DETERMINATION OF CRITICAL ACHIEVEMENT FACTORS IN DISTANCE EDUCATION BY USING STRUCTURAL EQUATIONMODEL: A CASE STUDY OF E-MBA PROGRAM HELD IN SAKARYA UNIVERSITY

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ABSTRACT
Nowadays, distance learning education has been started to become familiar in behalf of classical face to face education (F2F) model. Web based learning is a major part of distance education systems. Web based distance learning can be defined shortly as an education type which doesn't force students and educators being into the same mediums.
This education model has a student-cantered structure. In this type of education students can learn given lectures without dependency of time and place. And also students can communicate with their educators via various technology platforms. This is a fact that there are many factors have been effecting achievement of students in web-based distance learning. The success of students can be increased while determining weighted achievement factors.
This study aims for determining critical achievement factors in a case study of e-mba distance education program held Sakarya University, by using structural equation model.
Keywords: Internet, Web based distance learning, Factors of achievement, Structural equation model

1. INTRODUCTION

Continuously developing technology and changing requirements force making changes on common learning methods. Educational technology tries to bring solutions to the problems including all aspects of the phenomenon of human learning (Alkan, 1998). Due to increasing demands for education and learning subjects, discussions on radical thoughts about mentioned subjects become more visible. E-learning has increasingly become a viable, effective way of delivering instruction and training (Khan, B. H., Granato, L. A., 2007). Common base of developed alternative learning methods is creation of a practical medium for overcoming insufficiencies of classical learning methods. The most popular distance based model is web based education model (WBE).

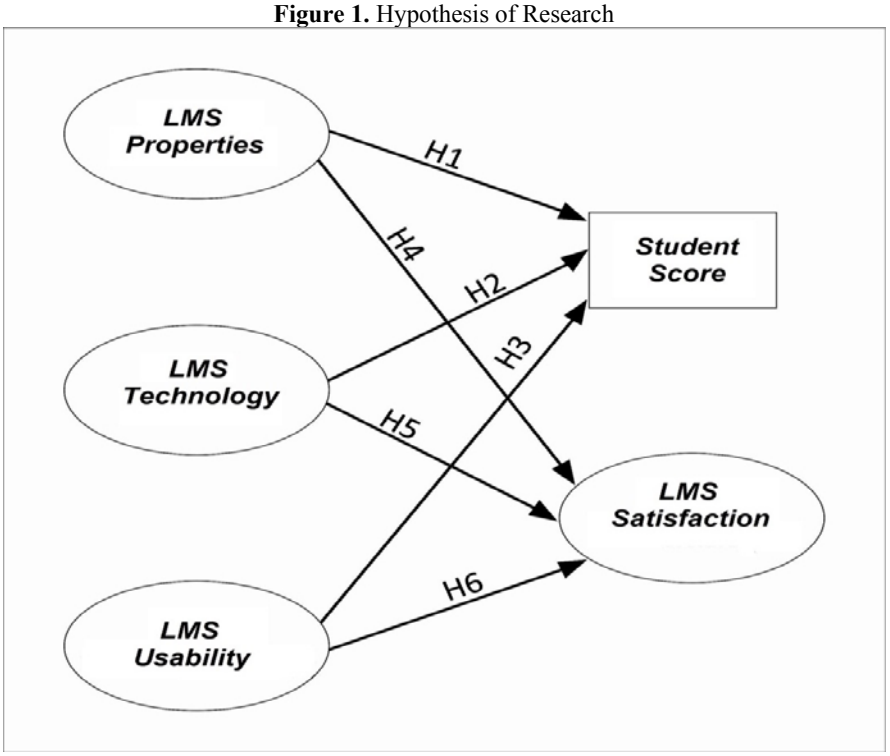
Because of increasing usage rates of information technologies, educators have been highlighted importance of inevitable global education requirements. These requirements force educators for developing new education and learning programs and models (İşman, 2005). Today there have been developed many instructional design models in distance education literature (İşman, 2011). There has been also open source learning management systems that challenges developing the most suitable e-learning platforms (Aydın, C.C., Tirkes, G., 2010).

