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Combining Two Models of Successful Information System Measurement

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Abstract

This paper purposes is to measure successful of Academic Advisory information system by combining two models of information system measurement. DeLone & McLean IS Success Model use to measure the successful of system while COBIT framework is to measure system maturity level. Result of this research showed that the successful of Academic Advisory IS affected by User Satifaction, Quality of Service, Quality of System while Maturity level at 3.7. The result also showed there's a relation between level of maturity system with the success of system.

Keywords*: DeLone McLean, COBIT, maturity level, information system*

1. Introduction

Implementation of information system can support organization to achieve its goals. According to James O'Brian [1] Information systems have become as integrated into our daily business activities as accounting, finance, operations management, marketing, human resource management, or any other major business function. Information systems and technologies are vital components of successful businesses and organizations. In educational organizations such as university information systems have also been implemented, one of the information systems academic advisory. At BINUS University Academic Advisory information system is a means provided by the campus so that students can consult about their academic activities with lecturers that appointed as mentors. In addition to assisting lecturers and students in conducting communication and scheduling to conduct meetings, academic advisory information system also helps in the data collection of academic achievement of students ranging from grades, course schedules, and courses taken in the current semester. But the problem arises when the supervisor says that the student often does not come on a set schedule while the student is reasonably late in knowing the information or not even knowing the information. These circumstances may prevent students from obtaining good academic advisory services. Because it is necessary to measure whether the system has been running as expected.

Measurements of the information system have been performed in the following studies. In the previous study Fuad Budiman [2] in his research measure the success of the implementation of regional management information system using Technology Acceptance Model (TAM) approach. While in her research Junita Juwita [3] perform analysis of TAM factors that influence in the use of knowledge management applications for small and medium enterprises in the creative industry. But TAM focuses more on providing general explanations of what determines technology acceptance. Another paper by Setiawan Assegaf use DeLone and McLean information system success model (D & M model) to measure social media success for knowledge sharing [7]. While study conducted by Johan and Angelia [8] use the 6 dimensions of D & M model to measure BINUS University Information System. Information system measurement can be considered as audit of the system. Audit system can be applied to evaluate whether information system implemented effectively. Enterprises need to measure where they are and where improvement is required. Maturity models to enable benchmarking and identification of necessary capability improvements. In a study conducted by Diema and Fia [16] maturity level of COBIT framework was applied to evaluate academic information system in order to improve service for user satisfaction. An empirical study also done by

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Irmawati [13], Diana and Michel [14], Azhari and Melia [15] to evaluate information system maturity level. On the other studies Haryanto and Sarno [17] conduct a research to propose the use of COBIT Maturity Model (CMM) and Structural Equation Model (SEM) to measure the alignment between the University Academic Regulations and Information Technology Goals where the results of this study proved that the alignment measurement using CMM and SEM gave relatively the same results, which described the same priority list of maturity levels of the IT processes.

Based on the exposure of the previous studies above, through this research we combine two measurements of information systems to measure the academic advisory information system. D & M model to measure the success of academic advisory information systems and CMM to measure the maturity level of academic advisory information system also to analyze the relation between the success of academic advisory information system with the system maturity level to find the affected factors of successful information system.

2. Research Method

According to DeLone and McLean [5], where have been revised [6], the implementation of information systems is said to be successful if organizations get the net benefits of information systems, while the net benefits gained due to user satisfaction in using the system. In this case, user satisfaction in using the system is influenced by the information quality, service quality and system quality. The D & M model proposed by DeLone and McLean as depicted as shown in Figure 1.

