleri, Analitik Hiyerarşi Prosesi (AHP)

CONTENTS

NOMENCLATURE

Acronyms

AHP: Analytic Hierarchy Process

ISO: International Standards Organization

MCDM: Multi Criteria Decision Making

TV: Television

UEMs: Usability Evaluation Methods

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CHAPTER 1

1. INTRODUCTION

Even with the spread of technologies such as smartphones and tablets, popularity is getting a bit smaller, but television is still an important part of our lives. After an intense day of hustle and bustle, there is still an important mass left over to television to relax and have some fun.

Television broadcasting in our country began to develop with the arrival of 90 years. In the beginning of the 2000's, digital publishing was the era. Decoders and analogue satellite receivers are now dropping their place to digital satellite receivers.

The most important increase in digital broadcasting platforms is the thematic channels. Although sports channels in our country generally shape the popularity of these platforms, they are also interested in an important piece of documentary and series-film.

Digital TV platforms are a platform with a membership system and a monthly fee. Digiturk led the digital TV platform. Then, D-Smart in 2007 and Tivibu in 2010 were established.

The most important feature of digital TV platform services is that it offers a variety of different types of user requests. This is needed to be using any of the users.

Products that meet user needs are considered ‘usable’. Hence, the term ‘product usability’ is more significant. As for the definition of International Standards Organization (ISO), usability is a measure of product effectiveness; efficiency and satisfaction (see Figure 1.1).

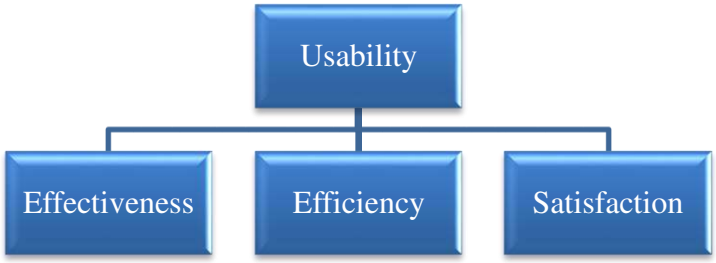


Figure 1.1 Usability Criteria

Effectiveness is the degree to which a system achieves the goals set out. Efficiency is a measure of the resources that must be spent to achieve these goals. Satisfaction is the degree to which a user's system is acceptable [1].

There are many ways to evaluate of usability. Usability tests are tests that test how effectively a product, system, or web page is used in an effective, efficient, and satisfactory manner in accordance with predefined goals and criteria.

The highest level of product satisfaction of the user can be provided by the desire to re-use the product and the effective and efficient use of the product. Thus usability is very important for companies.

Many usability studies have been done in the literature. Usability is increasingly being recognized as a critical dimension in the product design. Usability studies have increasing importance in almost every field in which, there is an interaction between human and an interface. However, when the literature was examined, it was found that there was a limited number of studies on the usability of digital TV platforms. Usability analysis of electronic products is the majority.

The term usability was used firstly in early 1980s whose primary goal is to provide guidance to product developers for the user-friendly Apps development. The usability test can be performed formally or informally in specified environment [1].

Kim and Han proposed a methodology of developing the usability index for electronic products. The methodology gives information about usability dimensions, developing usability measures, and building usability index models [2].

Extensive research was analyzed for product usability in the study of Akay and Kurt (2008). Principally, product usability dimensions were defined under two main titles as performance and emotional expectations [3].

Eraslan, analyzed usability of 14 types of MP3 player's by using multi-criteria decision making (MCDM) methods. In this study, the best alternative is determined with three different multi-criteria decision making methods [4]. In the other study of Eraslan, touch screen cell phones' usability is evaluated. Usability tests were implemented using multi-criteria methodology for selected four equivalent brands of touch screen phones [5].

Flaherty, Smart-TV usability is discussed. It has been understood that the primary role of the TV usability as it relates to the user's goals [6].

1.1. Purpose of the Study

Television undoubtedly still has an important place in our lives. The aim of this study is to evaluate and usability testing of Digital TV platforms.

Usability is an important issue for Digital TV platforms design because users want to use various functionalities and personal user interfaces. As technology increases, complex product functions increase it has taken time to take advantage of Digital TV platforms technologies for active users. This situation also affects product usability. Different Digital TV brands are compared in terms of their usability in this study. In this context, fourteen users evaluate three Digital TV platform brands. The best alternative is determined with multi-criteria decision-making method that is Analytic Hierarchy Process (AHP).

1.2. Definition of the Problem

In this study, different Digital TV platform brands are compared in terms of usability criteria. Usability criteria are considered as criteria to be used to compare Digital TV platform brands. Different Digital TV platform brands are structured as alternatives. AHP (Analytic Hierarchy Process) is used to rank alternatives.

Each user has different expectations from the platforms. The usability criteria were created by taking the expert opinion who knows the user expectancy. Platforms do not have many differences compared to each other. The way users perceive platforms to complete their tasks differs because of demographics.

To ensure continuous availability, the following destinations must be defined in digital TV platforms:

- A user should find it easy to accomplish tasks the first time they use it
- When a user comes back to using the platform after a long while, it should seem familiar to him/her
- Users should be able to complete tasks quickly
- Users must enjoy the design
- The number of errors users make on the platform should be less or must be recoverable without difficulty

Usability can complete tasks accurately providing a faultless user experience. It is mainly used to identify the rigidness of any process, whether it is easy going or not.

CHAPTER 2

2. THEORETICAL FRAMEWORK

In this section, definition of usability and the steps of AHP, an MCDM method used, in order to analyze the usability test results are outlined.

2.1. Definition of Usability

Usability is a term that has gained increasing significance in product design community in the past few decades. Usability is defined as "...the ease of use and acceptability of a system or product for a particular class of users carrying out specific tasks in a specific environment (Bevan, 1991), “designing software applications which people find convenient and practicable for use “(Nielsen, 1993) ‘‘quality of use’’, and “quality in use” (Bevan, 1995, 1997). Keevil described usability in computer science as “how easy it is to find, understand and use the information displayed on a web-based system” (Keevil, 1998). There are many different definition of usability in literature currently.