In web based education models reachability of educational web portal, easy and simple design of portal and logical relations among portal page contents can increase success of students during learning process (Girard, T., Pınar, M., 2011). The presentation of teaching materials by means of the computer technology helps students to process and develop information, to find alternative solutions, to take an active part in the learning process and to develop their problem solving skills (Serin, O., 2011). Users experience the usability of a web site before they have committed to using it and before making any purchase decisions (Nielsen, J., Norman, D., 2000). So it is assumed to be a direct proportional relation between properties of web portals and success rates. Starting with that point, for investigation content first hypothesis is determined as follows;

H_1: Sensation of students about properties of web portal is directly relational with their achievements during learning process.
It is assumed that access types of lectures and direct communication links with lecturers can contribute positively on success of students in distance learning web portals. So it is expected that technology used in we portal effects achievements of students. After mentioning this expectation the second hypothesis is determined as follows;
H_2: Sensation of students about used technology in web portal is directly relational with their achievements during learning process.
In web based education models, logical relations among portal page contents can increase success of students during learning process. So it is expected to be a direct proportional relation between usability of web portals and success rates. After mentioning this expectation the third hypothesis is determined as follows;
H_3: Usability of web portal is directly relational with achievements of students during learning process.

In web based education models, properties of web portal can increase satisfaction of students during learning process. So it is assumed to be a direct proportional relation betweenproperties of web portals and student satisfaction. Starting with that point, for investigation content fourthhypothesis is determined as follows;
H_4: Properties of web portal is directly relational with student satisfaction during learning process.
In web based education models, access types of lectures and direct communication links with lecturers can improve satisfaction of students. So it is expected that technology used in we portal effects satisfaction of students. After mentioning this expectation the fifthhypothesis is determined as follows;
H_5: Sensation of students about used technology in web portal is directly relational with their satisfactions during learning process.
In web based education models usability of web portalcan increasesatisfaction of students during learning process. So it is assumed to be a direct proportional relation betweenusability of web portals and student satisfaction rates. Starting with that point, for investigation content sixthhypothesis is determined as follows;
H_6: Usability of web portal is directly relational with satisfaction of students during learning process.

Figure 1. Hypothesis of Research



2. RESEARCH METHODOLOGY

2.1 Aim of Research

Some characteristics that motivating students in distance learning systems might be concerned with using technology, medium statements, learning style of distance system. There has been many works performed also on student characteristics of distance education (Ergul, H. 2004).This study aims for determining critical achievement factors in a case study of e-mba distance education program held Sakarya University, by applying data mining techniques on enrolled students' own ideas, web portal log information and overall scores recorded in student office databases. Another purpose of this study is to investigate relations between identified factors and students' satisfactions.

2.2 Sampling Process

By the purpose of determining critical achievement factors in a case study of e-mba distance education program held Sakarya University, In 2008-2009 education year a survey held among 350 students enrolled this program via internet platform. Data collecting tools used during investigation have been prepared along with literature Research and three achievement factors have been determined. In the first phase of survey, demographic structure and fact questions are inquired, in the second phase factor questions are inquired. First factor comprises six questions about technology, second one comprises seven questions about property, third one comprises seven questions about usability and forth factor comprises six questions about satisfaction.

On the other side, applying data mining techniques on Sakarya University Distance Learning Management Systems' (DLMS) logs login numbers of enrolled students have been acquired. For the indicator of student achievements, overall scores of students have been acquired into student affairs database records.

2.3 Data and Information Analysis

Due to testing identified hypothesis, structural equation model is used. Before applying mentioned equation model, reliability of used scales has been identified. For reliability scale, importance of internal consistency phenomenon has been highlighted. This scale guarantees a common scalability base for variables (Hair et al., 1998). This scale has been investigated by using Cronbach Alpha method. For minimal limits of Cronbach Alpha coefficient is taken as 0.70 values. This value is an applicable value in literature. Results of Alfa coefficient and scale variables acquired in investigation process are given in Table-1.

Table1. Reliability Coefficients of Scale Used During Investigation Process

Technology	**Alfa Coefficient**
C1. For reaching lectures, presenting contents as asynchronous methods effect achievement. **C2.** For reaching lectures, presenting contents as synchronous methods effect achievement. **C3.** Communicating lecturers via e-mail effects achievement. **C4.** Communicating lecturers via portal forums effects achievement. **C5.** Online Communication with lecturers at least once a week in a known periods effects achievement. (Chat ,Msn ,Perculus etc) **C6.** Ability of Portal's social interactive medium effects achievement.	**0.94**
Properties	**0.89**
D1. Reachability of portal effects achievement. **D2.** Easy and simple design of portal effects achievement. **D3.** Clear and understandablecontents effect achievement. **D4.** Consistency and harmony among portal pages effects achievement. **D5.** Edaquate update periods of platform effect achievement. **D6.** Symmetric establishments of portal platform' components effect achievement. **D7.** Answering my own satisfactions of portal effect achievement.	
Usability	**0.87**
F1. Consistency of presented items in different page effects achievement. **F2.** Easy and simple design of portal's page effects achievement. **F3.**Easy access to information needs effects achievement. **F4.** Access speed of portal effects achievement. **F5.** Existence of support sections effects achievement. **F6.** Contributing adequate answers about directed questions effects achievement.	
Satisfaction	**0.91**
J1. I feel happy when I surfs in portal. **J2.** I lost my time-sense when I surfs in portal. **J3.** It is easy to use portal **J4.** Design of portal is modern and dynamic **J5.** Design of portal is cool. **J6.**Visual aspects of portal is satisfactory.	

