

ANALYSIS OF INFORMATION SYSTEM IMPLEMENTATION IN BINUS UNIVERSITY USING DELONE AND MCLEAN INFORMATION SYSTEM SUCCESS MODEL AND COBIT FRAMEWORK

Johan Muliadi Kerta¹; Angellia Debora Suryawan²
Information System Department, School of Information Systems, Bina Nusantara University
Jln. K. H. Syahdan No. 9, Jakarta 11480, Indonesia
¹johanmk@binus.edu; ²asuryawan@binus.edu

Abstract: The success of implementation of information system in an organization will support the organization in the process of achieving goals. Successful information system will support the organization's day-to-day operations, so that problem can be resolved more quickly and easily. The information system which has been developed and implemented is also necessary to measure the maturity level. Therefore, it can determine whether the implementation of information systems made in accordance with the goals of the organization. Measuring the success of information systems used the DeLone and McLean IS success model. To measure the maturity level of information systems used COBIT (Control Objectives for Information and related Technology) frameworks that provides best practices for IT governance and control. The results of this analysis will assist and support the IT team in order to develop and build information systems that better fit the needs and goals of the organization.

Keywords: Information System Success; DeLone and McLean IS Success Model; COBIT; Maturity Level

INTRODUCTION

Information system is used to support the learning process and the supporting operational processes at Binus University where almost all operational processes, both backend and frontend are using information technology. The well managed information systems, as Turban said [1], will provide tangible benefits for the organization, such as cost reduction, labor efficiency, and increase productivity, while intangible benefits includes the availability of information, new well processes or better, and the benefits of standardization in system integration. In addition, information system can support the achievement of organizational strategy, so that the organization can be more competitive in business competition.

At Binus University IT division is responsible for the development and maintaining of existing information systems. Information systems used to support the need of Binus University stakeholders, the students, staff, faculty, and management in running the business. Therefore it should be a measurement of the implementation success of information system model, to analyze

whether information systems are in accordance with the needs of organizations.

Previously to measure the success of an information system, organization used financial parameters such as return on investment. Then Kaplan and Norton [2] developed a measurement that includes the benefits from information systems in organizations using balanced scorecards. After that, Seddon, et. al. added benchmarking [3][4] into the measurement. The researchers have made a model for measuring information system success [4][5][6], which emphasizes the need for a better success metrics and consistent factors. One of the methods to measure the success of the information system model is DeLone and McLean IS success model [7], which will then be called D & M model. The framework can be used to analyze and measure the dimensions of the existing information systems success and how they are organized.

The D & M model has 6 key dimensions which are used to measure the success of information systems, there are: system quality, information quality, service quality, system use, user satisfaction, and net benefits. The dimensions

will be mapped according to the needs of Binus University in the measurement process.

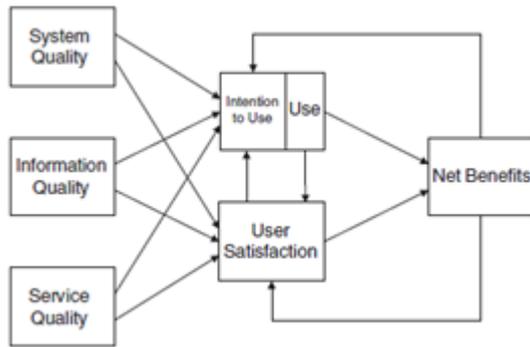


Fig 1: DeLone and McLean IS success model

To measure the maturity level of the information system, COBIT (Control Objectives for Information and related Technology) frameworks is used to provide best practices for governance and control of information technology, so it will help organizations optimize the IT investment, ensure the service provided, and provide measurements to examine any misconduct activity according to the plan. COBIT is used to align business objectives with IT purposes.

In some previous studies the use of COBIT Framework and IS Success Model could be combined to see the level of maturity and utilization of Information Systems can be analyzed through the relationship among variables determining the success of the use of the Information System. Tanuwijaya and Sarno [8] did the Comparison of COBIT Maturity Model and Structural Equation Model for Measuring the Alignment between University Academic Regulations and Information Technology Goals, whereas Darwas [9] studied about the role of Information System Maturity Model using COBIT framework at Plan and Organize Domain. DeVos, Landeghem, & Deschoolmeester [10][11] conducted a study to implement and successful implementation of information systems and good IT governance in SMEs (Small and Medium-Sized Enterprises). On the other hand, Anto and Suryani [12] also Suryani herself [13] conducted a study for the alignment of IT goals and business objectives to increase customer satisfaction. Using Empirical Examination of Maturity Model as Measurement of Information Technology Governance Implementation by Khadra, Zuriekat, & Alramhi [14], Nicho and Cusack[15], Ozkan [16], Ricoida [17], Sasongko [18], we also see that maturity model of IS can be measured by COBIT framework. While Liu [19] conducted a study to analyze the preparation of e-government models. It

performs analysis IT governance impact IS, the organization-IS alignment Impacts IS, IS Impacts the readiness for e-government, there is a connection between IT governance and the organization-IS alignment, the organization-IS alignment Impacts the readiness for e-government, Impacts of IT governance and the readiness for e-government. Hence for maturity level measurement and IT governance we use COBIT and D & M model for measuring the success of information systems.