The quality and consumer acceptability of a product mostly depends on the ease of use, physical, mental and psychological characteristics which are more important than the technical properties of the product [7].

Usability approach is exploring on the method of collecting data. It is result from the research of the user experience as knowing their intuition and condition.

The International Organization for Standardization (ISO) defined two definitions of usability in ISO 9241 and ISO 9126. ISO 9241 defines usability as, ‘the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use (ISO 9241-11, 1998). ISO 9126, usability compliance is one of five product quality categories, in addition to understandability, learnability, operability, and attractiveness [8].

The users who desire to re-use that product can provide the highest level of the product satisfaction. There are many criteria for usability to take place. Primarily, the good analysis is required for the segment of the user. In this study, young users are selected.

Usability has some attributes that should be supported by the systems. Nielsen (1993) defines five attributes of usability as follows [9].

Learnability: The system or an interface should be easy to learn so that end-users can rapidly overcome some work by using the system.

Efficiency: The system should be efficient to use, so that when the users learn the system, it can also be used with a high proportion of productivity.

Memorability: The system should be easy to remember, so that the users should be able to remember everything with the system even they did not used the system for some period and they should not have to learn everything all over again.

Errors: The system should have a low error rate, so that users encounter with few errors during the use of the system and they should get rid of errors easily.

Satisfaction: The system should be pleasant to use, so users are subjectively satisfied when using it.

2.2. Usability Evaluation Methods (UEMs)

The usability studies started in the 1950s. Usability testing is rated "highest as an effective usability methodology to create greater strategic impact," and is widely used in organizations [10].

Usability evaluation methods are grouped under various headlines in the literature. Three types of UEMs have been grouped: empirical methods, inspection methods and inquiry methods.

Empirical methods are based on users' experience with the system in question collected in some systematical way and can be grouped into user study.

User testing is a user-centered usability evaluation method that employs evaluators to observe and record the performance of user during the test session. According to Helen Sharp who quoted from Dumas and Redish (1999), `the goal is to test whether the product being developed is usable by the intended user population to achieve the tasks for which it was designed. Thus, it is a method of finding problem areas by

engaging the persons who are similar to the target users to perform certain tasks. Administered in the user testing laboratory and in a controlled environment within the scheduled time, the users are required to perform either certain tasks, such as navigating through the menus, information searching, reading the different typefaces, or other specific tasks. During the user testing sessions, the evaluator `interprets the user's actions in order to infer how these actions are related to the usability issues in the design of the interface (J. Nielsen, 1994) [11].

Usability specialists and sometimes software developers conduct inspection methods, or other professionals who examine usability related aspects of a user interface without involving any user. System inspection methods inspect the product, instead of studying the user. Inspection methods are divided into three groups: Heuristic Evaluation, Cognitive Walkthrough, and Action Analysis.

In a heuristic evaluation, usability experts review your site's interface and compare it against accepted usability principles. The analysis results in a list of potential usability issues.

Cognitive Walkthrough is done by having a group of evaluators go step-by-step through commonly used tasks. Evaluators can perform it in the early stages of design, before performance testing is possible.

Inquiry methods focus on information about users' likes, dislikes, needs, and understanding of the system by talking to them, observing them using the system in real work, or letting them answer questions verbally or in written form [11]. Usability testing benefits to people.

2.3. Analytical Hierarchy Process (AHP)

AHP, developed by Saaty, determines the relative importance of a set of factors in a MCDM problem [11]. The AHP is the most largely accepted method and is considered by many as the most reliable MCDM method.

In the AHP is in a hierarchy that includes objective, criteria and decision alternatives.

Table 2.3.1 Scale of Relative Importance (according to Saaty (1980))

Intensity of Importance	Definition	Explanation
1	Equal Importance	Two activities contribute equally to the objective
3	Weak Importance of one over another	Experience and judgment slightly favor one activity over another
5	Essential or strong importance	Experience and judgment strongly favor one activity over another
7	Demonstrated importance	An activity is strongly favored and its dominance demonstrated in practice
9	Absolute importance	The evidence favoring one activity over another is of the highest possible order of affirmation
2,4,6,8	Intermediate values between the two adjacent judgments	When compromise is needed
Reciprocals of above nonzero	If activity i has one of the above nonzero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i.	

Source: Thomas L. Saaty, "The Analytic Hierarchy and Analytic Network Measurement Processes: Applications to Decisions Under Risk", European Journal of Pure and Applied Mathematics, Vol 1, No 1, 2008, s. 125.

The pairwise comparisons generate a matrix of relative rankings for each level of the hierarchy. The number of matrices depends on the number elements at each level.

The order of the matrix at each level depends on the number of elements at the lower level that it links to. After all matrices are developed and all pair-wise comparisons are obtained, eigenvectors or the relative weights (the degree of relative importance amongst the elements), global weights, and the maximum eigenvalue (λmax) for each matrix are then calculated using Expert Choice software (Expert Choice, 2000). The software is easy to use and understand, as well as providing visual representations of overall ranking on a computer screen.

The λ_{max} value is an important validating parameter in AHP. It is used as a reference index to screen information by calculating the consistency ratio CR (Saaty, 2000) of the estimated vector in order to validate whether the pair-wise comparison matrix provides a completely consistent evaluation. The consistency ratio is calculated as per the following steps:

Calculate the eigenvector or the relative weights and λ_{max} for each matrix of order *n*

Compute the consistency index for each matrix of order *n* by the formulate:

$CI = (\lambda_{max} - n)/(n-1)$……(2.3.1)

The consistency ratio (CR) is calculated for each pairwise comparison matrix.

CR = CI/RI……...(2.3.2)

If CR≤0.1, it is concluded that comparison matrix is consistent. If CR> 0.1, then the comparison matrix should be reconstructed [11]. Table 2.3.2 shows the RI values for the pairwise comparison matrices with the order from 1 to 10.

