Analysis On Academic Information System Quality Toward User Satisfaction

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Abstract. Achieving excellent quality academic and administrative services is one of the efforts of the Indonesia University of Education (UPI) in building its Academic Information System (SIAK) under UPI Directorate of Information and Communication that was established on 6 July 2007. The use of Information and Communication Technology (TIK) for a system of information and academic services in higher education institution is an urgent necessity to increase the reputation of higher education institution both nationally and globally. This research aims to discover the relation, influences and analyzes the quality of academic information system quality toward user satisfaction in the Indonesia University of Education. The research use Gap Analysis and Structural Equation Model (SEM). Gap analysis results show a gap between performance and user expectation but average result of user satisfaction variable shows that respondents are satisfied with the academic information system implementation. SEM analysis result show that all research variables and indicators have significant relations, also that the academic information system quality (system quality, information quality and service quality (toward user satisfaction has a significant impact. Research discovery shows the necessity of periodical evaluation by the academic information system administrator with user participation, to ensure users need fulfillment.

Keywords: academic information system, gap analysis, quality analysis, user satisfaction

Abstrak. *Pencapaian pelayanan akademik dan tata kelola yang berkualitas salah satu upaya Universitas Pendidikan Indonesia (UPI) membangun Sistem Informasi Akademik (SIAK) yang berada pada Direktorat Teknologi Informasi dan Komunikasi UPI yang didirikan pada tanggal 6 Juli 2007. Pemanfaatan Teknologi Informasi dan Komunikasi (TIK) menjadi sistem informasi pada layanan akademik di peguruan tinggi menjadi kebutuhan yang sangat penting untuk meningkatkan reputasi perguruan tinggi baik di dalam negeri maupun global. Penelitian ini bertujuan untuk mencari hubungan, pengaruh dan menganalisa kualitas sistem informasi akademik terhadap kepuasan pengguna di Universitas Pendidikan Indonesia. Analisis yang digunakan adalah analisis Gap dan Structural Equation Model (SEM). Hasil anilisis Gap menunjukan masih terdapat kesenjangan antara kinerja dengan harapan pengguna tetapi hasil dari nilai rata-rata variabel kepuasan pengguna menunjukan bahwa responden merasa puas dengan implementasi sistem informasi akademik. Hasil analisis SEM menunjukan bahwa semua variabel dan indikator yang diteliti memiliki hubungan yang signifikan, begitu juga pengaruh dari kualitas sistem informasi akademik (kualitas sitem, kualitas informasi dan kualitas layanan) terhadap kepuasan pengguna memiliki pengaruh yang cukup besar. Temuan penelitian menunjukan perlu evaluasi secara berkala dari pengelola sistem informasi akademik dengan melibatkan pengguna, agar dapat memastikan bahwa kebutuhan pengguna terpenuhi.*

Kata kunci*: analisis gap, analisis kualitas, kepuasan pengguna, sistem informasi akademik*

INTRODUCTION

Higher education institution with main obligations on education, research, and community service (tridharma of higher education) to develop an innovative, responsive, creative, skilled and coperative academic community in order to increase the nation's competitiveness Innovations are necessary to achieve the tridharma of higher education by providing solutions to issues on Good Univesity Governance as stated in the law on higher education no. 12 year 2012 regarding the principles of higher education institution organization, among others of being non-profit, accountable, transparent, with good quality, effective and efficient (State Secretariat 2012), one of the higher education institution's breakthrough effort is academic service with good quality.

Achieving excellent quality academic and administrative services is one of the efforts of the Indonesia University of Education (UPI) in building its Academic Information System (SIAK) under UPI Directorate of Information and Communication that was established on 6 July 2007. The use of Information and Communication Technology (TIK) for a system of information and academic services in higher education institution is an urgent necessity to increase the reputation of higher education institution both nationally and globally.