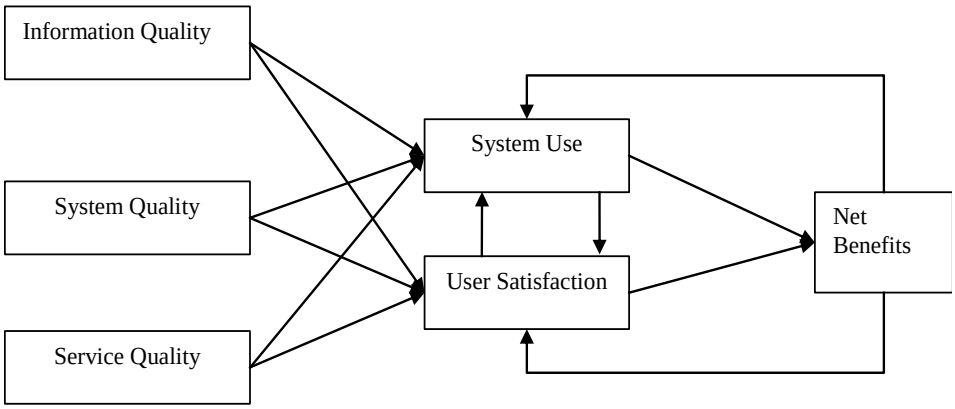

Figure 1. D & M information system success model

On the other hand according to The IT Governance Institute [12] the advantage of a maturity model approach is that it is relatively easy for management to place itself on the scale and appreciate what is involved if improved performance is needed.

2.1. Measurement and Indicators Development

In this study data collection is done through questionnaire sheet. The distribution of questionnaires was conducted to users of the Academic Advisory Information System. Of the 200 questionnaires that spread as many as 150 were returned with details to measure the success of information systems with a total of 140 users of system users. Meanwhile, to measure the maturity level of the system as much as 10 respondents.

Measurement variables for D & M model used Likert scale from strongly disagree to strongly agree. The scale is indicated by the following criteria: number 1 means strongly disagree (STS), 2 means disagree (TS), 3 means sufficient (C), 4 means agree (S), 5 means strongly agree [18]. Indicators for D & M model shown in Table 1.

On the other measurement, COBIT framework has defined information technology activities in four domain that is Plan and Organize, Acquire and Implement, Deliver and Support, Monitor and Evaluate. Maturity levels in COBIT framework are designed as profiles of IT

processes that an enterprise would recognise as descriptions of possible current and future states. The maturity levels scale are 0-non existent, 1-Initial/Ad-hoc, 2-Repeatable but Intuitive, 3-Defined Process, 4-Manage and Measureable, 5-Optimised [12]. The questionnaires to asses maturity level of information system was taken from the statement in each COBIT Maturity level [12].

Table 1. Variables and Indicators

VARIABLE	INDICATOR	Source
Quality of System (Qsys)	X1 = System flexibility X2 = System availability X3 = integration completeness X4 = Integration successfulness X5 = Response speed X6 = Response consistency X7 = Error recovery X8 = Recovery completeness X9 = Access convenience X10 = ease to use	[19]
Quality of Information (QI)	X11 = Command used X12 = Command ready X13 = Information consistency X14 = Information availability X15 = Iinformation accuracy X16 = Consistency and accuracy X17 = Actual information X18 = on time information X19 = output simplicity X20 = ease to understand	[19]
Quality of Service (QServ)	X21 = Tangibles X22 = Reliability X23 = Responsiveness X24 = Assurance X25 = Emphaty	[20]
User Satisfaction (USatisfy)	Y1 = Easy to use system Y2 = Happy to use system Y3 = informatin availability Y4 = Grows motivation Y5 = System flexibility	[19]
Net Benefits (NetB)	Y6 = Performance improvement Y7 = Accelerate the task Y8 = Productivity improvement Y9 = Effectiveness improvement Y10 = Easier the task Y11 = Usefull	[19]

2.2. Proposed Model

In research conducted by Livari [9] provide empirical evidence that the Quality of the System and the Quality of Information does not have a significant effect on the ntensity of Use, but has significant effect on User Satisfaction. This is because the object of research using a mandatory system. Other research conducted by McGill [10] find that Quality of the System and Quality of the Information was a significant predictor to User Satisfaction, but not a significant predictor for System of Use. Academic information system is a mandatory system. Based on exposure above the developed model for this research dropped System of Use variable, as shown in Figure 2.

3. Results and Analysis

Since this study purpose is to analyze relationship between variables the researchers use Structural Equation Modelling (SEM) to analyze the proposed research model. SEM is a multivariate statistical technique that is a combination of factor analysis and regression analysis, which aims to examine the relationships among variables that exist in a model [21].

