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Model Satisfaction Users Measurement of Academic Information System Using End-User Computing Satisfaction (EUCS) Method

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Abstract— **One of the concrete actions of the vision and mission of an organization or educational institution is to implement the system of academic information. The one factor that influences the success of the academic information system is the satisfaction of users. The problems in the user satisfaction are also issues that cannot be denied and continued to be studied. In consequently, having measurements related to user satisfaction is required. This research is done to see how the user satisfaction of the existing system has been implemented and to know what factors has influenced the system. The method used in this study is a quantitative method using the End User Computing Satisfaction (EUCS) model whereas 255 respondents are chosen as the sample for the study. The purposive sampling technique is used and the PLS-SEM approach with tools Smart PLS 3.0 is used for analyzing the data. This research consists of 7 hypotheses and 8 variables, namely Content, Accuracy, Format, Timeliness, Ease of Use, System Reliability, System Speed and End-User Satisfaction. The research finds out that the current level of end-user satisfaction is in satisfying level. Inferentially, of the 7 hypotheses tested, 2 of them were rejected and the other 5; *Accuracy, System Reliability, Timeliness, Content and System Speed* are accepted. Through this research, it is hoped that later it could be used as a practical consideration and theoretical study in the future.**

Index Terms— Academic Information System, User Satisfaction, EUCS, Partial Least Square- Structural Equation Modeling, SmartPLS

I. INTRODUCTION

Along with the development of the times in the modern era as it is today, the advancement of information and communication technology has now developed very rapidly, and provides many influences in all fields. For this reason, in its management, higher education institutions are required to have adequate excellence and competitiveness by improving the quality of academic services [9]. One of the efforts taken is the use of academic information systems, that is now becomes an obligation for higher education institutions to succeed[14][7].

There are many researches that test several variables in order to see the effect on the users satisfaction. One of those is Ilias et al.[5] that add *system speed* and *system reliability*. The result is that these variables significantly influence the user satisfaction.

Another study by Rosalina in Putra et al. [10] evaluates the satisfaction of the academic information system of UIN Jakarta using the EUCS model that is *extended* with *security* variables. The results of this study state that the variables of *content, timeliness, ease of use, and security* in the EUCS model affect user satisfaction, while variables of *accuracy* and *format* do not affect user satisfaction.

Based on the above, it is then important to know the level of users satisfaction and the factors affect it. In doing so this research was intended to determine the status of end-user satisfaction of the academic system based on the perception of respondents and to examine the factors that influence the satisfaction of users based on the model of academic information system *end-User Computing Satisfaction*.

II. THEORITICAL REVIEW

A. Definition of Measurement of User Satisfaction

User satisfaction measurement is a measurement of behavior information system users in terms of their response to several related factors in delivering information about products and services [19]. This is supported by previous research stated that satisfaction is the main factor in measuring the success of an information system [20]. Then it can be inferred that measurement of information system user satisfaction is a measurable assessment conducted hrelated to the user's perception regarding the wearing of an information system by

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looking at user satisfaction as the main indicator.

B. Academic Information System

According to Arifin [18], the Academic Information System is a resource for everything in the form of information that has to do with academic problems on campus. In addition to the information resource on campus, the Academic Information System can also be used as a medium of communication between lecturers and students, students with lecturer, students and related campus officials and anyone in the campus environment. The researcher concluded the Information System Academic is a system that is used to accommodate all matters relating to the academic process in order to improve the quality of the teaching and learning process as well as administrative quality related to the entire academic community at the university.

C. End User Computing Satisfaction

The *EUCS* evaluation model was developed by Doll & Torkzadeh [1], emphasizes end- user *satisfaction* with technological aspects by looking at several factors namely *content, accuracy, format, ease of use and timeliness.*

Content is the dimension to measure user satisfaction in terms of the content of a system. *Accuracy is* used to measure user satisfaction in terms of data accuracy when the system receives input and then processes it into information. *Format* dimensions are used to measure the user satisfaction of the appearance and aesthetics of the interface design.