The development of TIK in UPI began in 2001, which until 2004 TIK still utilized computers and cause queues and inconvenience for users because of the limited number of computers. It was then continued with UPInet era since 2004 to 2006. One of concrete manifestations of UPI's seriousness in welcoming the

era of information technology was the establishment of UPInet that was expected to anticipate the issues of computerized era. During this era the entire academic, research, and community service activities, also management process in UPI, used cyber based information technology. Various activities had been implemented by UPInet in UPI transition into the era of information technology, among them is the internet, e-mail, online syllabus, e-learning, multimedia streaming, control access system, e-book/e-journal. UPInet was connected by internet to sub-units such as the rectorate, the Administrative Bureau of Academic and Student Affairs (BAAK), Bureau of Public Administration and Finance (BAUK), Faculties and campus areas UPInet. And then in 2006 until now UPInet had changed name into TIK Directorate and in its development have establised Assets and Facilities Information System (SIASEF), Financial System (SIKU), Human Resources Information System (SISUDAMA), and Academic Information System (SIAK).

To face the challenge of increasing academic management necessities, academic information system development must take into account the success of previous information system model applied by preceding researchers, among them are DeLeon and Mclean on the three indicators of succesful information system implementation, whic are system quality, information quality and service quality in relation to user satisfaction. Whereas academic information system users in UPI are the students, lecturers and the academic staffs. Answering the challenges in the increasing necessities of academic management, the development if academic information system in UPI must be evaluated for continuous improvement toward excellence of effective, efficient and high quality business process through the support of information system that have been developed in SIAK.

According to Zwass (1998) quality is a measurement encompassing all systems to achieve targets and expected goals. While according to Carmichael (2002) quality is a measurement if outcome "quality" to achieve system target.

Achieving good quality information system requires resources, according to O'Brien (2005) information system consists of five basic resources, which are human (brainware), Hardware, software, dataware, and netware with main tasks of transforming data into information by entering, processing and giving output in the form of information to produce policies and decisions in achieving organization goals.

The goals of information system building is essentially providing satisfaction or to simplify user in meeting their needs. Kotler (2006) stated that satisfaction is an individual like/dislike toward a product after comparison of the product quality to the expectation, also according to Supranto (2011) satisfaction is the level of an individual feeling after comparing the performance (results) to the expectation.

There are many previous researches in the field of information system, especially those related to the DeLone and McLean's model, thus this research also refers to previous researches as stated below.

Alhendrawi and Baharudin (2013) carried a research on web based information system quality using the three indicators on system quality, information quality and service quality related to UNRWA Palestine staff performance. Research results shows that the three indicators of information system quality is correlated to strong influence over staffs performance.

Zained (2012) carried out a research on Egyptian students by modifying DeLone and McLean (2003) model and Technology Acceptance Model (TAM) by adding two dimension variables; management support and training. After statistical analysis and testing the results are as follows: information quality has significantly strong impact to IS Succes (81.9%) followed by behavioral intention (80.2%), perceived usefulness (78.8%) while the least is user involvement (70%). In overall it shows that the proposed model can be beneficial for decision makers in the organization in evaluating the implementation of information system.

Livari (2005) carried out a research on public sector in Oulu, Finland, regarding the succes of newly implemented information system toward information system user in a mandatory organization. The results show that perceived system quality and perceived information quality is a significant predictor for user satisfaction, but it is not a significant predictor for the system use intensity, and user satisfaction is also a significant predictor for individual impact.

Gemmell and Pagano (2003) carried out a research to evaluate final implementation of the student academic information system based on user perception. This research was done on the student information system implemented in Salford University. Three elements of the evaluated information system are product, process and service. The analysis used in the research was gap analysis. Primary data was collected through questionnaires distributed to users related to the attributes of the evaluated system.

Hsiu (2007) research on a higher education institute in Taiwan to 232 diploma students as respondents with DeLone and McLean (2003) model approach attempted to measure the Online Learning Systems success by utilizing 6 variables (system quality, information quality, service quality, actual online learning system use, user satisfaction and behavioral intention) modification of DeLone and McLean model and the conclusion is that system quality, information quality and service quality has tangible impact toward actual online learning system use through user satisfaction and behavioiral intention to use online learning system.