METHOD

The method used in this study began with the identification of the problem. There are no measurements of success model in information systems implementation. However this is necessary to analyze the suitability of the information systems within BINUS University, the extent of contribution of information systems to support operational processes at Binus University, and to recognize what factors that affect the success of information systems implementation. It included the measurement of existing information systems maturity level, so Binus University know what level the information systems used, and it can be used as input for further improvement according to business goals. Then an analysis was required to assess whether there is a correlation between the success of information systems models and maturity level information systems.

Model

Based on the literature study and previous studies, the variables used in this model can be shown in Figure 2.

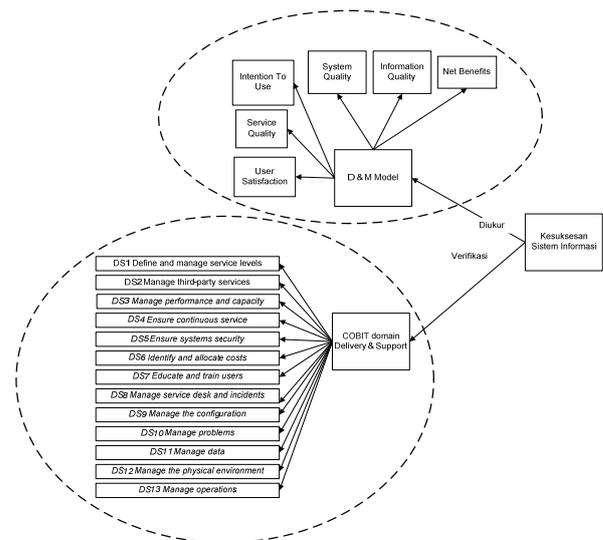


Fig 2: Assessment Model Variables

Measurement scales and variables

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 [20]. For the COBIT maturity level scale, it used the guidelines in accordance of COBIT 4.1.

Testing the variables

Regression testing was done to determine how the relationship between successful information systems and system quality, information quality, service quality, system use, user satisfaction and net benefits. In addition, correlation test was also performed to determine the relationship between successful information systems and the maturity level of information system.

Before discussing results of this study, the following is a recap of the application at Binus University business unit used in this case study.

Tabel 1: Application Category

Category	Amount
Administrasi/operasional	45
Content / Informasi	7
Report	1
Learning Multimedia System	5
Assessment	2
Total	60

Questionnaires were carried out in Binus University business units and to the divisions in Binus University. Respondents were administrative staffs who have regular and frequent use of information systems in their day-to-day work. The total number of staffs involved in this research was 630 people, but only 183 who use the information system. Using Slovin formula, we got 126, and the sampling method used probability sampling technique, or also known as simple random sampling.

RESULTS AND DISCUSSION

Based on the regression analysis between dimensions that had been conducted, the result showed that the quality system and quality of information ultimately have a significant effect on the performance of information systems success in an impact to the organization. Here are the results.

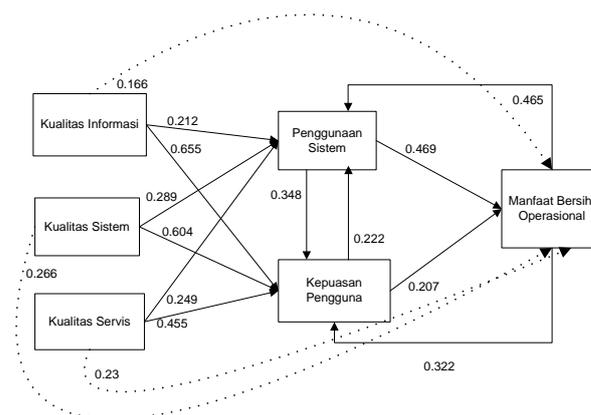


Fig 3: Regression between dimensions in D&M Model

Overall, the results obtained from this case study are as follows. (1) Information quality, system quality, and service quality have a significant impact to the user satisfaction. This result conjuncts with Iivari [21]. (2) Information quality, user satisfaction, and service quality have low impact to the use of the system. (3) Systems used have a major impact on the net benefits/operational benefits, or otherwise net/operational benefits also have a big impact to the use of the system. Petter, DeLone and McLean [22] have similar result about this. (4) Systems used have low impact on user satisfaction, or otherwise low user satisfaction also affects the use of the system.