Table 2.3.2 RI Index

N	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

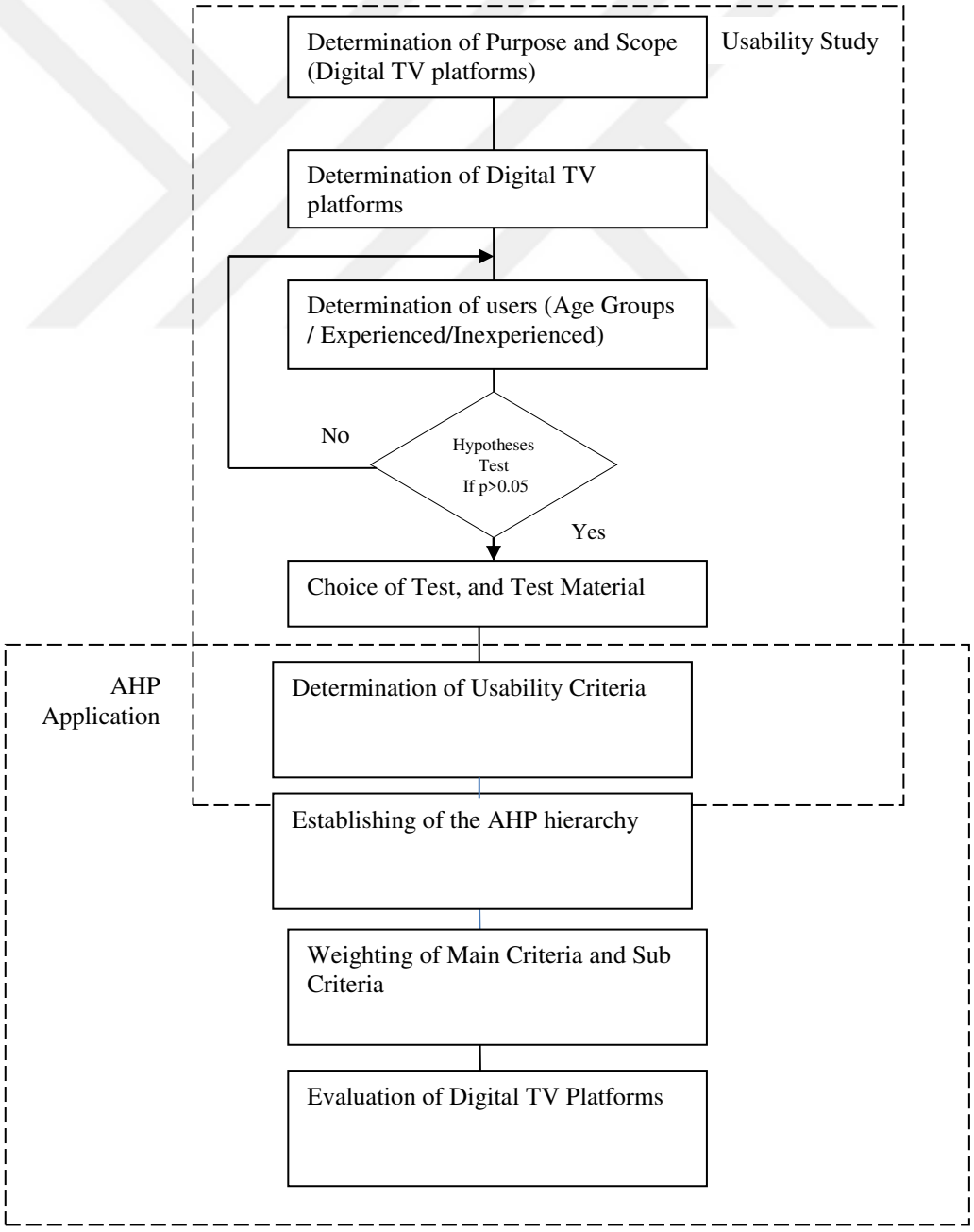
This method is a common one and is used in several studies from different areas especially in the last two decades [5].

CHAPTER 3

3. USABILITY ASSESSMENT IN THREE DIGITAL TV PLATFORMS

This section presents the methodology used in the study. First, presentation of participants are recognized. Section 3.2 describes the material used in the study. The conducted tests and their results are presented in following sections. Methodology shown in Figure 3.1.1.

Figure 3.1.1. Methodology and Flow Chart



3.1. Participants

Platform 1, Platform 2 and Platform 3 are market leaders in Turkish Digital TV platform market. Test procedure is issued to the 7 experienced and 7 inexperienced users in the use of Digital TV platforms located in Ankara. Fourteen of the randomly selected users were female 64% and remaining 36% were male. The seven of the fourteen students are inexperienced (50%) and seven are experienced (50%) in using Digital TV platforms. It is observed that the average task completion times of the experienced users do not deviate from the task completion times of the inexperienced users significantly. Therefore, responses of the users in both groups are evaluated together. 14 subjects participated in this study including 9 female and 5 male.

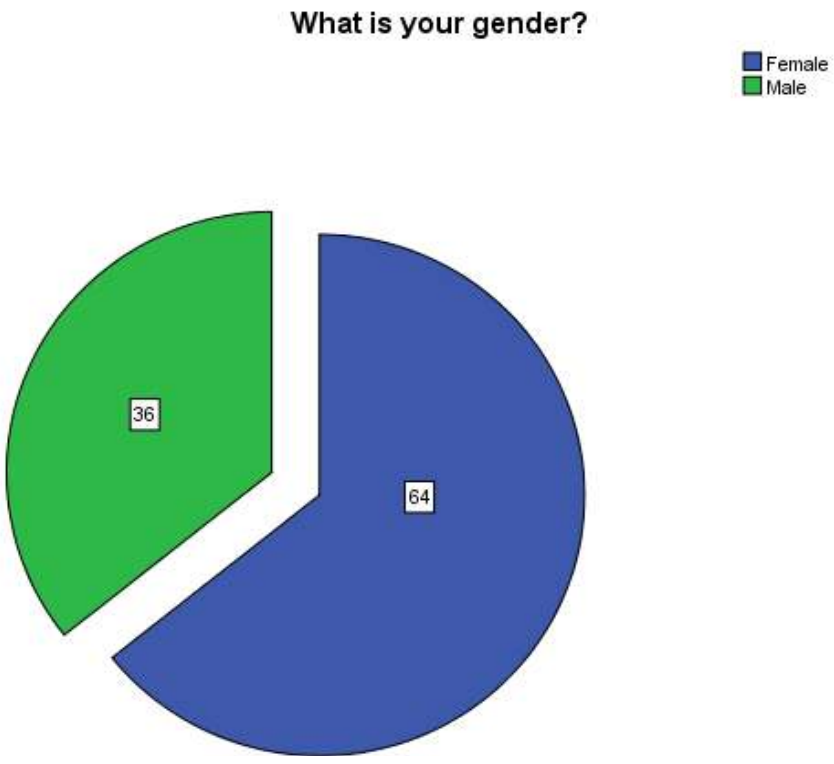


Figure 3.1.2 Distribution by Gender

64 percent of the users are female and 36 percent are male (see Figure 3.1.1).