Research of Kadarisman (2012) analyzes the factors of work satisfaction to analyze levels of work satisfaction and factors influencing it, also to give recommendations to increase work satisfaction of Human Resources in Apparatus in Bogor District Secretariat. The research utilized factor analysis to analyze factors of Apparatus Human Resources work satisfaction, which are 11 dominant factors for

Apparatus Human Resources work satisfaction, which are 1. Salary; 2. Benefits and facilities; 3. Superiors and subordinates relation; 4. Co-workers relations; 5. Development; 6. Opportunity; 7. Work safety; 8. Education; 9. Organizational policy; 10. Conflict resolution; and 11. Work Presentation The research results have an implication toward organization management efforts in increasing Apparatus Human Resources work satisfaction.

Preceding empirical researches in various fields and on various research objects to test the DeLone and McLean (2003) information system success model, which are the three aspects of system quality, information quality, service quality, but those researches only evaluated information system in general or yet to evaluate information system on specific academic field that is often used that is the financial and students information system. Therefore this research is carried out to evaluate information system specifically on the academic field as it is hoped to provide sharper result for the effort in providing academic information system in UPI.

RESEARCH METHODS

This research falls in the category of evaluation research with descriptive research method. This evaluation research used questionnaires as data collecting tool to observe and gain clear notes on the specific research matter. Through this method the entire aspects and phenomenon related to the implementation of SIAK in UPI can be described in details This research is also hoped to evaluate SIAK implementation in UPI to discover the quality of academic information system toward user satisfaction.

Respondents number was decided using the SEM rule of thumb. According to Hair et al. (2006), the necessary sample for each estimated parameter is five to ten times of research indicators. The number of indicator variables making up the SEM model in this research are 20 thus the research used a sample of 200 respondents consists of 152 students, 38 lecturers, and 10 academic staffs who run the operations of the academic information system.

This research evaluates information system quality based on the DeLone and Mc Lean (2003) model of information system success. There are three main dimension of the DeLone and Mc Lean information system success model, which are the system quality, information quality and service quality, which are related to satisfaction of users, which are students, lecturers and academic staffs. The three dimension will become the analyzed independent factor, while the dependent factors are academic information system quality and the satisfaction of SIAK user in UPI.

The measurement scale in this research is the four Likert scale from 1 to 4. The options are: (1) strongly disagree, (2) disagree, (3) agree, (4) strongly agree. Data processing and analysis techniques utilized the three main dimension of the DeLone and Mc Lean information system success model, which are the system quality, information quality and service quality, which are related to satisfaction of users, which are students, lecturers and academic staffs. The phases of data processing and analysis are as follows.

First, instrument validity test to discover whether the query points in the instrument have comply the constructed theory concept. The results of instrument validity test of the three constructs on academic information system quality and user satisfaction to show that all query itemss are correlated to the total scores of all information system quality and user satisfaction constructs. The significance test (t-count) value is consulted to the distribution table (t-table) with t-value validity criterion > t-table (1.73) in all information system quality construct all query item is valid except for one invalid query that is system quality construct item 5.

Secondly, instrument reliability test to discover the consistency of respondent answer so truthful answer is accountable. Thus reliability shows how far measurement can provide consistent results when re-measurement was taken on the same subject. The results of reliability test on each construct has Cronbach's alpha value of each construct > .60 (Kristaung 2011). This result signifies that the data collected using questionnaire instrument both the X variable (academic information system effectivity) and the Y variable (user satisfaction) are realible.

Third, gap analysis in this research was used to find the gap caused by attribute reality and user expectation level to the attribut, and the gap analysis result value is inserted in the cartesius diagram. Fourth, the Structural Equation Model (SEM), using Smart PLS 2.0 program to analyze the relations and impacts between dimension and variables (see table 1 and 2).