After exhibiting reliability of scales, identifying relational weight dependencies between each variable and each factor explanatory factor analysis has been handled and results has been shown in Table-2.

Table 2 Explanatory Factor Analysis Results

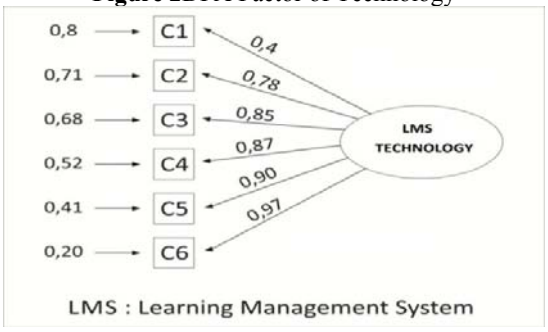
Factor Type	**F1**	**F2**	**F3**	**F1**
TECHNOLOGY				
C1	**0.543**			
C2	**0.775**			
C3	**0.834**			
C4	**0.750**			
C5	**0.841**			
C6	**0.765**			
PROPERTIES		**0.755**		
D1		**0.752**		

D2		**0.605**		
D3		**0.687**		
D4		**0.863**		
D5		**0.589**		
D6		**0.574**		
USABILITY				
F1			**0.755**	
F2			**0.552**	
F3			**0.605**	
F4			**0.755**	
F5			**0.552**	
F6			**0.755**	
SATISFACTION				
J1				**0,823**
J2				**0,798**
J3				**0,554**
J4				**0,723**
J5				**0,623**
J6				**0,523**

DFA for Factor of Technology

Figure 2 shows the results of confirmatory factor analysis of the technology factor. C1, C2, C3, C4, C5 and C6 question codes representing the observed variables as sketched in Figure 2. Each of the codes and questions expressed in the analysis are also given in Table 1.

Figure 2DFA Factor of Technology



In Figure 2, the value shown on directed arrows from technology factors towards observed variables shows each factor that resembles an utilization of the observed variables for the standard regression coefficient (confirmatory factor analysis loads). Error values of the observed variables from the error values towards each observed variable are given by directed arrows.

Table 3 Fit Indexesfor Factor of Technology

Technology	**Fit Indexes**					
	χ^2/df	**GFI**	**AGFI**	**TLI**	**CFI**	**RMSEA**
	6,71 / 2	,787	,837	,770	,789	,065

When investigating Fit Indexes of factor of technology (Table 3) it was shown that results failed within desirable limits of the values. The investigation of the error values for the variable observed in C1, is resulted with high covariance of with the value of other variables. For this reason, it is decided to remove C1 variable from the analysis.

After removal of the C1 variable, it is shown that the final fit index for the factor is into desirable limits as given in Table 4. Figure 3 shows the relationships between variables.

Figure 3 DFA Factor of Technology (1st Modification)

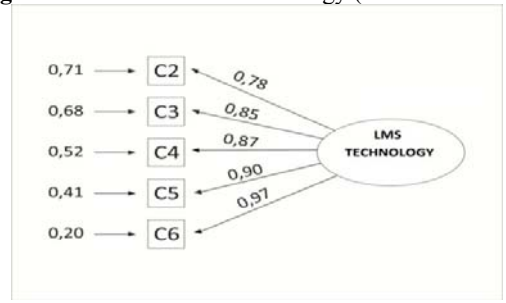


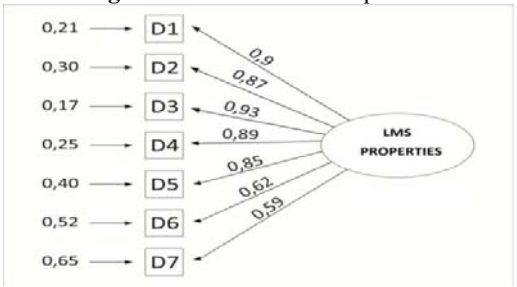
Table 4 Fit Indexes for Factor of Technology (1st Modification)

