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EVALUATION OF DIGITAL PLATFORMS IN TURKEY IN TERMS OF USABILITY

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ABSTRACT

In this study, 3 existing digital TV platforms in Turkey are selected and their usability is analyzed. These different Digital TV platforms are compared in terms of their usability criteria. In this context, fourteen decision makers evaluate three different Digital TV platforms. The usability criteria used in Digital TV platforms evaluation is created one categorie: performance expectations. The best alternative is determined with a multi-criteria decision making method which is Analytical Hierarchy Process (AHP).

Introduction

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.

Usability is an important issue for Digital TV platforms design because users need to access various functionalities via limited 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.

The main aim of the study is to handle the most usable Digital TV platform. In order to decide the digital TV platform, a survey is created according to the light of views of users of the institution. With the help of the views, all main criteria and sub criteria has been obtained. All relevant pairwise comparison has done for main criteria and sub criteria. As a result of this study, 4 main criteria and 11 sub criteria has been obtained as a research structure of the model.

Three different digital TV brands in Turkey are compared in terms of their usability in this study. In this context, 14 users evaluate this platform brands. The best alternative is determined with multicriteria decision making method which is Analytic Hierarchy Process (AHP).

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Literature Study

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 (Lewis, 2006).

A methodology was prepared in order to develop the usability indexes of the electronic products. This methodology included matters such as classifying the usability dimensions, developing usability measures and creating usability index model. A sample test was performed to demonstrate the acceptability of the proposed methodology on video disc players. Results showed that a high-level correlation exists between the usability index and the degrees of subjective points. According to the researchers of this study, providing a numeric index for estimating the usability level was a new approach for the evaluation of usability (Kim and Han , 2008).

Product usability dimensions were defined under two main titles as performance and emotional expectations. Studies related to the product usability, and predominantly related to the emotional expectations, were presented. Best and insufficient aspects of the available studies were discussed, and titles of the subjects were outlined (Akay and Kurt, 2008).

Usability of 14 types of MP3 player's by using multi-criteria decision making (MCDM) methods were evaluated (Eraslan, 2009).

Methodology

In this section, the steps of AHP, an MCDM method used in order to analyse the usability test results, and the usability test made for the Digital TV platforms phones are outlined.

Usability Test

Usability test is the evaluation of the product and of the process performance of the determined tasks on the users from the aspects of effectiveness, efficiency and satisfaction.

After the users is determined, users are asked to test the predetermined factors of the product to be tested by using specific equipment and specific method, and then, the data obtained is analysed and explained.

The usability test process to be made after determination of the usability factors should follow the steps defined as follows (Nemeth, 2004):

Step 1: Researching the requirements to conduct the test.

Step 2: Writing the test plan.

Step 3: Determining the users who shall make the tests.

Step 4: Developing the test materials.

Step 5: Preparing the test environment and test equipment.

Step 6: Making a trial test.

Step 7: Making the usability test.

Step 8: Compiling, summarising and analysing the data collected during the test.

Step 9: Reporting and presenting the advices for the test results and the product development.

In this study, the steps of the AHP are applied to analyse and evaluate the data collected during the usability test. Survey study is done, in order to determine all the criteria or the opinions of experts in the matter.

Analytical Hierarchy Process (AHP)

AHP, developed by Saaty, determines the relative importance of a set of factors in a MCDM problem (Saaty, 1980). The AHP is the most largely accepted method and is considered by many as the most reliable MCDM method.

The first step in the AHP is in a hierarchy which includes objective, criteria and decision alternatives in respect to the Saaty's 1-9 scale in Table 1.

Table 1 Scale of Relative Importances (according to Saaty (1980))

Intensity of Importance	Defenition	Explanaiton
1	Equal importance	Two activities contribute equaly to the objective
3	Weak importance	Experience and judgment slighty 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 second step is the comparison of the alternatives and the criteria with pairwise comparison. The pairwise comparison matrix (A), as shown

$$\begin{bmatrix} a_{11}...a_{1n} \\ an1...a_{nn} \end{bmatrix} = \begin{bmatrix} w_1/w_2...w_1/w_n \\ w_n/w_1...w_n/w_n \end{bmatrix} \quad (1)$$

The relative weights are given by the right eigenvector (w) corresponding to the largest eigenvalue ($\lambda_{max} = n$), as

$$Aw = w \quad (2)$$

If the pairwise comparisons are completely consistent, the matrix A has rank 1 and . In this case, weights can be obtained by normalizing any of the rows or columns of A (Dağdeviren et al.,2009).

The last step of AHP is consistency verification step. Thus, it is possible to reflect the consistency of a decision maker's judgments during the evaluation phase. If the consistency is defined by the relation between the entries of A : (Büyüközkan, 2007; Dağdeviren et al., 2009).

The consistency ratio (CR) is calculated for each pairwise comparison matrix. If CR 0.1, it is concluded that comparison matrix is consistent. If CR> 0.1, then the comparison matrix should be reconstructed (Saaty, 1980). CR could be calculated with the following equations:

$$CR = CI/RI \quad (3)$$

$$CI = (\lambda_{max} - n) / (n-1) \quad (4)$$

where CI is consistency index and RI is random index. Table 2 shows the RI values for the pairwise comparison matrices with the order from 1 to 10.