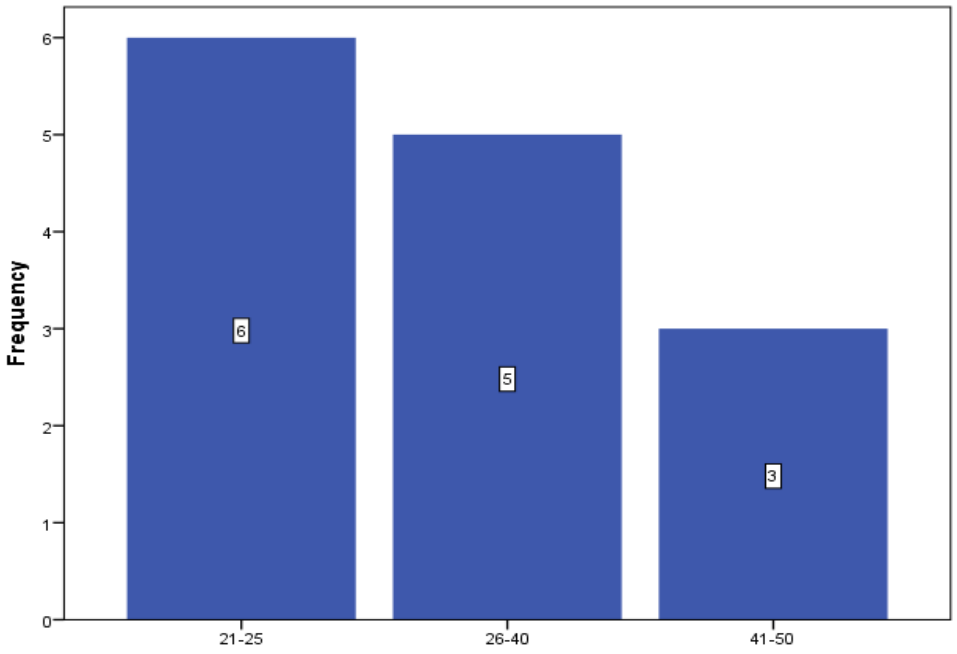


Figure 3.1.3 Distribution by Age

Especially young users are selected because young people will develop Digital TV Platforms in the future. 6 users are between the ages of 21-25, 5 users are between the ages of 26-40 and 3 users are between the ages of 41-50 (see Figure 3.1.2).

3.2. Test Material and Plan

The equipment and material that was used is presented below, as well as the tasks that were given to the participants.

Test: Usability test

Testing Tool: Three different Digital TV platforms with equivalent features. The brands of the Digital TV platforms are concealed and identified in this study as Platform 1, Platform 2 and Platform 3.

Subjects: 14 users chosen. (7 experienced and 7 inexperienced users in the use of Digital TV platforms)

Testing Environment: Silent and real living room.

Testing Materials: Chronometer, Questionnaires and Job Cards

Questionnaire 1: Demographic information test (before the usability test-Appendix B- Results for each platform, See Appendix D)

Questionnaire 2: Post test (after the usability test- See Appendix B)

Pairwise Comparisons (See Appendix C)

4 job cards (See Appendix A) are performed chosen from different menus:

Job 1: Please find (the provided random movie) and begin watching.

Job 2: Saving a program to a list to watch later.

Job 3: Find your saved program.

Job 4: Removing a saved title from the personalized title list.

Evaluation Method: Multi Criteria Decision Making Methods. (AHP Procedure)

In brief, the dataset in this study consist of 14 users (subjects), eight questions for demographic information test used before the usability test and time measurement of four jobs cards for three different brands of Digital TV Platforms.

In this study, it is aimed to evaluate the most usable Digital TV Platform selection problem under four main criteria and 11 sub criteria as:

F 1.1. : Data Processing Speed

F 1.2. : Interface Quality

F 2.1. :Interface Design

F 2.2. :Easy Use

F 2.3. :Understandable Guidance

F 3.1. :Easy Learn

F 3.2. :Memorization

F 3.3. : Informativeness

F 4.1. :Accessibility

F 4.2. :Error Prevention

F 4.3. : Task Completion

The descriptive statistics obtained from the tests for 14 users and 11 usability criteria is summarized in Table 3.2.1 for the selected three brands.

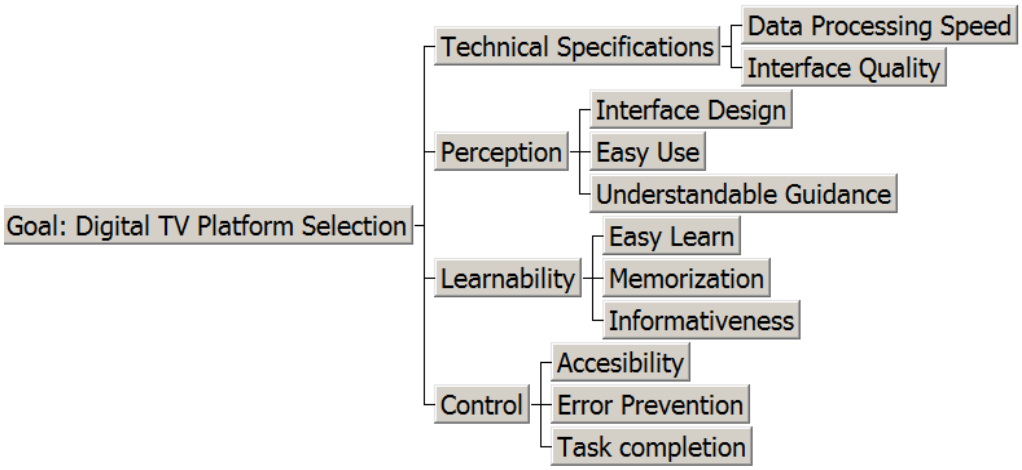
Table 3.2.1 Presentation of basic statistics of dataset