Ease of use is a dimension used to measure satisfaction of the ease of the user in using the system. *Timelin*ess dimension to measure the timeliness of the system presents data [11].

D. System Speed

System speed is one of the features that can affect the web users satisfaction. Based on research conducted by Chin & Lee [17] states that, the operational speed of a system increases user satisfaction. This is supported by the statement of Nawangsari et al. (2008) that the access dimension in this case the speed of access to a website, whether downloading or obtaining data or information has a significant impact on the level of user satisfaction.

E. System Reliability

System reliability is also an important variable that has an effect on system user satisfaction. System variable reliability is declared valid and has an effect on system end-user satisfaction [5]. This variable measures user satisfaction in terms of information system's resilience towards damage and error.

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III. PROPOSED & HYPOTHESIS MODELS

Based on this opinion, the researchers tried to develop the EUCS model by adjusting the facts of the problems faced by system users in the field. Model development carried out by researchers is also inseparable from the literature review which shows the development of the EUCS model with the addition of other variables that also affect user satisfaction. This does refer to the statement of Ilias et al., [4] which states that many researchers define end-user satisfaction based on objectivity and studies conducted by themselves. So that the researcher developed 7 independent variables namely *content, accuracy, format, timeliness, ease of use, system speed* and *system reliability* and the *End User Satisfaction* as dependent variable in Fig.1.

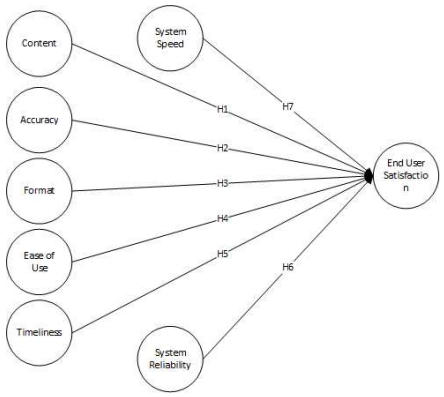


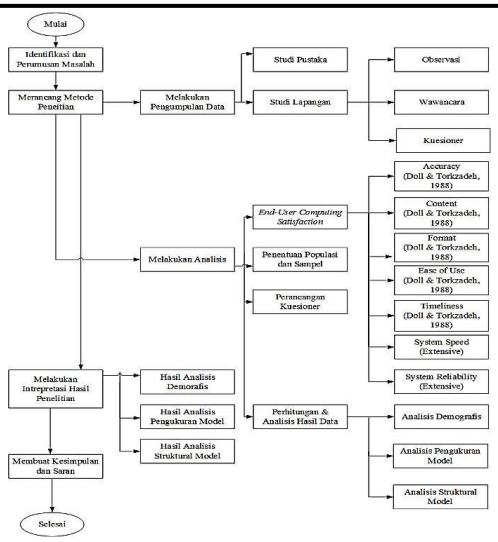
Fig. 1. Extension EUCS Model

IV. RESEARCH METHODS

In general, this study uses a quantitative method (Sugiyono, 2013) as a research procedure that produces data in the form of numerals presented tables and diagrams. In this study, a research model was developed as a source of formulation of a number of hypotheses, where the study consisted of 7 hypotheses. This research itself starts from data collection by conducting library studies and studying related literatures. Furthermore, the researchers also conducted observation studies by visiting the research site and making observations related to the general description of the academic information system which is the main object of research. After making observations, the author conducted aninterview with the respondent's representative. As for this study, the authors compose several hypotheses, where the hypothesis then tested using data that has been collected from the questionnaire.

The questionnaire was designed in the form of variable statements based on the EUCS model that was developed and distributed to end-users of the system (students, lecturers and academic staffs). The scale used in this questionnaire is 5 Likert scale. In determining the sample, researchers used a *purposive sampling technique* where the selected samples are users who already had experience in using academic information systems. Furthermore, quantitative data analysis was carried out through the PLS-SEM approach with *Smart* PLS [15][2]. This is done to analyze measurement and structural models.