Analysis of Measurement Results in COBIT Delivery and Support Domain

Based on the calculation of the maturity level using questionnaires on Domain Delivery and Support to information systems [23], the results are:

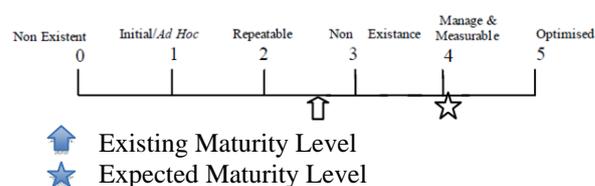


Fig 4: Maturity Level of Information Systems Implemented using COBIT

Result Analysis of Maturity Level in Delivery and Support Process Attributes

Based on calculation, found that the maturity level of each attribute of the process is at the level of Repeatable but Intuitive. It means the existing process of informal procedures to be used as a reference in the task, followed by the related

parties. There has been no formal communication regarding the training and standard procedures, and responsibility is left to each individual. There is a heavy reliance on the ability and knowledge of the individual, so it could lead to the bigger possibility of errors.

Highest score of attribute is the goal setting process and measurement. It means that purpose, measurement and control of the process are still in the category of fair (definition is not clear) and still informal. The lowest score is the Skills & Expertise, meaning a minimum skill requirement has been identified to address critical problems in the processes of Delivery and Support.

Results on Relationship of Information System Success with Maturity Level

Studies show, there is a correlation between the successful information systems and information systems maturity level (H_0 is rejected), but the correlation is not very strong/significant (0.38). The higher value of maturity level, the higher success of information systems can be reached, but in this case its contribution is not significant.

This is supported by the results of the previous analysis, where the average yield on the domain of information systems success is quite good, and maturity level is at the Repeatable but Intuitive. It can be seen that if IT governance is not maximized, the resulting information system is also not aligned with user's expectations.

CONCLUSION

Conclusions according the analysis and discussions are as follows. Information system is good enough/successful (on a scale of 3.6 out of 5). Highest score is the use of the system. It is obvious that the use of information systems is used as a day-to-day activity to assist, facilitate and accelerate operational processes work in organizations. The lowest score is the quality of the system. It explains that users feel the quality system is not too good, so it needs to improve the quality of information systems.

Maturity level score of the organization delivery and support domain of COBIT 4.1 is 2.71 (Repeatable but Intuitive), which means documentation, procedures, and standardization of processes, as well as process monitoring and assessment have not been done thoroughly and formal. Also there is no formal training in communication and organization to the process on the domain delivery and support.

There is a correlation between the successful information system model with maturity level of information systems, which means that the higher the level of maturity value, the higher

success of information systems. However, the relationship between successful information system model and information system maturity level is not significant (correlation value of 0.38 out of 1).

System quality and information quality most greatly affect the performance of information systems success in an impact to the organization, especially to the satisfaction of users. Nevertheless, there are many other factors beyond the research that influence upon the success of information systems.

Use of the system is directly affected in a positive or significantly by information quality, system quality, service quality, user satisfaction and net benefits or daily operational. The greatest effect on the use of the system is net benefits/operational usage obtained, and the least influence is the quality of information.

User satisfaction is directly affected in a positive/significant way by information quality, system quality, service quality, system usage, and net benefits/daily operations. The greatest impact on user satisfaction is the quality of information produced, and the effect is the lowest net benefit/operations. Overall, user is also feeling quite satisfied with the quality system, quality of information and the quality of existing services. This is because the system has already helped the user in resolving day-to-day operational works.

Net benefits/operations are directly affected positively/significantly by the use of the system and user satisfaction. Net benefits/operational are indirectly influenced positively/significantly by information quality, system quality, and service quality. The greatest effect on the net benefits/operational use of the system, and the least influence is the quality of information.

Gap between the expectation maturity level by maturity level in the current condition is 1.44. There is a big gap to achieve the desired maturity level (4.15 - Managed and Measurable). It should be carried out in procurement procedures, documentation, formal standardization process, procurement of communication and formal training, supervision, evaluation and assessment processes on a regular basis by management.

REFERENCES

- [1] E. Turban, R. K. Rainer, & R. E. Potter, *Introduction to Information Technology*, 3rd Ed., New Jersey: John Wiley and Sons, 2005.
- [2] R. S. Kaplan, & D. P. Norton, *Translating Strategy into Action: The Balanced Scorecard*, Boston: Harvard Business School Press, 1996.
- [3] P. B. Seddon, "A respecification and extension of the DeLone and McLean model of IS success", *Information Systems Research*, 8(3), pp. 240–253, 1997.