Sub-criteria	***Platform1***			***Platform2***			***Platform3***		
	Mean	***Mode***	***SD***	***Mean***	***Mode***	***SD***	***Mean***	***Mode***	***SD***
F 1.1.	3.67	3	0.72	3.62	4	0.69	3.74	3	0.79
F 1.2.	4.01	4	0.69	3.03	5	0.49	3.64	3	0.42
F 2.1.	3	3	0.58	2.14	3	0.77	3.03	2	0.53
F 2.2.	2	3	0.39	2	3	0.55	2.42	2	0.93
F 2.3.	2	3	0.39	2	3	0.55	2.42	3	0.93
F 3.1.	3.52	4	0.31	3.52	5	0.31	3.28	3	0.83
F 3.2.	3.52	4	0.31	3.52	5	0.31	3.28	3	0.83
F 3.3.	3.52	4	0.31	3.52	5	0.31	3.28	3	0.83
F 4.1.	3.82	2	0.66	3.85	4	0.69	3.46	3	0.92
***F.4.2.**	3.82	2	0.66	3.85	4	0.69	3.46	3	0.92
F.4.3.	3.82	2	0.66	3.85	4	0.69	3.46	3.	0.92

3.3. Establishing the AHP Hierarchy

According to The International Standards Organization (ISO), usability achieve specified goals with effectiveness, efficiency, and satisfaction in a certain context of use. Thus, at the first step of the usability evaluation study, a hierarchical structure is done in order to analyze the results of the questionnaires. There are main criteria at the first level of the decision hierarchy and sub-criteria at the second level of the decision hierarchy. The main criteria should be considered as the strategic criteria. According to ISO usability definition and past literature studies in usability evaluation, the main criteria (level 1 of AHP structure) are illustrated as 'technical specifications (satisfaction) (F1)', 'perception (efficiency) (F2)', learnability (efficiency) (F3), and 'control/action (satisfaction) (F4) as seen in Figure 3.1.1. In AHP structure.

Figure 3.3.1 Hierarchical Structure



Main criteria that are Technical Specifications, Perception, Learnability and Control are compared with each other. Calculations are done according to the answers of 14 surveys that include pairwise comparison in them.

The calculations are done with the help of 'Expert Choice' package software program. At first, the results obtained are tested in the two categories (experienced and inexperienced users) for each platform.

3.4. The Test Results of the Hypotheses

The hypotheses were tested where H_0 means that there are no significant differences between the means of the groups statistically and H_1 is the opposite. After the F test, H_0 hypothesis is accepted (p = 0.06>0.05).

When Table 3.4.1 is analyzed, it is seen that the value of total mean square is 0.52 between the groups. Totally, 14 measurement (subjects) values are tested. Means are calculated for each platform. The degrees of freedom (df) are 1 (k-1) between groups, 12 (n-k) within groups and 13 (n-1) totally.

Table 3.4. 1 The test results of the hypotheses for experienced and inexperienced users

MEAN	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.525	1	.525	4.293	.060
Within Groups	1.467	12	.122		
Total	1.991	13			

3.5. AHP Application to Weighting the Criteria

The weights of the main criteria are found in the hierarchy. To do that, a comparison matrix was formed by using Expert Choice. For user satisfaction, opinions in the market and the job periods measured in the usability test made in this study were decisive. Comparison matrix formed by using the main criteria and the weights obtained from this matrix are shown at Table 3.5.1.

Table 3.5.1 Weights of the strategic factors

Performance Dimensions	Weights
Technical Specifications (F1)	0.464
Perception(F2)	0.207
Learnability (F3)	0.168
Control (F4)	0.161

With analyzing the table 3.5.1 above, the most essential criteria for selecting Digital TV platform is rated in following sequential order; %46.4 Technical Specifications, %20.7 Perception, %16.8 Learning and finally %16.1 Control.

An AHP model should be formed for each Digital TV platform with the comparison matrices formed for Platform 1, Platform 2 and Platform 3.

Pairwise comparison matrices were set up for the sub-criteria from the analytical hierarchy models (AHP) with the help of Expert Choice software.

Table 3.5.2 The Evaluation Point of the Platform 1 Digital TV Platforms

Performance Dimensions	Global Weights	Sub-criteria	Local Weights	Category Score	Evaluation Points of the Factors Platform 1
Technical Specifications (F1)	0.464	**F.1.1.**	0.5	3	0.696
		F.1.2.	0.5	4	0.928
Perception (F2)	0.207	**F.2.1.**	0.33	3	0.204
		F.2.2.	0.33	3	0.204

		F.2.3.	0.33	3	0.204
Learnability (F3)	0.168	**F.3.1.**	0.435	4	0.292
		F.3.2.	0.487	4	0.327
		F.3.3.	0.078	4	0.052
Control (F4)	0.161	**F.4.1.**	0.327	2	0.119
		F.4.2.	0.413	2	0.132
		F.4.3.	0.26	2	0.008
TOTAL					3.166

In Table 3.5.2, Evaluation Points of the Factors Platform 1 is given. In order to compute of Platform 1 category score, median is calculated. The global weights of the sub-factors were found. The global scores of the sub-factors were multiplied with the local weights and category scores given by the users in the questionnaires made after the usability test. For Platform 1, Data Processing Speed sub-criteria have come to the forefront.