Table 1. Component Forming Exogen Attribute Latent Variable of Academic Information System Quality

Latent Variable	Indicator	Sources
System Quality	Data presented with accuracy, clear and easy to use	DeLone dan McLean (2003), Liu dan Arnett (2000), Molla dan Licker (2001)
	An integrated system	
	System designed to fulfil user's needs.	DeLone dan McLean (2003)
	Sophisticated system	
	System consistency with accurate measurement	
	Fast response time	
	Optimalization of information resources	DeLone dan McLean (2003), Palmer 2002, Molla dan Licker 2001
	Socialization and increased competence of user	DeLone and McLean (2003)

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	Information presented is important and easy to understand	DeLone and McLean (2003)
	Information presented is relevant, clear and beneficial	DeLone and McLean (2003), Molla and Licker (2001)
Information Quality	Form and content of information is interesting and unique	DeLone dan McLean (2003), Palmer (2002)
	Up to date information	DeLone and McLean (2003), D'Ambara and Rice (2001), Molla and Licker (2001)
	Punctual information	
	Measured quantity of information	DeLone dan McLean (2003)
	Bias-free information	DeLone and McLean (2003)
	Tangible	
	Reliability/service consistency	Parasuraman A (1994), Liu and Arnett (2000), Molla and Licker 2001)
Service Quality	Responsiveness	
	Assurance	
	Empathy	

Table 2. Endogen Attribute Latent Variable Formation Component

Latent Variable	Indicator	Sources
	Satisfaction on information usage	
	Satisfaction on software usage	
	Informational access	DeLone and McLean (2004), Reichheld and Shefer (2000), Teo and Too (2000)
User Satisfaction	Efficiency	
	Quality of information and service	
	Satisfaction on displayed items	

RESULT AND DISCUSSION

The analysis on information system quality in this research is applied on each dimension forming information system quality in SIAK implementation at the Indonesia University of Education, which are the dimensions of system quality, information quality, and service quality.Each dimension of information system quality consists of several indicator variables or attributes that form the dimension.

Research gap analysis results in overal shows that the performance of the entire information system quality attributes in SIAK implementation in UPI is still under the respondent expectation. Calculation results of the entire performance attribute have an average value of 2.66, (two point sixty six), while the calculation results of the entire user expectation attribute toward SIAK implementation in the Indonesia University of Education is an average value of 3.65 (three point sixty five). Each attribute of information system effectivity in SIAK implementation in the Indonesia University of Education still has gaps. Therefore, quality improvement is required from each attribute which will lessen the gap between expectation and resulted performance, so it would help in increasing the information system activity in a whole and will impacted on the increase of user satisfaction.

Based on gap value of the system quality dimension when put in order according to the biggest indicator value that has yet to fulfil user expectation, which is the SYSQUA 5 (information system response speed) indicator with -1.36 value, SYSQUA 7 (socialization and user competence improvement) with -1.22 value, SYSQUA 6 (optimalization of SI resources usage) with -1.06 value, SYSQUA 4 (information system sophistication) with -1.04 value, SYSQUA 3 (system design fulfilling users needs) with -0.92 value, SYSQUA 2 (system integration) with -0.86 value and the lowest gap is in the SYSQUA 1 (data accuracy, simplification and clarity) with -0.77 value. From the order of the system quality attribute value depicted above it could be concluded that the biggest gap value is at the SYSQUA 5 indicator, which means that the academic information system in UPI needs to increase its response speed.