Table 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 (Eraslan, 2006).

Usability Evaluation Of The Digital TV Platforms

Many usability studies have been done in the literature. But 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.

AHP method have been used for the electronic product selection problem. Because the study is done for real implementation, it is significant to define main criteria and sub criteria for the case.

As the review of mentioned model, the basic goal has defined as the best digital TV platform selection. The main goal is divided into 4 criteria as Technical Specifications, Perception, Learnability and Control. With the help of the answers of survey, the most usability criteria are examined. These criteria are also divided into sub criteria in their integrity. The collected data has been analyzed by Expert Choice software package program.

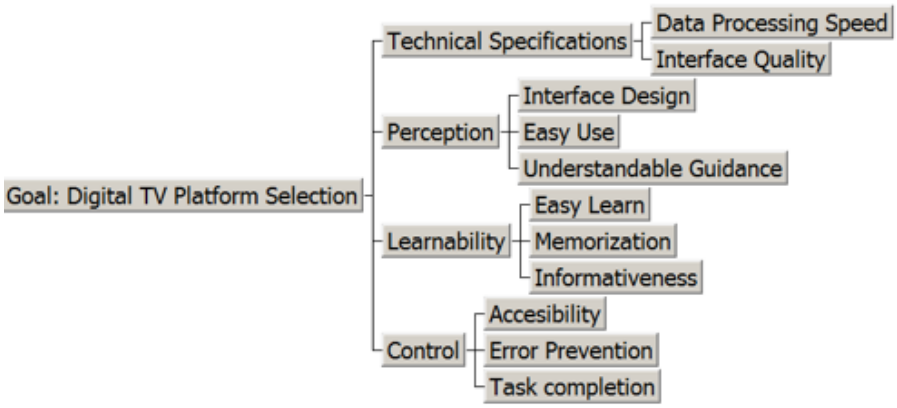

Figure 1 Hierarchical Structure

In this study, it is aimed to evaluate the most usable digital TV Platform selection problem under four main criteria and 11 sub criteria:
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.:Accesibility
F 4.2.:Error Prevention
F 4.3.: Task Completion

The next study is to compose the usability test plan as shown below:
Test: Usability test
Testing Tool: 3 different Digital TV platforms with equivalent features/functions (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)
Questionnaire 2: User satisfaction test (after the usability test)
4 job cards 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)

Analysis and Findings

In this study, it is possible to make comparisons and calculations of AHP by forming hierarchy for critical main criteria and sub criteria for digital TV Platforms as seen previous figure. First, it is formed a hierarchical structure thanks to the nature of AHP. After forming, main criteria and sub criteria that take part in the hierarchy, has been compared with each other in sequential order.

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 as in Tablo 3-5.

Table 3 The Evaluation Point of the Platform 1 Digital TV Platforms

Performance Dimensions	Global Score	Subcriteria	Category Score	Evaluation Points of the Factors Platform 1
Technical Specifications (F1)	0,464	F.1.1.	3	1,392
		F.1.2.	4	1,856
Perception (F2)	0,207	F.2.1.	3	0,621
		F.2.2.	3	0,621
		F.2.3.	3	0,621
Learnability (F3)	0,168	F.3.1.	4	0,672
		F.3.2.	4	0,672
		F.3.3.	4	0,672
Control (F4)	0,161	F.4.1.	2	0,322
		F.4.2.	2	0,322
		F.4.3.	2	0,322
TOTAL				8,093

With analyzing the table 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.

Table 4 The Evaluation Point of the Platform 2 Digital TV Platforms

Performance Dimensions	Global Score	Subcriteria	Category Score	Evaluation Points of the Factors Platform 2
Technical Specifications (F1)	0,464	F.1.1.	4	1,856
		F.1.2.	5	1,035
Perception (F2)	0,207	F.2.1.	3	0,621
		F.2.2.	3	0,621
		F.2.3.	3	0,621
Learnability (F3)	0,168	F.3.1.	5	0,84
		F.3.2.	5	0,84
		F.3.3.	5	0,84
Control (F4)	0,161	F.4.1.	4	0,644
		F.4.2.	4	0,644
		F.4.3.	4	0,644
TOTAL				9,206

Table 5 The Evaluation Point of the Platform 3 Digital TV Platforms

Performance Dimensions	Global Score	Subcriteria	Category Score	Evaluation Points of the Factors Platform 3
Technical Specifications (F1)	0,464	F.1.1.	3	1,392
		F.1.2.	3	1,392
Perception (F2)	0,207	F.2.1.	2	0,414
		F.2.2.	2	0,414
		F.2.3.	3	0,414
Learnability (F3)	0,168	F.3.1.	3	0,504
		F.3.2.	3	0,504
		F.3.3.	3	0,504
Control (F4)	0,161	F.4.1.	3	0,483
		F.4.2.	3	0,483
		F.4.3.	3	0,483
TOTAL				6,897

According to the results, Platform 2 had the greatest usability with 9,206 points, Platform 1 and Platform 3 are follows it with 8,093 and 6,897 points respectively.

Results and Comments

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. Data collection is done by survey in the light of views of users. Thanks to answers of survey, the most selection criteria are examined. The collected data has been analyzed by Expert Choice software package program.

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.

For the study, 3 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 were 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. 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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