Technology	Fit Indexes					
	χ^2/df	**GFI**	**AGFI**	**TLI**	**CFI**	**RMSEA**
	6,71 / 2	,947	,927	,930	,919	,093

DFA for Factor of Properties

Figure 4 shows the results of confirmatory factor analysis for factor of properties. D1, D2, D3, D4, D5,D6 and D7 question codes representing the observed variables as sketched in Figure 4. Each of the codes and questions expressed in the analysis are also given in Table 1.

Figure 4DFA Factor of Properties



In Figure 4, the value shown on directed arrows from properties factors towards observed variables shows each factor that resembles an utilization of the observed variables for the standard regression coefficient (confirmatory factor analysis loads). Error values of the observed variables from the error values towards each observed variable are given by directed arrows.

Table 5 Fit Indexes for Factor of Properties

Properties	Fit Indexes					
	χ^2/df	**GFI**	**AGFI**	**TLI**	**CFI**	**RMSEA**
	6,065 / 5	,791	,864	,838	,921	,098

When investigating Fit Indexesof factor of technology (Table 5) it was shown that results failed within desirable limits of the values. The investigation of the error values for the variables observed in D6 and D7, is resulted with high covariance of with the value of other variables. For this reason, it is decided to remove D6 and D7 variables from the analysis.

After removal of the D6 and D7 variables, it is shown that the final fit index for the factor is into desirable limits as given in Table 6. Figure 5 shows the relationships between variables.

Figure 5DFA Factor of Properties (1st Modification)

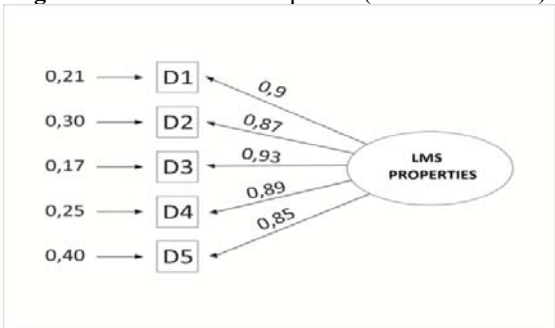


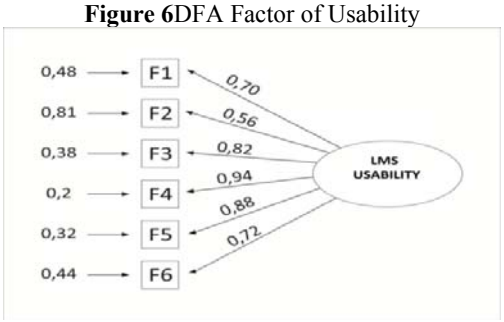
Table 6 Fit Indexes for Factor of Properties (1st Modification)

Properties	Fit Indexes					
	χ^2/df	**GFI**	**AGFI**	**TLI**	**CFI**	**RMSEA**
	6,065 / 5	,911	,924	,938	,921	,038

DFA for Factor of Usability

Figure 6 shows the results of confirmatory factor analysis for factor of usability. F1, F2, F3, F4, F5 and F6 question codes representing the observed variables as sketched in Figure 6. Each of the codes and questions expressed in the analysis are also given in Table 1.

Figure 6DFA Factor of Usability



In Figure 6, the value shown on directed arrows from usability factors towards observed variables shows each factor that resembles an utilization of the observed variables for the standard regression coefficient (confirmatory factor analysis loads). Error values of the observed variables, from the error values towards each observed variable are given by directed arrows.

Table 7 Fit Indexes for Factor of Usability

Usability	Fit Indexes					
	χ^2/df	**GFI**	**AGFI**	**TLI**	**CFI**	**RMSEA**
	6,065 / 5	,799	,884	,898	,881	,068

When investigating Fit Indixes of factor of usability (Table 7) it was shown that results failed within desirable limits of the values. The investigation of the error values for the variable observed in F2, is resulted with high covariance of with the value of other variables. For this reason, it is decided to remove F2 variable from the analysis.

After removal of the F2 variable, it is shown that the final fit index for the factor is into desirable limits as given in Table 8. Figure 7 shows the relationships between variables.