Table 3.5.3 The Evaluation Point of the Platform 2 Digital TV Platforms

Performance Dimensions	**Global Score**	**Sub-criteria**	**Local Weights**	**Category Score**	**Evaluation Points of the Factors Platform 2**
Technical Specifications (F1)	0.464	**F.1.1.**	0.5	4	0.928
		F.1.2.	0.5	5	0.517
Perception (F2)	0.207	**F.2.1.**	0.33	3	0.204
		F.2.2.	0.33	3	0.204
		F.2.3.	0.33	3	0.204
Learnability (F3)	0.168	**F.3.1.**	0.435	5	0.365
		F.3.2.	0.487	5	0.409
		F.3.3.	0.078	5	0.065
Control (F4)	0.161	**F.4.1.**	0.327	4	0.210
		F.4.2.	0.413	4	0.265

		F.4.3.	0.26	4	0,167
TOTAL					3.538

In Table 3.5.3, Evaluation Points of the Factors Platform 2 is given. In order to compute of Platform 2 category score, median is calculated. The global weights of the sub-factors were found. The global scores of the sub-factors were multiplied with the local weights and category scores given by the users in the questionnaires made after the usability test. For Platform 2, Data Processing Speed sub-criteria have come to the forefront like Platform 1.

Table 3.5.4. The Evaluation Point of the Platform 3 Digital TV Platforms

Performance Dimensions	**Global Score**	**Sub-criteria**	**Local Weights**	**Category Score**	**Evaluation Points of the Factors Platform 3**
Technical Specifications (F1)	0.464	**F.1.1.**	0.5	3	0.696
		F.1.2.	0.5	3	0.696
Perception (F2)	0.207	**F.2.1.**	0.33	2	0.136
		F.2.2.	0.33	2	0.136
		F.2.3.	0.33	3	0.136
Learnability (F3)	0.168	**F.3.1.**	0.435	3	0.219
		F.3.2.	0.487	3	0.245
		F.3.3.	0.078	3	0.039
Control (F4)	0.161	**F.4.1.**	0.327	3	0.157
		F.4.2.	0.413	3	0,077
		F.4.3.	0.26	3	0,125
TOTAL					2.662

In Table 3.5.4, Evaluation Points of the Factors Platform 3 is given. In order to compute of Platform 3 category score, median is calculated. The global weights of the sub-factors were found. The global scores of the sub-factors were multiplied with

the local weights and category scores given by the users in the questionnaires made after the usability test. For Platform 3, Data Processing Speed and interface quality sub-criteria have come to the forefront.

Global score and local weights are found from pairwise comparison matrices with the help of Expert Choice software. Consistency ratios of all matrices formed according to these scales and none of them was more than %10. In order to compute of each platform category score, median is calculated. The global weights of the sub-factors were found, a general ranking was made among the usability of the Digital TV platforms used in this study. For this aim, the global scores of the sub-factors were multiplied with the local weights and category scores given by the users in the questionnaires made after the usability test. In this way, Evaluation points of the factors platform are found.

3.6. Findings

According to the results, Platform 2 had the greatest usability with 3.538 points, Platform 1 with 3.166 points and Platform 3 with 2.662 points (See Figure 3.6).

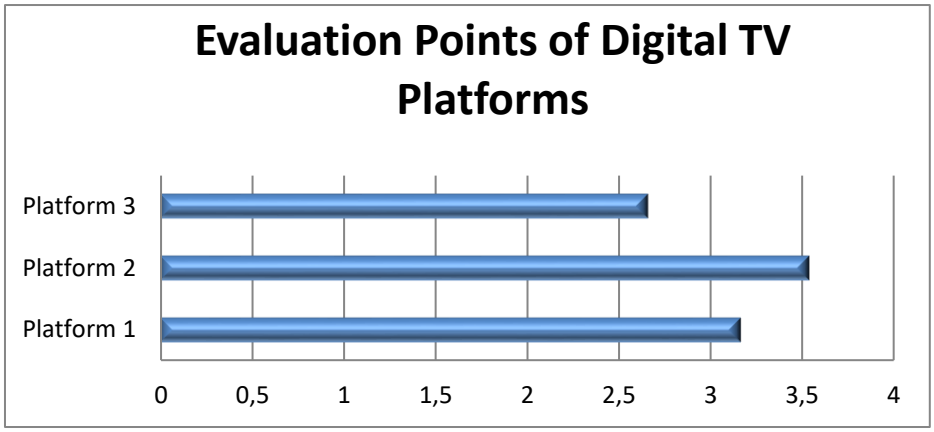


Figure 3. 6.1. Total Usability Evaluation Points of Digital TV Platforms

The most important factors are presented according to their calculated global weights for the evaluation of the usability of the selected digital TV platforms. According to the results, the outstanding factor for any platform from any brand is the “Technical Specifications” factor. Additionally “Perception” and “Learnability” are the exceptional sub-factors for platforms. Among these products, it would not be

difficult to say that Platform 2 brand digital TV platform is more usable when compared to the other platforms. The reason for this is that sub-factors such as, data processing speed and interface quality for Platform 2 brand digital TV platforms were at the forefront. Results of the test and the calculated weights support this point of view.

CHAPTER 4

4. CONCLUSION AND DISCUSSION

The way we are watching TV has changed during the last decade. Earlier, watching TV was an activity spent with family and friends where we took the time to sit down at a specific hour to watch a specific show together, from one of the few channels, giving the TV the full attention. Today's households have multiple televisions with a huge number of channels available and watching TV is not seen as a family activity any more. The TV consumers now watch a big part of their TV content trough on-demand TV, online or on their mobile devices. Digital TV platforms provide user expectations.

Products usability concept holds great importance from the customers' point of view. In this study, Digital TV Platforms, which have become largely used in recent years, were examined and the factors that might affect the usability of these products were evaluated.

This study is a unique study that is implemented in Digital TV Platforms in Turkey. The aim of the study is to have the most usable Digital TV Platform selection in our country. Data collection is done by survey in the light of views of users. Especially young users are selected. Thanks to answers of survey with experts' opinion, the most selection criteria are examined. The collected data has been analyzed by Expert Choice software package program.

For the study, 3 popular brands of Digital TV Platforms were chosen. Usability test was performed on 14 subjects using the selected platforms. During the application of the usability test, 4 different jobs were determined on the menus of selected platforms and the job time was measured while the users performed these duties. Demographic information of the users was obtained with the questionnaire applied before the usability test. The opinions of the users about the related platforms were obtained from the questionnaire given after the tests. With the AHP method, the

weights of the factors were calculated by also taking into consideration the relationships among them.

