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Key Factors in Implementing Knowledge Management System based on Project Management (Case Study Pusilkom UI)

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Abstract

Transformasi digital dalam sektor publik (*E-government*) telah dilakukan dalam beberapa tahun terakhir. Namun, dari banyaknya proyek TIK yang telah berjalan, hanya 15% proyek TIK ini dapat dikatakan sukses. Banyak proyek yang gagal dikarenakan buruknya strategi dan perencanaan, buruknya manajemen SDM, kurang siapnya pemanfaatan TIK yang akan digunakan, serta tergesa-gesanya implementasi TIK tanpa ada perencanaan dan pengujian yang memadai. Proyek TIK ini sendiri sangatlah memakan banyak biaya, sehingga diperlukan suatu penanganan yang baik dalam pengelolaan proyeknya. Salah satu cara untuk dapat menangani proyek ini dengan baik adalah dengan menggunakan sistem pengelolaan proyek yang dapat mengelola pengetahuan (*knowledge*) dalam pengerjaan proyek tersebut. Menggunakan pendekatan *post-positivism* dan menganalisis data primer dari responden dengan aplikasi SEM-PLS, peneliti ingin mencari faktor apa saja yang dapat digunakan untuk dapat meningkatkan pemanfaatan pemakaian *knowledge management system* yang berbasiskan proyek. Hasil dari penelitian ini menunjukkan faktor Kualitas Sistem, Kualitas Konten, Kualitas Konteks dan Hubungannya, serta Keberkesinambungan Sistem; dapat meningkatkan pemanfaatan *knowledge management system* berbasiskan proyek yang baik. Dari hasil penelitian ini, didapatkan aplikasi Phabricator adalah *Knowledge Management System* yang berbasiskan proyek yang cocok untuk dapat diterapkan pada organisasi.

Kata kunci: E-government, Manajemen Pengetahuan, Manajemen Proyek, Proyek TIK

Abstract

Digital transformation in every public sector (E-government) already happened this past year. Though, from many IT Projects that previously ran, in average only 15% projects that can be said succeed. Many projects that failed caused by bad strategic and planning, bad management of human resources, lack of technological preparation, lousy implementation without proper preparation and proper acceptance testing. IT Projects are very costly, so we need to handle those problems with appropriate project management. One of the best ways to realize appropriate project management is using a project management system that can utilize proper knowledge management as well. Using post-positivism and analyzing the primary data from samples with SEM-PLS, researcher try to research which factors in good knowledge management aspects that can be used in a good project management system to satisfy user needs and make the best benefit for all. For the result, the researcher can know that 1) Quality of System, 2) Quality of Content, 3) Quality of Context and Relation, and 4) Sustainability of System, can improve the User Satisfaction factor which indirectly can increase the Benefit factor gained for all. After this result out, the researcher found Phabricator as the best Project Management System that can comply with all the elements above.

Keyword: *E-government, Knowledge Management, Project Management, IT Project*

INTRODUCTION

Digital transformation in the public sector (E-government) has begun to occur in recent years, especially after the emergence of Presidential Instruction No.3 of 2003. However, in the course of time the E-government project experienced many problems in the process. According to data from the United Nations (UNDPEPA & ASPA, 2002), this ICT project for the public sector has little success value, which is only 15% of all existing projects, the remaining 85% have total failure and partial failure. From the report, obtained information the main factors that caused this failure came from:
1) Lack of understanding of the government in the public administration system,
2) Lack of strategic plans,
3) HR problems,
4) Minimal ICT investment and budgeting plans,
5) ICT Vendors who are few and do not accept high risk,
6) Immaturity of technology planning, and
7) ICT Implementation that is forced so that preparation and testing is lacking.

Seeing from the problems found, previously, the main problem that is often encountered is regarding poor project management. From this problem, the best solution is to implement good knowledge management in existing project management (Liu & Liu, 2009). Here, Liu believes that there needs to be a balance in the implementation of project management with the implementation of good knowledge management. In project management the things that must be considered are project planning, organizational management, tools

and techniques, and operational management. In knowledge management, what must be considered is the time pressure, the impact of organizational culture, differences between information management and knowledge management, and performance evaluation on knowledge management. Liu also believes the project management will be more effective if it can use the system, namely the Project Management System (PMS), which has been integrated with the elements of Knowledge Management System (KMS).