Figure 7DFA Factor of Usability (1st Modification)

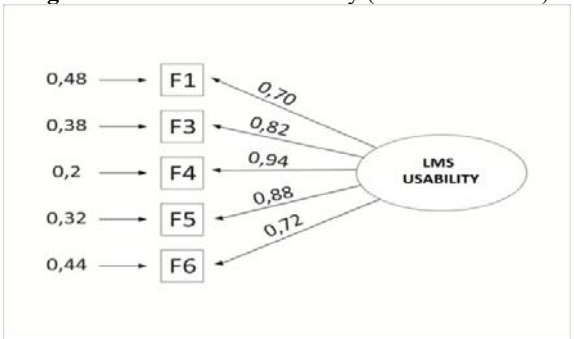


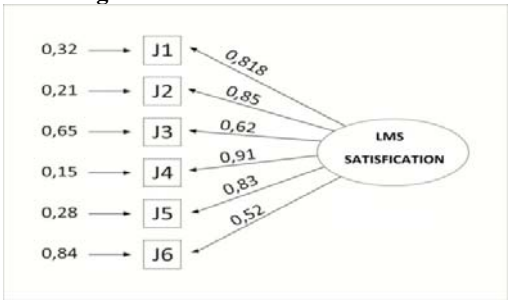
Table 8 Fit Indexes for Factor of Usability (1st Modification)

Usability	Fit Indexes					
	χ²/df	**GFI**	**AGFI**	**TLI**	**CFI**	**RMSEA**
	4,024 / 2	,928	,986	,929	,979	,012

DFA for Factor of Satisfaction

Figure 8 shows the results of confirmatory factor analysis for factor of satisfaction. J1, J2, J3, J4, J5 and J6 question codes representing the observed variables as sketched in Figure 8. Each of the codes and questions expressed in the analysis are also given in Table 1.

Figure 8DFA Factor of Satisfaction



In Figure 8, the value shown on directed arrows from satisfaction factors towards observed variables shows each factor that resembles an utilization of the observed variables for the standard regression coefficient (confirmatory factor analysis loads). Error values of the observed variables, from the error values towards each observed variable are given by directed arrows.

Table 9 Fit Indexes for Factor of Satisfaction

Satisfaction	Fit Indexes					
	χ²/df	**GFI**	**AGFI**	**TLI**	**CFI**	**RMSEA**
	6,065 / 5	,779	,864	,858	,861	,058

When investigating Fit Indexes of factor of satisfaction (Table 9) it was shown that results failed within desirable limits of the values. The investigation of the error values for the variable observed in J3 and J6, is resulted with high covariance of with the value of other variables. For this reason, it is decided to remove J3 and J6 variables from the analysis.

After removal of the J3 and J6 variables, it is shown that the final fit index for the factor is into desirable limits as given in Table 10. Figure 9 shows the relationships between variables.

Figure 9DFA Factor of Satisfaction (1st Modification)

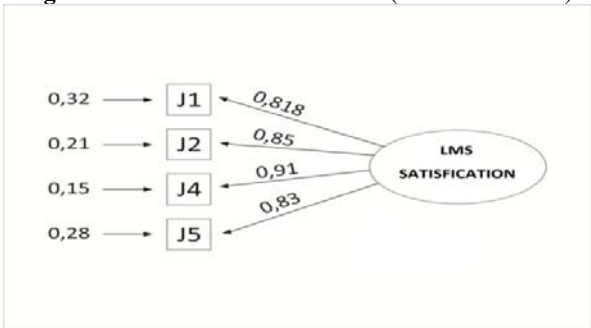


Table 10 Fit Indexes for Factor of Satisfaction (1st Modification)

Satisfication	Fit Indexes					
	χ^2/df	GFI	AGFI	TLI	CFI	RMSEA
	6,065 / 5	,979	,964	,958	,961	,019

After validation and reliability of scales used in investigation, for the aim of determining relations among properties, technology, usability, achievements and satisfaction of students in web technology based distance learning models, a structural equation model has been developed. Structural equation model is a statistical approach that identifies relations among measured (observed) and hidden variables (Hoyle, 1995). Structural equation model has become familiar with model testing for last many years among social scientists (Sütütemiz et al., 2009). The main reason for becoming familiar this model among social scientists is presenting a multi-test medium among all measured and hidden variables.

3. RESULTS OF RESEARCHES

In this part of study, application of structural equation model for testing demographic structures and research hypotheses has been handled and results of researches have been given.

3.1 Demographic Properties of Research Sample

Statistical information about demographic properties of 350 students enrolled e-mba distance education program held Sakarya University in 2008-2009 education year, such as frequency and percentage distributions are given in Table-11.