The most important factors are presented according to their calculated global weights for the evaluation of the usability of the selected platforms.

Though, this study seems to implement to a small group, it is possible to detect the descriptive statistics of users. Further, there are these types of ergonomic studies in literature. It appears to be sufficient that the number of subject users be more than 13 in order to ascertain 90% of the general picture [5].

14 subjects participated in this study including 9 female and 5 male. Especially young users are selected. Because young people will develop Digital TV platforms in the future.

The amount of TV use by participants ranged from 1 hour to more 8 hours per day. Usability criteria determined by experts of digital TV platforms. Main criteria that are Technical Specifications, Perception, Learnability and Control are compared with each other. Calculations are done according to the answers of 14 surveys that include pairwise comparison in them.

Usability issues and the general user experience might have been prejudiced due to the small sample size. Furthermore, due to the recruitment of participants using convenience sampling, only one user outside this group, 3 people being 50 years of age and not a student. Thus, the sample cannot be stated as being representative of the population, and the results of the study should not be conceived of as such either.
A larger sample size with a broader age span and a wider variety of human groups would presumably result in further qualitative feedback and an expanded range of smaller usability issues only encountered by certain groups.
In recent years, with the increase in the usage of the smart TV platforms, Digital TV platform usage has also become quite prevalent. From this point of view, each platform has been developed, tested and validated against usability testing. In recent years, the usage of the Digital TV platform has become quite prevalent. All in all, this study aims at forming a basis for the studies to be made in the future.

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APPENDICES

Appendix A: Job Cards

Appendix B: Questionnaire

Appendix C: Pairwise Comparisons

Appendix A: Job Cards

Task 1: "Please find (the provided random movie) and begin watching."

Scenario: Can users efficiently find the movie they are looking for?

Compare success rate

I conducted a paired F-test to compare the time on Task 1 between Platform 1, Platform 2 and Platform 3. I found no significant difference ($p= 0.43$, $p > .05$)

Compare time on task

Success Criteria:

The user was able to find the movie they wanted to watch. The participants did not hit any roadblocks or was able to recover quickly from any confusion.

Metrics:

1. Success rate: Did they complete the task: YES / NO

2. Time on Task: _____

Follow-up question:

On a scale of 1 to 10, with 1 being "very difficult" and 10 being "very easy", how easy was it to find this movie and start watching it?

1 Very Difficult	2	3	4	5	6	7	8	9	10 Very Easy

Task 2: Saving a program to a list to watch later.

Scenario: Can users save their favorite titles to their account for quick reference?

Task: "Please show me how you would save, or mark this program, so you can watch it later."

Success Criteria:

The user was able to add the program they wanted to watch to "My list".

The participants did not hit any roadblocks or was able to recover quickly from any confusion.

Metrics:

1. Success rate: Did they complete the task: YES / NO

2. Time on Task: _____

Follow-up question:

On a scale of 1 to 10, with 1 being "very difficult" and 10 being "very easy", how easy was it to find this movie and start watching it?

1 Very Difficult	2	3	4	5	6	7	8	9	10 Very Easy

Task 3: Find your saved program.

Scenario: Can users find and view their personalized “My list”?

Task: “Please find the program you have saved to watch later.”

Success Criteria:

The user was able to find “My list”.

The participants did not hit any roadblocks or was able to recover quickly from any confusion.

Metrics:

1. Success rate: Did they complete the task: YES / NO

2. Time on Task: _____

Follow-up question:

On a scale of 1 to 10, with 1 being “very difficult” and 10 being “very easy”, how easy was it to find this movie and start watching it?

1 Very Difficult	2	3	4	5	6	7	8	9	10 Very Easy

Task 4: Removing a saved title from the personalized title list.

Scenario: Can users remove titles from their favorites list?

Task: “Please remove the program from your saved programs.”

Success Criteria:

The user was able to remove the title from “My list” and “Queue”.

The participants did not hit any roadblocks or was able to recover quickly from any confusion.

Metrics:

1. Success rate: Did they complete the task: YES / NO

2. Time on Task: _____

Follow-up question:

On a scale of 1 to 10, with 1 being “very difficult” and 10 being “very easy”, how easy was it to find this movie and start watching it?

1 Very Difficult	2	3	4	5	6	7	8	9	10 Very Easy

Appendix B: Questionnaire

PRE-TEST

Bu anketin amacı, 3 farklı Digital Tv platformunun, daha önce bu TV platformlarını kullanmayan 5 kişi ve daha önce TV platformlarını kullanan 5 kişinin bakış açısıyla, kullanım kriterlerinin önem derecesini belirlemektir. Çalışmanın sonuçları tamamen akademik amaçlı olarak değerlendirilecektir. Kıymetli zamanınızı ayırarak yapacağınız samimi ve doğru değerlendirmeler için teşekkür ederiz.

Demografik Özellikler (Demographics)

Cinsiyet (Sex)	() Erkek ( ) Kadın
Yaş (Age)	() 21-25 ( ) 26-40 ( ) 41-50
Eğitim Durumu (Education)	( ) İlkokul Lise ( ) Lisans (*) ( ) Lisansüstü/Doktora
Medeni Durum (Marital Status)	( ) Evli ( ) Bekar

Digital TV Platform Deneyimi

Soru 1: Daha önce herhangi bir Digital TV platformu kullandınız mı?

( ) Kullandım ( ) Kullanmadım

Soru 2: Daha önce hangi Digital TV platformunu kullandınız?

( ) Digiturk ( ) D-SMART ( ) Tivibu ( ) Diger

Soru 3: Digital TV platformunu ne zamandır kullanıyorsunuz?

( ) Yeni kullanmaya başladım

( ) 1-3 yıl arası

( ) 4-6 yıl arası

( ) 7 yıl ve daha uzun süre

Soru 4: TV'de tercih ettiğiniz kanal türlerini 1'den 4'e kadar derecelendiriniz?