Figure 1 Conceptual Framework PMS based on KM *(Liu & Liu, 2009)*

For information, currently physical resources are no longer the main asset for the organization, knowledge is the main asset (Stacey, 2001). Knowledge management is vital to the success of an organization. Knowledge management using systems or better-known Knowledge Management Systems are systems that facilitate methods, tools and techniques used to manage knowledge more effectively (Green, Liu, & Qi, 2009). By including elements of KMS in PMS, it can make the success rate of a project increase (Alawneh & Aouf, 2016). Seeing this, it is necessary to review what elements of KMS can increase user satisfaction that can increase the value of the benefits of project success.

This study uses the main sample data from Pusilkom UI employees who have used KMS. Pusilkom UI itself is a Fasilkom UI UKK which is engaged in ICT consulting with its main work is to provide ICT-related solutions for the public, private, or LMS sectors. Pusilkom has a total of 50 employees who make it a business unit of the type of MSME. The KMS platform that has been used by Pusilkom until 2016 is JIRA. Investment for the implementation of JIRA is very expensive, for the installation of a new JIRA with a maximum of 50 users requires a fee of $ 2,200 (Atlassian, 2013). Large investments must be balanced with benefits. Therefore, this study was conducted with the aim of getting factors that can increase user satisfaction and benefits in the use of KMS. By obtaining these factors, it is hoped that Pusilkom will be more effective in providing this KM-based PMS implementation to be able to have significant value in increasing user satisfaction and the benefits of using the success of ICT projects.

Research Problems. Which factor can be the best critical factor in using Knowledge Management System based on Project Management?

Research Goals. 1) To identify the key factors that can be use in using Knowledge Management System based on Project Management. 2) To find the best Knowledge Management System based on Project that can comply with key factors that has been found in this research.

Research Benefit. For academic purpose, this research can be used as reference material to find the key factors that can be used in choosing the best Knowledge Man-

agement System for Project purpose. For organization, this research can be used as reference material for choosing the best Knowledge Management System for their projects.

LITERATURE REVIEW

Knowledge Mangement System (KMS). Knowledge Management System (KMS) is an integration of technology and a mechanism built to support 4 KM processes, namely discovery, capture, sharing, and application. Based on the supported KM process, KMS can be categorized into four which can be seen in the following table:

Table 1 KMS Category *(Becerra-Fernandez & Sabherwal, 2010)*

Category	Explanation
Knowledge Discovery System	This type of KMS supports the process of developing new knowledge both tacit and explicit from data and information or the synthesis of existing knowledge. This system supports 2 KM subprocesses that are related to knowledge discovery which is a combination (allows discovery of new explicit knowledge) and socialization (allows the discovery of new tacit knowledge).
Knowledge Capture System	This type of KMS supports the process of storing explicit and tacit knowledge that exists in individuals, artifacts, or organizations. This system helps the storage of existing knowledge inside and outside the organization including the knowledge that exists in consultants, competitors, customers, suppliers, and companies where new employees work before. Knowledge Capture System relies on mechanisms and technologies that support sub-processes of externalization and internalization.
Knowledge Sharing System	This type of KMS supports the process of communicating/distributing explicit and tacit knowledge to other individuals. This system supports 2 KM subprocesses, namely exchange (for example: explicit sharing of knowledge) and socialization (sharing tacit knowledge).
Knowledge Application System	This type of KMS supports the process of knowledge application by enabling an individual to use knowledge possessed by other individuals without actually learning the knowledge. Mechanisms and technology support this process by facilitating routine and direction sub-processes.

JIRA. It is one of the project-based Knowledge Management Systems. JIRA has three main features, such as: bug tracking, issue tracking and project management. The following is a brief feature explanation about JIRA which can be seen in the following table.