Based on gap value of the information quality dimension when put in order according to the biggest

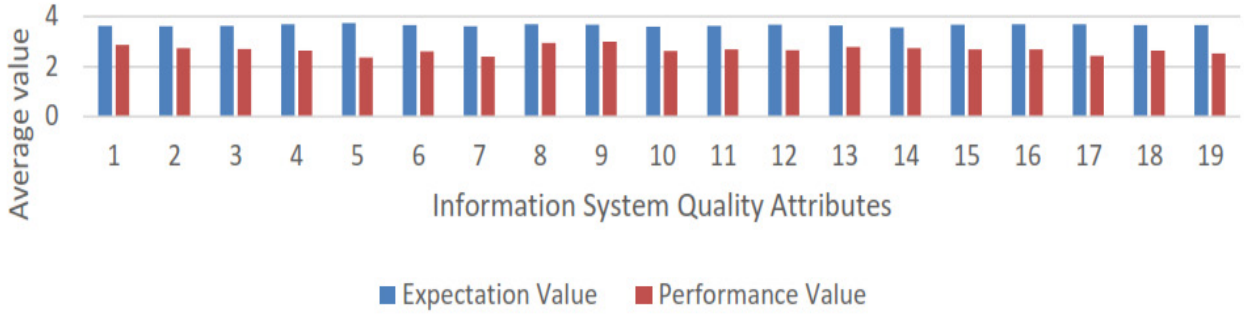

Figure 1. Average Value of expectation and performance toward all information system quality attribute

indicator value that has yet to fulfil user expectation that are INQUA 5 (punctual information) indicator with -1.02 value, INQUA 3 (information content format is interesting and unique) with -0.98 value, INQUA 4 (up to date information) with -0.94 value, INQUA 6 (measured information quantity) with -0.86 value, INQUA 7 (bias-free information) with -0.82 value, INQUA 1 (important and easy information) with -0.75 value and the lower gap is at the INQUA 2 (relevant, clear and useful information) with -0.68 value. From the order of the information quality attribute value depicted above it could be concluded that the biggest gap value is at the INQUA 5 indicator, which means that the academic information system in UPI needs to increase its punctual information.

Based on gap value of the system quality dimension when put in order according to the biggest indicator value that has yet to fulfil user expectation that are SERQUA 3 (fast service) indicator with -1.25 value, SERQUA 5 (empathy) with -1.13 value, SERQUA 4 (service warranty) with -1.02 value, SERQUA 2 (service reliability/consistency) with -1.00 value and the lowest gap is at the SERQUA 1 (manifested/ physical evident) indicator with -0.99 value. From the order of the system quality attribute value depicted above it could be concluded that the biggest gap value is at the SERQUA 5 indicator, which means that the academic information system in UPI needs to increase the service speed of its academic information system.

Respondents answer distribution regarding academic information system user satisfaction in the Indonesia University of Education. The results show that most user answered agree as much as 751 respondents and total average is 2.86. The value falls within the interval class between 2.51 - 3.25 in the satisfied category/ The results show that in general users are satisfied with the provided Academic Information System.

Gap analysis in this research was used to find the gap caused by attribute reality and user expectation level to the attribut. Thus the analysis can observe the position of each indicator to make future improvements easier.

Based on the Cartesius Diagram (Supranto J 2011) the academic information expectation and performance above can be explained as the following (1-7 = System qualitu, 8-14 = Information quality and 15-19 = Service quality). Quadrant A shows the factors or attributes impacting the expectations of Academic Information System users. Attributes in this quadrants are considered important by users, but its implementations are yet to fulfil users expectations. Attributes included in this quadrant are attributes of sophisticated system design, system response time and speed, information system resources usage, punctual information, perceptive service in helping user with efficiency and clarity (service speed), service warranty, and empathy. The quadrant A description shows that the attributes within this quadrant can be prioritized for improvements by the organization.