( ) Güncel Kanallar ( ) Haber Kanalları ( ) Sinema/Dizi Kanalları ( ) Spor Kanalları

GÖREVLER

Görev 1:

X filmini bulunuz ve izlemeye başlayınız.

Görev tamamlandı mı?

( )Evet

( ) Hayır

Görev ne kadar sürede tamamlandı?

-- dk---

Görev 2:

Daha sonra izlemek için herhangi bir programı favori listenize kaydediniz.

Görev tamamlandı mı?

( )Evet

( ) Hayır

Görev ne kadar sürede tamamlandı?

Görev 3:

Kaydettiğiniz programı bulunuz.

Görev tamamlandı mı?

( )Evet

( ) Hayır

Görev ne kadar sürede tamamlandı?

--dk---

Görev 4: A kanalını açınız ve yayın akışını bulunuz.

Görev tamamlandı mı?

( )Evet

( ) Hayır

Görev ne kadar sürede tamamlandı?

--dk---

POST-TEST

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1. Fiziksel olarak iyi hissediyorum.					
2. Mental olarak iyi hissediyorum.					
3. Bu sistemi daha sonra kullanacağımı düşünüyorum.					
4. Sistemin kolay kullanıldığını düşündüm.					
5. Bu sistemi kullanabilmek için teknik bir kişinin desteğine ihtiyacım olabileceğini düşünüyorum.					
6. Sistemi kullanırken kendimden emindim.					
7. Kullanım kolaylığından memnun kaldım.					
8. Sistemdeki bilgiler (ekran mesajları gibi) açıktı.					
9. Genel olarak sistemden memnun kaldım.					
10. Görev umduğumdan kısa sürdü.					

11. Sistemi gereksiz bir şekilde karmaşık buldum.					
12. Sistemin kullanımını çok hantal, ağır buldum.					
13. Sistemde çok fazla tutarsızlık olduğunu düşündüm.					
14. Sistemdeki çeşitli fonksiyonları iyi entegre olmuş biçimde buldum.					
15. Sistemi kullanırken hata yaptığımda kolayca ve hızlı bir şekilde toparladım.					
16. Sistemi kullanırken hata yaptığımda açık bir şekilde hata mesajı verdi.					
17. Sisteme girmeden önce bir çok şey öğrenmem gerekti.					
18. Sistem kullanımını öğrenmek kolaydı.					

Appendix C: Pairwise Comparisons

Açıklama:

Aşağıda Digital TV platformlarının kullanım kriterleri yer almaktadır. Cetvelin sağ ve sol uçlarında yer alan kriterleri karşılaştırarak, hangisinin size göre daha önemli olduğunu cetvel üzerinde işaretleyerek belirtiniz. (Sayı doğrusu üzerinde "1" rakamı kriterlerin eşit öneme sahip olduğunu gösterir. Kritere yakın bir yere işaretleme, o kriterin diğerine göre daha önemli olduğu anlamına gelir).

Digital TV Platformu Kullanılabilirlik Kriterleri

	Çok daha önemli — **Eşit öneme sahip** — **Çok daha önemli**	
Teknik Özellikler	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Algılama**
Teknik Özellikler	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Öğrenilebilirlik**
Teknik Özellikler	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Kontrol Edilebilirlik**
Algılama	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Öğrenilebilirlik**
Algılama	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Kontrol Edilebilirlik**
Kontrol Edilebilirlik	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Öğrenilebilirlik**

Digital TV platformalarının Kullanım Kriterlerine Ait İkili Karşılaştırma Anketi

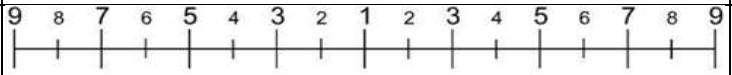
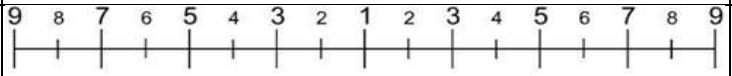
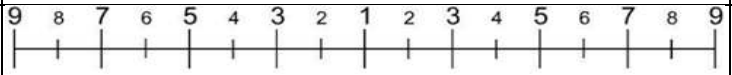
Teknik Özellikler (Alt Kriterler)

	Çok daha önemli — **Eşit öneme sahip** — **Çok daha önemli**	
İşlem Hızı	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Arayüz Kalitesi**

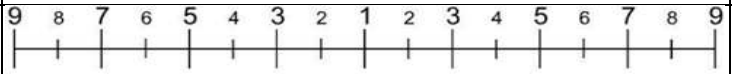
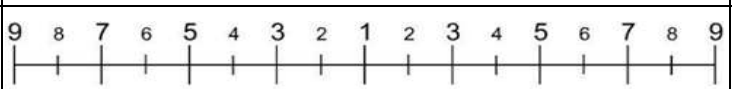
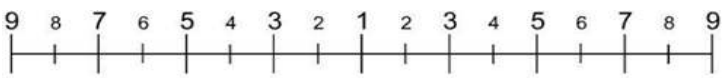
Algılama (Alt Kriterler)

	Çok daha önemli — **Eşit öneme sahip** — **Çok daha önemli**	
Arayüz Tasarımı	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Kullanım Kolaylığı**
Arayüz Tasarımı	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Yönlendirmelerin Anlaşılabilirliği**
Yönlendirmelerin Anlaşılabilirliği	9 8 7 6 5 4 3 2 1 2 3 4 5 6 7 8 9	**Kullanım Kolaylığı**

Öğrenilebilirlik (Alt Kriterler)

	Çok daha önemli — Eşit öneme sahip — Çok daha önemli	
Kolay Öğrenme		**Hatırlanabilirlik**
Kolay Öğrenme		**Bilgilendirebilirlik**
Hatırlanabilirlik		**Bilgilendirebilirlik**

Kontrol Edilebilirlik (Alt Kriterler)

	Çok daha önemli — Eşit öneme sahip — Çok daha önemli	
Erişilebilirlik		**Hata Önleme**
Erişilebilirlik		**Görevin Etkili Şekilde Tamamlanması**
Hata Önleme		**Görevin Etkili Şekilde Tamamlanması**

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