Tabel 2 JIRA's Feature (Atlassian, 2013)

Feature	Explanation
License	JIRA has three types of licenses, paid, free and developer sources. For paid licenses, the price of using this system depends on the maximum number of users who use ($ 50 per user in-house, $ 7 per month per user for hosted version). For free licenses, JIRA provides this opportunity for open source projects that have criteria such as non-profit, non-government, non-academic, non-commercial, non-political and secular organizations. For academic and commercial purposes, JIRA provides full source code under the developer source license.
Architecture	System developed by Atlassian, Inc. this was developed with JAVA using the WebWork framework and can be run on any operating system. The architecture adopted by JIRA is also very good for its users, because in already supporting the general things used in the development of IT projects. Such as the existence of support from Pico inversion of control containers that help for OOP projects; Apache OFBiz ERP entity engine open source software supports data flow; integration of source control programs (Subversion, CVS, Git, Mercurial, etc.); IDE integration like Eclipse and IntelliJ IDEA; API is available for developers to do JIRA integration with other third-party applications. For Remote Procedure Call, JIRA supports SOAP, XML-RPC, and REST. For the languages supported, JIRA supports English, Japanese, German, French and Spanish.
Security	Regarding security, JIRA uses assistance from the Apache Software Foundation to

	maintain the security of the system.
Adoption	JIRA has been adopted by more than 25,000 customers in 120 countries. Some companies that use JIRA are Linden Lab, Spring Framework, Zend Framework, Hibernate, OpenSymphony, Fedora Commons, Codehaus Xire, Wildix, Apache Software Foundation and Skype.

ANALYTICAL RESEARCH FRAMEWORK

Using Assessment model from previous researchs, such as KMS Satisfaction Assessment Model from Ong & Lai, 2007; KMS Success Model from Wu & Wang, 2006; E-government System Success Measurement from Wang & Liao, 2008; this conceptual framework established.

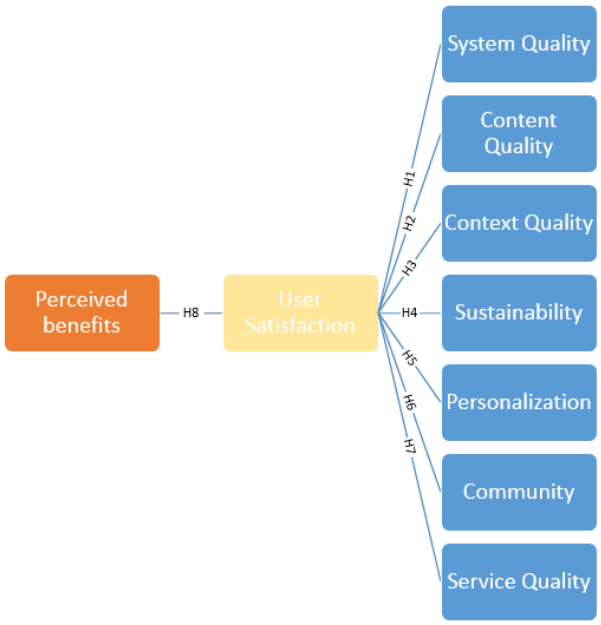

Figure 2 Analytical Research Framework

H1: System quality affects user satisfaction.
H2: Quality of content affects user satisfaction.
H3: The quality of context and relationships affects user satisfaction
H4: Subsequent use affects user satisfaction
H5: Personalization affects user satisfaction
H6: Community affects user satisfaction
H7: Service quality affects user satisfaction
H8: User satisfaction affects the perceived benefits.

RESEARCH METHOD

This is a quantitative research with the technique of analyzing using Structured Equation Model-Partial Least Square (SEM-PLS). With the Likert (1-5) scale in the survey, this study will use the main sample data from 31 Pusilkom UI employees who have used the JIRA KMS system. This research approach itself is confirmatory research, where the researcher will confirm the main factors in the implementation of KMS that are good from the results of previous research to check the truth in one of the UMKM business units in Indonesia that is engaged in ICT.