Table 11. Statistical InformationaboutDemographics in Survey

Sexuality	**Frequency**	**Percentage**
Male	207	74,2
Female	72	25,8
Total	**279**	**100**
Working Condition		
Works	237	88,5
Doesn't work	42	11,5
Total	**279**	**100**
Educational Situation		
Business Administration	187	67
Science	9	3,2
Engineering	56	20,1
Others	27	9,7
Total	**279**	**100**

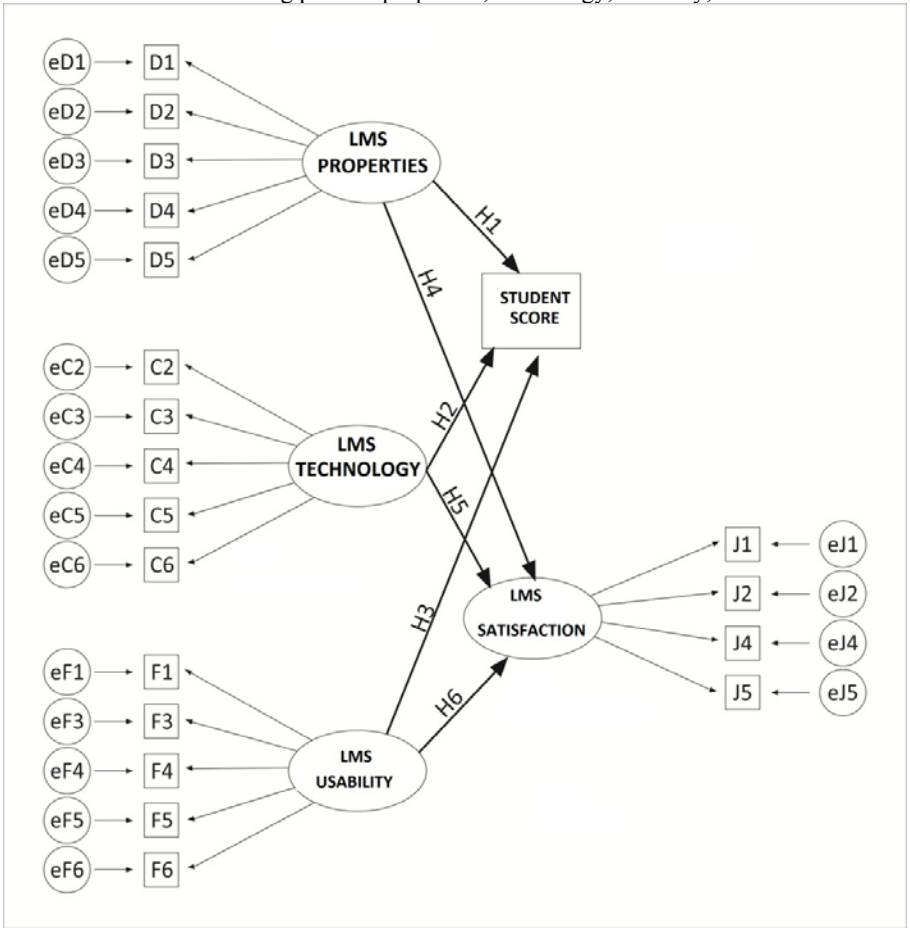
As seen in Table-10, number of males is nearly three times greater than number of females. Number of working participant students is nearly eight times greater than number of unworkings. This is an expected result, because distance learner students always have working opportunities. 67percent of participant students graduated from 4-year business administration program before enrolled distance learning programme. 20.1 percent of participant students graduated from engineering program, 3.2 percent graduated from science program and 9.7 percent graduated from other program before enrolled distance learning programme. This type of distribution confirms E-MBA programme's being continuous of business administration programs.

3.2. Implementation of Structural Equation Model

For the aim of determining relations among properties, technology, usability, achievements and satisfaction of students enrolled in e-mba distance education program held SakaryaUniversity; a structural equation model has been used. This model implemented via AMOS Statistical Simulation Package Software.