3.1. DM Model

In SEM, Confirmatory Factor Analysis (CFA) measurement intended to confirm that indicator are valid constructor to its latent variable. The result of CFA measurement showed that all indicators estimation above 0.5 which is fulfilled validity criteria (> 0.5) as shown in Table 2.

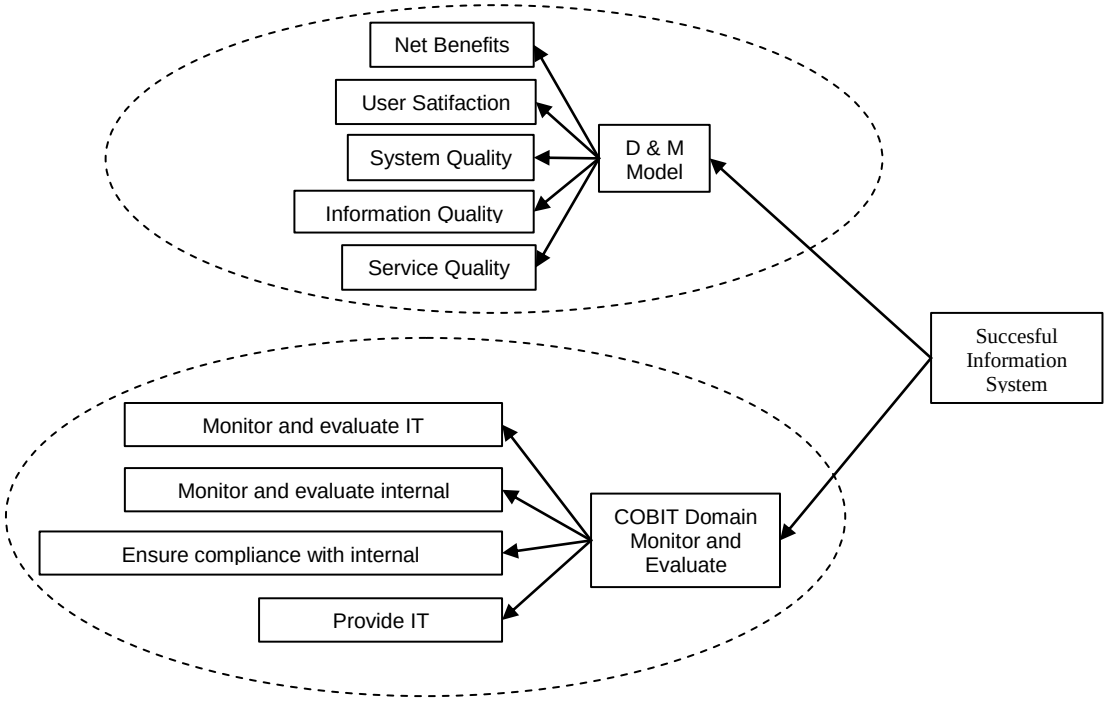

Figure 2. Proposed research model

Table 2. Indicator Validity

Variable	Indicator	Estimate	Validity (> 0.5)
Quality of System (Qsys)	X1	.782	valid
	X2	.767	valid
	X3	.795	valid
	X4	.736	valid
	X5	.795	valid
	X6	.865	valid
	X7	.787	valid
	X8	.733	valid
	X9	.813	valid
	X10	.787	valid
	X11	.667	valid
	X12	.735	valid
Quality of Information (QI)	X13	.851	valid
	X14	.866	valid
	X15	.878	valid
	X16	.900	valid
	X17	.896	valid
	X18	.799	valid
	X19	.830	valid
	X20	.793	valid
Quality of Service (Qserv)	X21	.887	valid
	X22	.843	valid
	X23	.875	valid
	X24	.825	valid
	X25	.792	valid
User Satisfaction (USatisfy)	Y1	.819	valid
	Y2	.897	valid
	Y3	.893	valid