Quadrant B shows the factors or attributes impacting the expectations of Academic Information System users. Attributes within this quadrant needs to be maintained, becase in general its implementation have

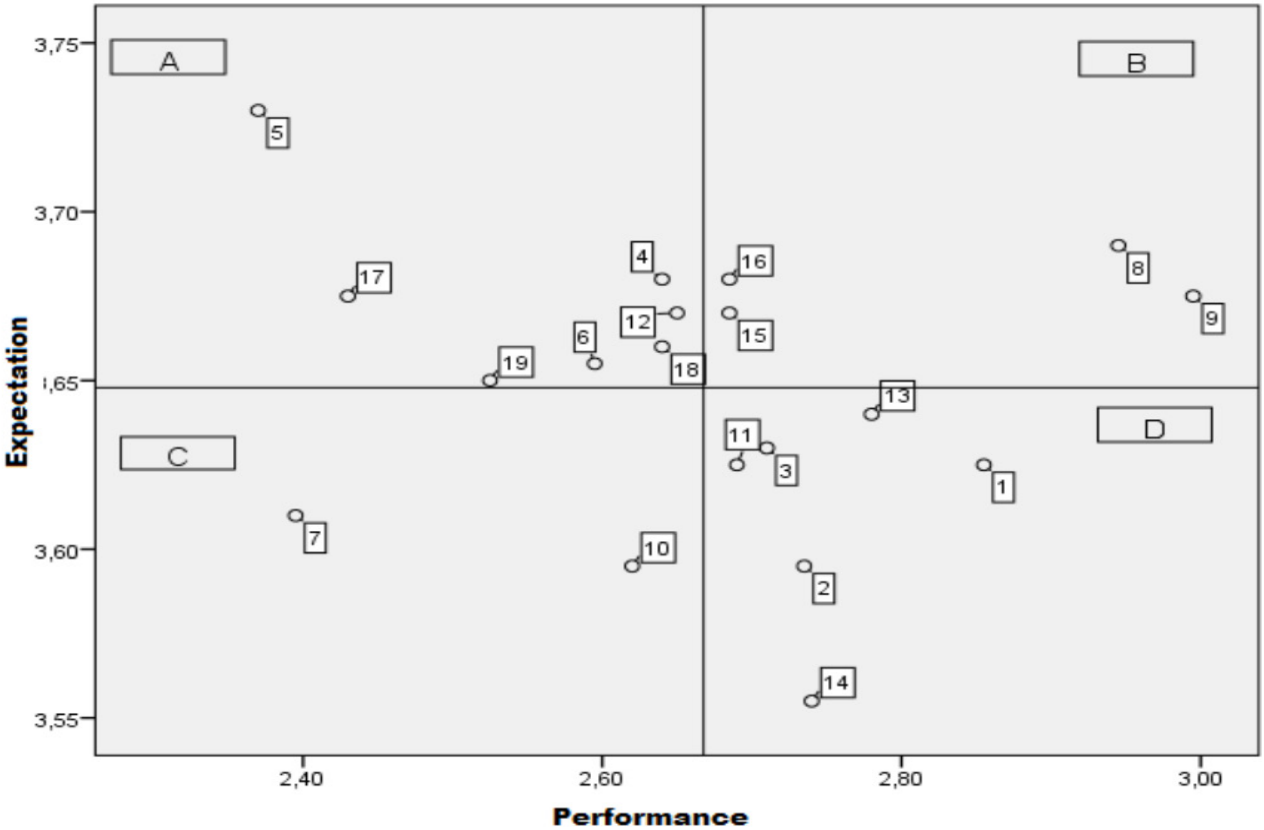

Figure 2. Cartesius Diagram on SIAK UPI Expectation and Performance

met the user interest and expectation, therefore satisfy the users. Attributes included within this quadrant are important and easy to understood information; relevant, clear and beneficial information; adequate means and infrastructure (physical evident), and accurate and reliable service. Therefore the attributes within this quadrant need to have the performance maintained by the organization. The C quadrant shows factors or attributes considered to be less important by users and average implementation by the organization. Attributes included in this quadrant are socialization and user competence improvement, also interesting and unique information format.

D Quadrant shows factors and attributes considered to be less important by users and exceeding implementation by the organization. The attributes included in this quadrant are: accurate, clear and easy to use data; good system integration; system designed to meet user needs; up to date information, measured information quantity; and bias-free information.