Students' sensations about properties of portal's page have been measured via seven variables, technology measured via six variables, usability measured via six variables, satisfaction measured via six variables, and overall scores of student have been acquired by student affairs database records. As highlighted above, before applying mentioned equation model, reliability of used scales has been identified by using Cronbach Alpha method and validation of used scales has been determined by confirmatory factor analysis method. The most used statistical techniques are percentage and factor analysis (Karataş, S., 2008). After implementing confirmatory factor analysis method, it has been brought out that error values have high rated covariance value both with theirselves and other variables. This make increases in total variance. After confirmatory factor analysis method; five variables of students' sensations about properties of portal's page, five variables about technology, five variables about usability, and four variables about satisfaction, totally 19 variables have been added into structural equation model. Figure-10 shows relations among portal's properties, technology, usability, satisfaction and scores.

Figure 10 Relation Model among portal's properties, technology, usability, satisfaction and scores.



Results ofa structural equation model for the aim of determining relations among properties, technology, usability, achievements and satisfaction of students enrolled in e-mba distance education program held Sakarya University, are given in Table-11and Table-13.

Table 12 Results for Research Model of Fit Godness Indexes

Fitness İndexes	Model
X^2 (Chi Square)	112,88
Freedom Degree	101
p (Goodness Degree)	0,001
x^2/df	1,047
GFI (Goodness Fit Index)	0,923
AGFI (Adjusted Fit Goodness Index)	0,891
RMR (Root Mean Square of Remainder)	0,026
IFI (Increased Fit Goodness Index)	0,938
CFI (comparative Fit Goodness Index)	0,958
NFI (Normed Fit Goodness Index)	0,969
TLI(Tucker-Lewis Index)	0.923
RFI (Relativities Fit Goodness Index)	0,920
RMSEA (Root Mean Square of Rapprochement Error)	0,027

Evaluation of harmony between data and model, three basic criteria are investigated during implementation of structural equation model. This criteria are Chi-square/df, goodness of fit) and RMSEA values. If results of analysis show similarities among expected values and acquired values, it can be said that there is a harmony between data and model.

Goodness statistics of investigated model are given in Table-12. In Table-13, perfect harmony between research model and data is shown into research model column and perfect harmony between model and data is shown into ideal model column.

When examining results shown in Table-12, Chi-square statistic taken into analysis is meaningful at 0.01 goodness level. However, because of excessive sensitiveness of Chi-square value to sample values requires another indicator for measuring harmony between model and data (Baker, Parasuraman, Grewal, Voss, 2002). So other harmony measurement criteria should be examined

One of other harmony measurement criteria is CMIN/DF value. This ratio need to be near zero or alt least to be under five (Yoo, Donthu, Lee, 2000). In Research model, this value is measured in 3,674. This value confirms reasonable harmony between model and data.

One of other harmony measurement criteria is Goodness of Fit Index-GFI. This index gets a value between zero and one. This index need to be combined assessments by CFI(Comparative Fit Index), NFI(Normed Fit Index), TLI(Tucker-Lewis Index), RFI(Relative Fit Index) and IFI(Incremental Fit Index). This mentioned sub-index get also a value between zero and one. Index value becoming near to one shows harmony between model and data. As seen in Table-12, 0.923-GFI value, 0.969- NFI value, 0.920- RFI value, 0.9381- IFI value, 0.925- TLI value and 0.958-CFI value are measured. This confirms reasonable harmony between our model and data.

One of other harmony measurement criteria is RMSEA value. In Research model, this value is measured in 0,027. This value confirms reasonable harmony between model and data. . Hoelter ,05 and ,01 indexes give minimum sample size in reliable interval of test hypotheses.Holding research hypotheses into 95 percent of reliability interval and 0.05 goodness values, required sample size should be 99 and holding 99 percent of reliability interval and 0.01 goodness value, required sample size should be 110. Number of samples used in this research is 350 and this value is enough for satisfied results.

Table 13 Hypotheses Test Results of Structural Model

	MLE : Non-Std MLE	Standard Ht.	t	Hypotesis Results
Properties→Score	0,228:0307	0,138	2,229	H1:YES
Technology→Score	0,051:0,047	0,148	0,321	H2:NO
Usability→Score	0,208:0,207	0,139	1,229	H3:YES
Properties→Satisfaction	0,218:0307	0,138	2,129	H4:YES
Technology→Satisfaction	0,256:0,042	0,141	3,621	H5:YES
Usability→Satisfaction	0,049:0,017	0,122	1,121	H6:NO
***** p< 0,01; **p< 0,05; *p<0,10**				

H1 tests relation between properties and student scores. For model, site properties (r=0.228) means positive and meaningful effects on student achievements (t =2,229; p<0,05). One unit increase in properties factor effect 0.228 unit increase at student achievements. So that H1 hypothesis confirms itself.