Table 2. Indicator Validity

Variable	Indicator	Estimate	Validity (> 0.5)
Net Benefits (NetB)	Y4	.771	valid
	Y5	.801	valid
	Y6	.860	valid
	Y7	.902	valid
	Y8	.910	valid
	Y9	.884	valid
	Y10	.822	valid
	Y11	.854	valid

After finding in confirmatory factor analysis that all indicators are valid to its variable, the next step is to analyze the structural model. At this stage we analyzed the overall model conformity test and the significance of the causality relationship buit into the model. Based on AMOS software calculation we found that Quality of Information (QI) have P=0.51 (see Table 3) which is above the cut off of 0.05 and negative value in relation with User Satisfaction (USatisfy) (see Table 4). Quality of Service (Qserv) and Quality of System (Qsys) have a relation to User Satisfaction (Usatisfy) 0.64 and 0.35 respectively. Furthermore User Satisfaction (Usatisfy) have a relation with Net Benefits (NetB) as big as 0.83 (see Table 4).

Table 3. Regression Weights of Research Model

			S.E.	C.R.	P	Label
Usatisfy	<---	QI	.045	-.657	.511	
Usatisfy	<---	Qserv	.077	8.262	***	
Usatisfy	<---	Qsys	.033	5.206	***	
NetB	<---	Usatisfy	.061	17.348	***	

Table 4. Standardized Regression Weights of Research Model

			Estimate
Usatisfy	<---	QI	-.048
Usatisfy	<---	Qserv	.643
Usatisfy	<---	Qsys	.354
NetB	<---	Usatisfy	.835

Because P=0.51 as shown in Table 3 does not meet the requirement and negative impact from Quality of Information (QI) to User Satisfaction (USatisfy) as shown in Table 4 we modify the model as the last model by dropping Quality of Informatin (QI) variable. After dropping Quality of Information (QI) variable the next step is to re-calculate the estimation. The result of the modification model calculation shows that Quality of Service (Qserv) and Quality of System (Qsys) have a relation to User Satisfaction(Usatisfy) 0.61 and 0.33 respectively. Furthermore User Satisfaction (Usatisfy) have a relation to Net Benefits (NetB) 0.83 as shown in Table 5.

Table 5. Standardized Regression Weights of Last Model

			Estimate
Usatisfy	<---	Qserv	.614
Usatisfy	<---	Qsys	.339
NetB	<---	Usatisfy	.835

Overall, the result can be described as follow: Quality of Service and Quality of System have a relation to User Satisfaction although Quality of Service have more strongest relation to User Satisfaction. User Satisfaction have a strong relation to Net Benefits.

Comparing this study to other papers, the results is support previous researches conducted by Livari [9] and McGill [10] that use DeLone and McLean [6] Information System Success Model for measuring successful of information system with results that were only partially proven.

3.2. Maturity Level

The data collection in this study was carried out by spreading questionnaires to respondent had meet the criterria of RACI chart. COBIT defines RACI chart as the duties, which

are Responsible, Accountable, Consulted, and Informed. The questions of questionnaires is taken from control objectives of Monitor and Evaluate (ME) domain [12]. The result of maturity level based on questionaires on Monitor and Evaluate domain shown by Table 6.

Table 6. Maturity Level of ME Domain

Domain	Level						Total	Maturity level
	0	1	2	3	4	5		
ME1.1.1				4	2	1	25	3.6
ME1.1.2				2	4	1	27	3.9
ME1.1.3				4	2	1	25	3.6
ME1.2.1				2	4	1	27	3.9
ME1.2.2			1	1	5		25	3.6
ME1.2.3				6	1		22	3.1
ME1.3.1				4	2	1	25	3.6
ME1.3.2				4	2	1	25	3.6
ME1.4.1				2	5		26	3.7
ME1.5.1			1	2	4		24	3.4
ME1.5.2				3	4		25	3.6
ME1.5.3				3	3	1	26	3.7
ME1.6.1				2	4	1	27	3.9
ME1.6.2				2	5		26	3.7
ME2.1.1			1		5	1	27	3.9
ME2.2.1			1	2	4		24	3.4
ME2.3.1				2	5		26	3.7
ME2.3.2				2	4	1	27	3.9
ME2.4.1				3	4		25	3.6
ME3.1.1				3	2	2	27	3.9
ME3.2.1				1	5	1	28	4
ME3.3.1				2	5		26	3.7
ME3.4.1				3	4		25	3.6
ME3.5.1			1	2	4		24	3.4
ME4.1.1			1	1	4	1	26	3.7
ME4.1.2				1	6		27	3.9
ME4.2.1			1	2	4		24	3.4
ME4.2.2			2		4	1	25	3.6
ME4.2.3				2	4	1	27	3.9
ME4.2.4				3	2	2	27	3.9
ME4.3.1				1	5	1	28	4
ME4.3.2				2	5		26	3.7
ME4.3.3				2	5		26	3.7
ME4.4.1				3	3	1	26	3.7
							Average	3.7