The Cartesius diagram analysis results above shows the distribution of the attributes in the four quadrants, the B quadrant only have four attribute indicator that needs to be maintained by SIAK administrator in UPI whereas the quadrants A and D need solutions so that the strength in D quadrant can be shifted to increas the performance of indicators/attributes in quadrant A.

Inner model evaluation to observe the structural relation and impact between latent variable and the formed model. Inned model evaluation is done by observing the R-square value and hypothesis testing using t-test. Using Smart PLS, SEM analysis results are as the following on table 3

Table 3. Exogen Attribute Latent Variable Formation Component

Latent Variable	Indicator Changer Component
System Quality	$X_{1.1}$ Data presented with accuracy, clear and easy to use
	$X_{1.2}$ An integrated system
	$X_{1.3}$ System designed to fulfil user's needs
	$X_{1.4}$ Has up to date system
	$X_{1.5}$ System consistency with accurate measurement
	$X_{1.6}$ Has quick system response
	$X_{1.7}$ Optimalization of information resources
	$X_{1.8}$ Socialization and increased competence of user
Information Quality	$X_{2.1}$ Information presented is important and easy to understand
	$X_{2.2}$ Information presented is relevant, clear and beneficial
	$X_{2.3}$ Form and content of information is interesting and unique
	$X_{2.4}$ Up to date information
	$X_{2.5}$ Punctual information
	$X_{2.6}$ Measured quantity of information
	$X_{2.7}$ Bias-free information
Service Quality	$X_{3.1}$ Tangible
	$X_{3.2}$ Reliability/service consistency
	$X_{3.3}$ Responsiveness
	$X_{3.4}$ (assurance) 6
	$X_{3.5}$ Empathy

Table 4. Endogen Attribute Latent Variable Formation component

Latent Variable	Indicator Changer Component
User Satisfaction	Y_1 Satisfaction on information usage
	Y_2 Satisfaction on software usage
	Y_3 Informational access
	Y_4 Efficiency
	Y_5 Information and service effectivity
	Y_6 Satisfaction on displayed items

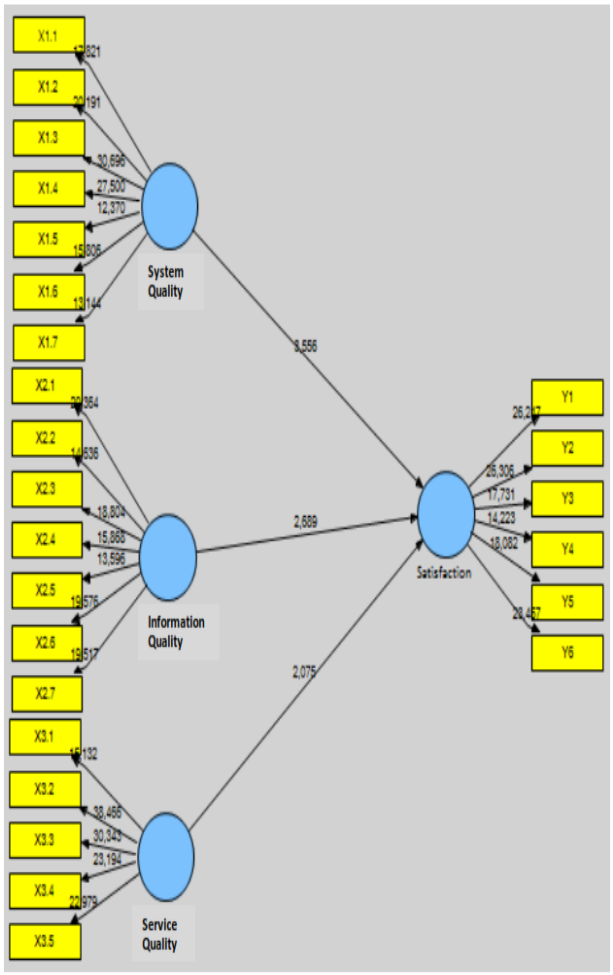

Figure 3. Structural Model and its Correlation Value Scheme

Table 5. Inner Model Evaluation

Variables	Structural Channel Coefficient	Correlation to Y	Influence (%)
X1 -> Y	0,390	0,772	30.1%
X2 -> Y	0,314	0,741	23.3%
X3 -> Y	0,193	0,706	13.6%
Correlation		0,819	Service
		Total Influence (R^2)	67%