RESULT AND DISCUSSION

Validity Test

1. Convergent Validity Test

Convergent validity test is intended to describe the relationship between instruments that measure the same attributes. Convergent validity is indicated by a single instrument correlation score with other instruments that measure the same attributes, whose value is expected to have a higher correlation score than the instrument's correlation score with other instruments that measure different attributes. The measurement of convergent validity can be done in three ways, namely: Loading factor, Average Variance Extracted (AVE), Communality. Based on these three methods, identification of data that needs to be removed is shown as follows:

1.A. Loading Factor

Only a few questions that satisfied the calculation (had a value higher than 0.7), we need to remove those questions for a better calculation result later. (Can be seen from the Table 3 below)

1.B. Average Variance Extracted (AVE)

Rejected result in H1, H2, and H4 for this calculation (had a value below than 0.5). Still all of those hypothesizes have a good value and can be used as a sample to calculate correlation.

1.C. Communality

Same as AVE value, H1, H2, and H4 rejected (had a value below than 0.5). But all of them can be used for correlation calculation later.

2. Discriminant Validity Test

Discriminant validity test is intended to describe the relationship between instruments that measure different attributes. Discriminant validity is indicated by a correlation score between one instrument and another instrument that measures different attributes, whose value

is expected to be smaller than the instrument's correlation score with other instruments that measure the same attributes. Measurement of discriminant validity can be done in 2 ways, namely: Cross Loading and Square Root AVE (Correlation between latent constructs AVE shows the total variance construct that can be explained by the measurements made).

2.A. Cross Loading
Using standard value higher than 0.7; all the hypothesizes accepted.

2.B. Reliability
To measure the consistency of the model
• Composite Reliability: This estimate takes into account the contribution of each latent factor to each item (loading factor) and each variance error that the item has. This calculation is based on the proportion of variance and can be used in situations where hierarchical structures exist in the data.
• Cronbach's Alpha: measures internal consistency, which is the relationship between components and the total variance studied and the component variance of each sample.
Only H1 had a value below than 0.7; and by doing this we can remove all the indicators that had loading factor value, below than 0.7.

Table 3. Result

Hypothesis	Validity Test Convergent			Validity Test Discriminant		Structural Model (Bootstraping)			Hypothesis Checked
	Loading Factor (> 0.7)	Average Varian Extracted (AVE) (> 0.5)	Communality (> 0.5)	Cross Loading (> 0.7)	Reliability (> 0.7)	Regression Analysis	Goodness of Fit (0.72)	Q2 Predictive Relevance	T-statistic > 1.96 Significant 5%
H1	H1.2 : 0.93			Accepted	Rejected		Accepted		Significant, Moderate
H2	H2.9 : 0.78 H2.12: 0.75 H2.15: 0.76			Accepted	Accepted		Accepted		Significant, Strong
H3	H3.1 : 0.74 H3.2 : 0.73 H3.3 : 0.86 H3.4 : 0.87	0.64	0.64	Accepted	Accepted		Accepted		Significant, Weak
H4	H4.4 : 0.73 H4.5 : 0.82 H4.6 : 0.78			Accepted	Accepted		Accepted		Significant, Moderate
H5	H5.1 : 0.93 H5.2 : 0.91 H5.4 : 0.83	0.70	0.70	Accepted	Accepted		Accepted		Rejected
H6	H6.1 : 0.91 H6.2 : 0.95 H6.3 : 0.91 H6.4 : 0.85	0.82	0.82	Accepted	Accepted		Accepted		Rejected
H7	H7.1 : 0.91 H7.2 : 0.75 H7.3 : 0.73	0.64	0.64	Accepted	Accepted		Accepted		Rejected
H8	H8.2 : 0.86 H8.3 : 0.77 H8.4 : 0.87 H8.5 : 0.79 H8.6 : 0.81	0.62	0.62	Accepted	Accepted	Moderate (0.59)	Accepted	Strong (0.41)	Significant, Strong

3. Structural Model
Bootstrapping - number of observations as much as 133 as a bootstrap case and 5000 bootsrap samples generated with SmartPLS (Hair, Ringle, & Sarstedt, 2011):

3.A. Regression analysis
To check whether the model has matched the data distribution, we can check through the R-square, Goodness of fit and Q-square.