In addition, structural analysis models is performed to examine the inner workings model through several stages of testing, ie testing *the path coefficient, coefficient of determination, t-test, effect size, predictive relevance, and the relative impact* [15][2]. The researcher also interprets the data based on the results of the analysis. Finally, researchers make conclusions and suggestions in accordance with the limitations and research hypotheses that have been made previously. The details of the process are shown in Fig.2.



V. Results and Discussion

A. *Results of Demographic Analysis*

This stage will display demographic information regarding to the characteristics of the respondents, the role of the system, and the status of the system's user satisfaction. The results show that most of the respondents are female (56%) and college students (86%). And Most of them are from the Faculty of Engineering (16 %) and the Faculty of Teaching Sciences (14 %). From the analysis it can be concluded that about 71% of respondents feel the systems assist them in many ways and about 56% of respondents are satisfied or even very satisfied when using the system. For more details, the results of demographic analysis can be seen in Table I.

Table I. Profile of Respondents

Category	Item	%
Gender	Women	56
	Man	44
Job Status	College Student	86
	Employee	6
	Lecturer	8
Age	<20 years old	87
	20-30 years old	52
	31-40 years old	3
	>40 years old	8
Last education	High School	82
	D3	2
	S1	8
	S2	7
	S3	1
	Item	%
	FAI	13
	FH	11
	FIK	7
	FKK	11
	FISIP	13
	FIP	14
	FT	16
	FAPET	9
	Academik	6
	Very helpful	34
	Helpful	37
	Quite Helpful	25
	Less Helpful	3
	Not Helpful	1
	Very Satisfied	21
	Satisfied	35
	Quite Satisfied	36
	Less Satisfied	6
	Not Satisfied	2

B. *Inferential Analysis Results*

a) Model Measurement Analysis Results

The outer model is measured by four stages of testing, namely testing of *individual items reliability*, *internal consistency*, *average variance extracted*, and *discriminant validity*. The explanation of the results of the model measurement analysis is as follows:

Table 2. Outer Model Analysis

	ACC	CON	EOU	EUS	FOR	SSP	SSR	TIM
ACC1	0.822	0.655	0.346	0.61	0.397	0.554	0.559	0.615
ACC2	0.833	0.67	0.436	0.592	0.45	0.551	0.515	0.569
ACC3	0.77	0.608	0.506	0.573	0.501	0.541	0.491	0.557
ACC4	0.802	0.63	0.476	0.635	0.472	0.593	0.572	0.549
CON1	0.645	0.8	0.37	0.6	0.398	0.497	0.549	0.553
CON2	0.582	0.788	0.307	0.579	0.376	0.42	0.542	0.615
CON3	0.696	0.824	0.438	0.618	0.442	0.502	0.54	0.568
CON4	0.57	0.76	0.334	0.503	0.436	0.505	0.548	0.627
CON5	0.66	0.809	0.439	0.591	0.458	0.513	0.56	0.623
EOU1	0.464	0.39	0.767	0.416	0.566	0.454	0.34	0.357
EOU2	0.29	0.233	0.726	0.307	0.438	0.371	0.243	0.264
EOU3	0.468	0.36	0.791	0.471	0.56	0.466	0.371	0.327
EOU4	0.328	0.348	0.742	0.367	0.562	0.397	0.333	0.346
EOU5	0.463	0.435	0.741	0.414	0.582	0.365	0.417	0.437
EUS1	0.583	0.542	0.416	0.812	0.466	0.516	0.572	0.608
EUS2	0.578	0.573	0.43	0.819	0.428	0.536	0.532	0.555
EUS3	0.685	0.673	0.476	0.875	0.478	0.654	0.702	0.655
EUS4	0.664	0.656	0.47	0.865	0.426	0.626	0.662	0.617
FOR1	0.246	0.289	0.324	0.255	0.587	0.289	0.302	0.335
FOR2	0.463	0.441	0.582	0.426	0.824	0.404	0.379	0.404
FOR3	0.471	0.441	0.623	0.427	0.801	0.4	0.384	0.393
FOR4	0.475	0.397	0.605	0.444	0.779	0.423	0.397	0.382
FOR5	0.404	0.393	0.518	0.408	0.73	0.308	0.351	0.319
SSP1	0.58	0.489	0.413	0.582	0.378	0.853	0.542	0.569
SSP2	0.565	0.47	0.501	0.535	0.466	0.843	0.511	0.568
SSP3	0.561	0.552	0.48	0.586	0.43	0.813	0.557	0.559
SSP4	0.626	0.54	0.456	0.63	0.385	0.855	0.604	0.541
SSR1	0.495	0.532	0.312	0.533	0.361	0.532	0.798	0.59
SSR2	0.562	0.572	0.402	0.621	0.387	0.597	0.841	0.623
SSR3	0.497	0.528	0.33	0.563	0.377	0.506	0.798	0.555
SSR4	0.567	0.567	0.417	0.637	0.427	0.484	0.773	0.5
TIM1	0.66	0.672	0.387	0.647	0.415	0.622	0.566	0.867
TIM2	0.654	0.662	0.456	0.654	0.492	0.575	0.611	0.863
TIM3	0.567	0.619	0.382	0.619	0.386	0.576	0.628	0.872
TIM4	0.575	0.636	0.378	0.584	0.393	0.528	0.645	0.868