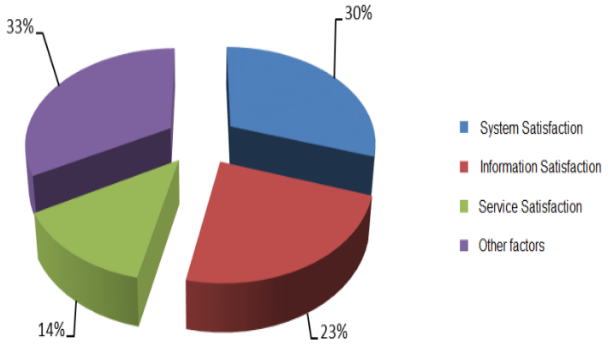

Figure 4. Percentage of SIAK Quality Influence on User Satisfaction

Table 6. Inter Construct Relation Coefficient

Inter construct	*(0)* (0)	Standard Error (STERR)	T Statistics (O/ STERR)	Notes
Service Quality → User satisfaction	0,390282	0,109766	3,556239	Signifi-cant
Information Quality → User satisfaction	0,313856	0,116699	2,689440	
Service Quality → User satisfaction	0,193253	0,093136	2,074959	

Table figure shows that there is a significant relation between system quality, information quality and service quality with user satisfaction at the Indonesia University of Education. The research result on SIAK quality impact with dimensions of system quality, information quality and service quality toward user satisfaction as much as 67%, therefore an advance research is necessary with different research model to gain dimension description that has yet been discovered by this research. So far information technology development is increasingly fast as well as the increasingly complex development of human needs. This also happens to the research of information system experts DeLone and McLean in 1999 by using only two dimensions that are system quality and information quality and then it is later improved in 2003 with the addition of service quality.

CONCLUSION

Based on data analysis and study related to the academic information system quality and user satisfaction in the implementation of SIAK in Indonesia University of Education, the following conclusions can be made. The results of gap analysis show user expectation on all attributes of the system quality, information quality, service quality dimensions is still bigger when compared to the performances and there is a variety of gap, which means the performance quality of academic information system in UPI with three quality dimensions have yet to fulfil user expectation standard.

The study results on the user satisfaction dimension, in general respondents feel satisfaction on the implementation of information system because it reduces issues that emerged prior to the academic information system implementation but in this case it is still in the satisfaction interval class and have yet to be in the very satisfied level.

Cartesius diagram analysis show that the attributes distribution on the four quadrants, the B quadrant only have four indicators in the information quality dimension (important and easy to understood information; relevant, clear and beneficial information) and service quality dimension (adequate means and infrastructure, and accurate and reliable service), that need to be maintained by SIAK administrators in UPI, while quadrant A and D needs to improve its quality by increasing performance of quadrant A.

There is a strong and significant relation between system quality, information quality and service quality with user satisfaction at the Indonesia University of Education. Also the impact given by system quality (X1) toward user satisfaction (Y) by 30.1%, information quality (X2) by 23.3% and service quality (X3) contributes to user satisfactions by 13.6%, that the total contribution of the three variables manifests to 67%, while the other 33% is attributed to non-researched variables.

To increase academic information system quality performance UPI TIK Directorate needs carry out periodical evaluation on system quality, information quality and service quality. Periodical information system evaluation needs to involve users, to ensure that their needs are fulfiled by the applied information system.

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