- [4] P. B. Seddon, V. Graeser, & L. P. Wilcocks, "Measuring organizational IS effectiveness: an overview and update of senior management perspectives", *The Database for Advances in Information Systems*, 33(2), pp. 11–28, 2002.
- [5] W. H. DeLone, & E. R. McLean, "Information systems success: the quest for the dependent variable", *Information Systems Research*, 3(1), pp. 60–95, 1992.
- [6] J. Ballantine, M. Bonner, M. Levy, A. I. M. Martin, & P. L. Powell, "The 3-D model of information systems success: the search for the dependent variable continues", *Information Resources Management Journal*, 9(4), pp. 5–14, 1996.
- [7] W. H. DeLone, & E. R. McLean, "The DeLone and McLean model of information systems success: a ten-year update", *Journal of Management Information Systems*, 19(4), pp. 9–30, 2003.
- [8] H. Tanuwijaya, R. Sarno, "Comparison of COBIT maturity model and structural equation model for measuring the alignment between university academic regulations and information technology goals", *IJCSNS, International Journal of Computer Science and Network Security*, 10(6), 2010.
- [9] R. Darwas, "Evaluasi Peran Sistem Informasi Manajemen Koperasi Swadharma dengan Menggunakan Model Maturity Level pada Kerangka Kerja Cobit pada Domain Plan and Organise", Program Magister, Sistem Informasi Akuntansi, Universitas Gunadarma, Jakarta, 2010.
- [10] J. Devos, H. V. Landeghem, & D. Deschoolmeester, "Theoretical Foundations for IS Success in Small and Medium-sized Enterprises", in *Measuring Organizational Information Systems Success: New Technologies and Practices*, Z. Belkhamza & S. Azizi Wafa, IGI Global, 2012.
- [11] J. Devos, H. V. Landeghem, & D. Deschoolmeester, *Theoretical Foundations for IS Success in Small- and Medium-sized Enterprises*, IGI Global, DOI: 10.4018/978-1-4666-0170-3.ch005, 2012.
- [12] A. Anto, & E. Suryani, "Pendekatan Sistem Dinamik Untuk Analisa Peningkatan Kepuasan Pelanggan Melalui Penyelarasan Tujuan TI Dan Tujuan Bisnis", Program Magister, Bidang Keahlian Sistem Informasi, Jurusan Teknik Informatika, Fakultas Teknologi Informasi, Institut Teknologi Sepuluh November, Surabaya, 2011.
- [13] Suryani, "Pengembangan model Information Technology (IT) Governance pada organisasi Pendidikan Tinggi menggunakan Cobit 4.1 Domain Po dan Ai", in *Seminar Nasional Informatika*, 2009.
- [14] H. A. Khadra, M. Zuriekat, & N. Alramhi, "An empirical examination of maturity model as measurement of Information Technology governance implementation", *The International Arab Journal of Information Technology*, 6(3), 2009.
- [15] M. Nicho, & B. Cusack, "A metrics generation model for measuring the control objectives of information systems audit", in *Proceedings of the 40th Hawaii International Conference on System Sciences*, 2007.
- [16] S. Ozkan, "A Process-Based Framework for Information Systems Effectiveness Assessment in Organizational Contexts: A Study", Submitted to the Graduate School of Informatics, the Middle East Technical University, 2006.
- [17] D. I. Ricoida, "Perancangan tata kelola TI untuk peningkatan layanan sistem informasi akademik: studi kasus STMIK MDP", *Jurnal Ilmiah STMIK GI MDP*, 4(2), 2008.
- [18] N. Sasongko, "Pengukuran kinerja Teknologi Informasi menggunakan Framework Cobit versi. 4.1, Ping Test dan Caat pada PT Bank X, Tbk di Bandung", in *Seminar Nasional Aplikasi Teknologi Informasi (SNATI)*, 2009.
- [19] Shin-Ping Liu, *An E-government Readiness Model*. Dissertation Prepared For The Degree Of Doctor Of Philosophy, USA: University Of North Texas, 2001.
- [20] U. Sekaran, & R. Bougie, *Research Methods for Business: A Skill Building Approach*, 5th Ed., New Jersey: John Wiley and Sons, 2010.
- [21] J. Iivari, "An empirical test of DeLone-McLean model of information systems success", *The DATA BASE for Advances in Information Systems*, 36(2), pp. 8–27, 2005.
- [22] S. Petter, W. DeLone, & E. McLean, "Measuring information systems success: models, dimensions, measures, and interrelationships", *European Journal of Information Systems*, 17, pp. 236–263, DOI: 10.1057/ejis.2008.15, 2008.
- [23] IT Governance Institute, *COBIT 4.1*, The IT Governance Institute, 2007.