- The results of *individual* testing *of reliability items* have met the minimum standards which is 3-5 indicators in this study have had a value of *loading factors* above 0,5 [15].So there is no elimination of the indicators used in this study. See Table 2.

- Results *Internal consistency* testing shows that all variables in this study already have a *Composite Reliability* (CR) value above the threshold of 0.7. See Table 3.
- The *average variance extracted* test results show that all variables in this study have the value of *Average Variance Extracted* (AVE) above 0.5. See Table 3

TABLE 3. AVE DAN CR

Variabel	*Average Variance Extracted (AVE)*	*Composite Reliability*
Accuracy	0.651	0.882
Content	0.634	0.897
Ease Of Use	0.568	0.868
Format	0.561	0.863
System Speed	0.708	0.906
System Reliability	0.645	0.879
Timeliness	0.753	0.924
End User Satisfaction	0.711	0.908

- Results of testing *discriminant validity* in this research is conducted through two examination stages which are examination of *cross loading* between indicators and examination of cross loading Fornell- Lacker 's. *Cross loading* checks between indicators require conditions where the correlation between indicators and constructs must be bigger than the correlation with other block constructs. Whereas, for Fornell-Lacekr's*cross loading* examination, the root value of AVE must be higher than the correlation between constructs and other constructs. The results of *discriminant validity* checks as a whole, as well as the value and condition of *cross loading* can be said to be fulfilling, so the test can be continued at the structural analysis phase of the model. In addition, R2 (coefficient of determination) has a level of 70.6% which means that 7 variables used as hypotheses in this study are considered to have represented the dependent variable of end user satisfaction (end user satisfaction).

b) *Model Structural Analysis Results*

Structural analysis model (*inner model*) is done through six stages of testing, namely testing *path coefficient (β) , the coefficient of determination ($R^{2)}$, t-test, effect size ($f^{2)}$, predictive relevance ($Q^{2)}$* and the *relative impact ($q^{2)}$* . The results can be seen in the table 7.

Overall, the research model has gone through the structural testing phase of the model to find out about how much the influence of the linkages and the relationship between the variables used in this study. First, for the results of the *path coefficient* (β) stage, it is known that 2 of the 7 paths have an insignificant effect on the model (i.e., the *Format* path → *End User Satisfaction*, *Ease Of Use* → *End User Satisfaction*) because the *path coefficient* value of the 2 paths is below the threshold (ie 0.1).