H2 tests relation between technology and student scores. For model, technology doesn't mean any effects on student achievements (p<0,587). So that H2 hypothesis cannot be accepted.

H3 tests relation between usability and student scores. For model, site usability (r=0.208) means positive and meaningful effects on student achievements (t =2,209; p<0,041). One unit increase in usability factor effect 0.208 unit increase at student achievements. So that H3 hypothesis confirms itself.

H4 tests relation between properties and student satisfaction. For model, site properties (r=0.218) means positive and meaningful effects on student satisfaction (t =2,129; p<0,04). One unit increase in properties factor effect 0.218 unit increase at student satisfactions. So that H4 hypothesis confirms itself.

H5 tests relation between technology and student satisfaction. For model, technology (r=0.256) means positive and meaningful effects on student satisfactions (t =3,621; p<0,044). One unit increase in technology factor effect 0.256 unit increase at student satisfactions. So that H5 hypothesis confirms itself.

H6 tests relation between site usability and student satisfaction. For model, site usability doesn't mean any effects on student satisfaction (p: 0,637). So that H6 hypothesiscannot be accepted.

3.3 CONCLUSION

In E-MBA web based distance education program, there are meaningful regression results about relations among variables of site properties, used technology, site usability, achievements and satisfaction of enrolled students as shown in Table-13. In another saying, H1, H3, H4 and H5 hypotheses confirm theirselves. On the other side, it is shown that H2 and H6 hypothesescannot be valid on this model.

REFERENCES

Aydın,C.C. and Tirkes,G.(2010) Open Source LearningManagementSystemsin Distance Learning. *TOJET: The Turkish Online Journal of Educational Technology,* 9(2), 175-184.

Alkan, C. (1998), EğitimTeknolojisi. *6. Baskı.: AnıYayıncılık, Ankara*

Baker, J., Parasuraman, A., Grewal, D., & Voss, G. B. 2002. The influence of multiple store environment cues on perceived merchandise value and patronage intentions. *Journal of Marketing,* 66(2): 120-141.

Ergul, H. (2004). Relationship between student characteristics and academic achievement in distance education and application on students of AnadoluUniverstiy.*Turkish Online Journal of Distance Education* 5(2), pp.80-89.Retrieved February 8, 2006, from http://tojde.anadolu.edu.tr/tojde21/left.htm.

Girard,T., Pınar,M. (2011). A Usability Study of Interactive Web-Based Modules *TOJET: The Turkish Online Journal of Educational Technology,* 10(3), 27-32.

Hair, J.F. Jr. , Anderson, R.E., Tatham, R.L., & Black, W.C. (1998). Multivariate Data Analysis, *(5th Edition). Upper Saddle River, NJ: Prentice Hall.*

Hoyle, R.H. (1995). Structural Equation Modeling.*SAGE Publications, Inc. Thousand Oaks, CA.*

İşman, A.(2005). UzaktanEğitim. *PagemYayıncılık. Ankara*

İşman, A. (2005).ÖğretimTeknolojileriVeMateryalGeliştirme. *2. Baskı. SempatiYayınları, Ankara*

İşman,A. (2011). Instructional Design in Education: New Model.*TOJET: The Turkish Online Journal of Educational Technology, 10(1), 136-142.*

Karataş,S. (2008) Interaction in the Internet-Based Distance Learning Researches: Results of a Trend Analysis. *TOJET: The Turkish Online Journal of Educational Technology, 7(2), 11-19.*

Khan, B. H., Granato, L. A. (2007). Program Evaluation in E-Learning [Electronic Version], from http://asianvu.com/digital- Library/elearning/elearning_program_evaluation_by_khan_and_Granato.pdf

Nielsen, J.,Norman, D. (2000), "Web Site Usability: Usability On The Web Isn't A Luxury, http://www.informationweek.com/773/web.htm (erişimtarihi: 20.05.2008)

Serin, O. (2011).The effects of the computer-based instruction on the achievement and problem solving skills ofthe science and technology students.*TOJET: The Turkish Online Journal of Educational Technology,*10(1), 183-201.

N.Sütütemiz, S.S. Çiftyıldız, F.A. Konuk (2009). Importance of Perception for Packaged Milk and Influence of Packaging on Purchasing Behavior of Consumers: A case study of Istanbul. *AkademikGıda 7(6) 18-28*

Yoo, B., Donthu, N., & Lee, S. (2000) "An Examination of Selected Marketing Mix Elements and Brand Equity," *Journal of the Academy of Marketing Science*, 28 (2): 195-212.