There is a gap when we compare between the result of existing maturity level and the expected maturity level. We can see the gap as the Figure 3 shown.

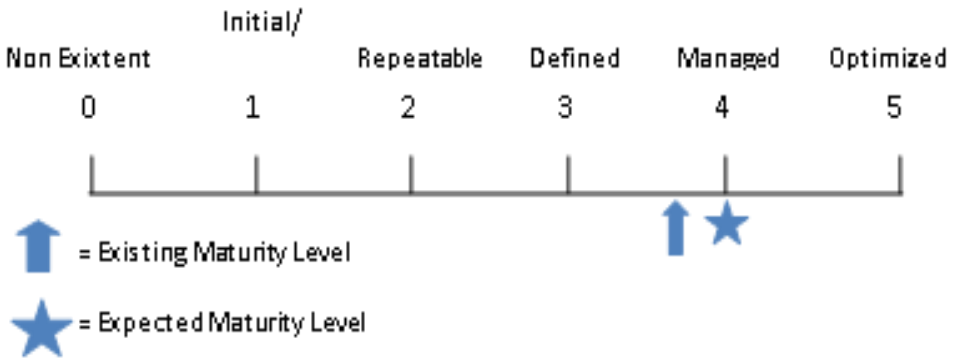

Figure 3. Maturity level gap

3.3. Maturity Level Relation with Information System Success

After we calculate DM model measurement and get the result of existing maturity level of BINUS University Academic Advisory we combine the model to find out if there's a relation between ME domain of Cobit maturity level and Academic Advisory success model. As shown of the Table 7 above we can see there's an impact from Cobit maturity level ME domain to Net Benefits variable which is the impact of successful information system. The result shown that there's a relation between Cobit maturity level to information system success of 0.59 . The result about this study supports the research conducted by Johan and Angelia [8] that there's a relation between the maturity level of system and successful of information system.

Table 7. Standardized Regression Weights COBIT ME and DM IS Success Model

			Estimate
NetB	<---	ME	.590

4. Conclusion

The result of this paper provides affected factors to the successful of Academic Advisory information system. The finding prove that Quality of Information (QI) is not the affected factor to the successful of BINUS University Academic Advisory information system. The success of the Academic Advisory Information System is affected by Quality of System (Qsys), Quality of Service (Qserv), User Satifaction (Usatisfy) and Net Benefits (NetB). Where Quality of System has an impact of 0.33 to User Satisfaction and Quality of Service has an impact of 0.61 on User satisfaction and User Satisfaction has an impact of 0.83 against Net Benefits. In this research variable Quality of Information (QI) has a negative impact of -0.04 on User Satisfaction.

Academic Advisory system maturity level is at level 3.7 where the gap with level 4 is quite small (0.3). However, recommendations are given for improvements to all sub-processes in the ME domain accordance with the COBIT framework documentation [8], especially in sub-processes that have a low enough value (ME1.2.3, ME1.5.1, ME2.2.1, ME3.5.1, ME4.2.1). The result of this research also shows that there is a relationship between system maturity level and the success of information system. In other word maturity level is the affected factor to the successful of information system. However, the relationship between the maturity level of the system and the success of the information system is not very strong relation. The next research will be done by adding more data collection and modification of relevant indicator.

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