In addition, referring to the results of the t-test phase, it is known that 5 of the 7 hypotheses proposed in this study were accepted. This is because the value of the *t-test* from the 5 hypotheses is above the threshold value (ie 1.96).

Furthermore, the results of the effect size (f2) stage on all 7 lines indicate that 7 paths as a whole have a small effect. Then, for the results of the *predictive relevance* stage (Q^2), it states that all the variables in this study have a predictive relationship of 46.6%. Finally, for the results of the *relative impact* stage (q^2), the 7 lines have a small effect. See Table 4 below

TABLE 4. AVE DAN CR

Hipotesis		β	t-test	R^2	f^2			Q^2	q^2			Analysis					
No	Jalur				R^2-in	R^2-ex	$\sum f^2$		Q^2-in	Q^2-ex	$\sum q^2$	β	t-test	R^2	f^2	Q^2	q^2
H1	CON → EUS	0.143	2.419	0.706	0.706	0.7	0.02041	0.466	0.466	0.462	0.007	*Sign*	*A*	S	k	*P*	k
H2	ACC → EUS	0.205	3.069	0.706	0.706	0.694	0.04082	0.466	0.466	0.459	0.013	*Sign*	*A*	S	k	*P*	k
H3	FOR → EUS	0.022	0.329	0.706	0.706	0.706	-	0.466	0.466	0.467	-0.002	*Insign*	*R*	S	k	*P*	k
H4	EOU → EUS	0.068	1.2	0.706	0.706	0.704	0.00680	0.466	0.466	0.465	0.002	*Insign*	*R*	S	k	*P*	k
H5	TIM → EUS	0.148	2.029	0.706	0.706	0.699	0.02381	0.466	0.466	0.461	0.009	*Sign*	*A*	S	k	*P*	k
H6	SSP → EUS	0.150	2.337	0.706	0.706	0.697	0.03061	0.466	0.466	0.462	0.007	*Sign*	*A*	S	k	*P*	k
H7	SSR → EUS	0.258	3.862	0.706	0.706	0.679	0.09184	0.466	0.466	0.448	0.034	*Sign*	*A*	S	k	*P*	k

Notes :

1) *Sign: Significant* 2) *Insig: Insignificant*
3) *A: Accepted* 4) *R:Rejected*
5)*L: Large* 6) M: Medium
7) S:Substantial 8) *P:Predictive*
9) k: small

C. Discussion

Based on the results of the structural analysis model, it is known that H1 (content), H2 (accuracy), H5 (timeliness), H6 (system speed), and H7 (system reliability) in this study were accepted. While FOR (format), EOU (Ease of Use) variables have no effect on system end-user satisfaction. This proves the consistency of the findings of the previous research states that the five variables proved to affect user satisfaction. While the rejected variables namely formatting variables and Ease of Use are also consistent with the previous research conducted [6]. Thus the results of this study indicate that there are 5 hypotheses accepted in this study, namely CON → EUS; ACC → EUS; TEAM → EUS;

SSP → EUS; SSR → EUS. And for those 2 variables that are rejected, it is assumed that this has something to do with the use of indicators in instrument making selection of respondents, and the process of collecting data. This is a limitation in this study and it is suggested that further research should revisit these matters.

VI. CONCLUSION

Based on the 255 respondents that consists of students, faculty and academic staff which are the user of Academic Information System of University of Muhammadiyah Jakarta (UMJ SIKAD), it can be concluded that most of the respondents felt quite satisfied when using the system, namely 93 people (36%).

A total of 89 respondents (35%) were satisfied and as many as 54 respondents (21 %) felt very satisfied when using the system.

Furthermore, based on the results of the *inner model* test, it is known that the factors which influenced the system end user's satisfaction are *conten, accuracy, timeliness, system speed and system reliability* . From the results of these studies, the researchers recommend to the authorities in developing the system that they should focus more on the factors that influence user satisfaction as previously mentioned.

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