R-square
Judging from the table, the distribution of data for the model has a good pattern on the KP and H8 variables. This result explains that the exogenous variable impact on the endogenous variable has a moderate or strong impact level.

Table 4. R-square

	R Square	Description
H2		
H3		
H7		
H6		
KP	0.802754	Strong
H1		
H8	0.59309	Moderate
H5		
H4		

Goodness of fit
By calculating the square root between the average R2 value and the average communality value, a goodness of fit value of 0.7195 is obtained. From this value it can be seen that the sample data with the model has matched.

Q2 predictive relevance
By checking the repetition level of a variable that has a R2 value, the Q2 value is obtained which is useful for predictive relevance. From the resulting table, it can be seen that the KP and M variables have a strong predictive relevance level.

Table 5. predictive relevance level.

	Redundancy	Description
H2		
H3		
H7		
H6		
KP	0.426826	Strong
H1		
H8	0.40789	Strong
H5		
H4		

4. Hypothesis checking
By sticking to the t-statistic value and significant level, the acceptance of the results of the hypothesis can be known whether the hypothesis is acceptable or not. Following are the results of the calculations performed.

Table 6. Hypothesis checking

	B	T Statistics	f2	Description	Level
H1	0.054561	5.226157	0.285144	Significant	Moderate
H2	0.110701	5.111797	0.565881	Significant	Strong
H3	0.075513	1.967287	0.148556	Significant	Low
H4	0.085272	3.91677	0.333992	Significant	Moderate
H5	0.09342	1.644897			
H6	0.05996	1.181544			
H7	0.073719	1.20963			
H8	0.032097	23.993672	0.770124	Significant	Strong

Terms of Hypothesis accepted: t-statistic> 1.96; 5% significant level

From the table, we can conclude that the acceptable hypothesis the truth is: H1, H2, H3, H4 and H8, while we reject the hypothesis H5, H6 and H7. Therefore, the previously created model will change to the following:

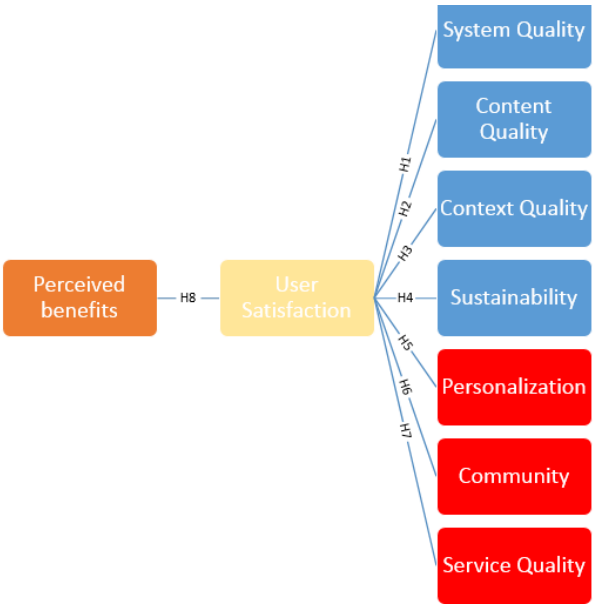

Figure 6 Hypothesis Result

Discussion

Some discussions need to be discussed later regarding this research result:

- The generalization of end-user that using knowledge management system, ambiguity appear in here (about personality and service quality), because all respondents have the same scientific background: as a computer science person (Tech Savvy). Need more sample using non-IT end-user.
- Pusilkom UI need a more robust, agile, and flexible system that can be used for agile project management → Suggestion: Using Phabricator
    - Phabricator is a PMS based on KMS elements platform → It is a PMS developed by Facebook to improve innovation projects undertaken by them.
    - This PMS Phabricator Platform can be used not only in ICT-based project management but also can be used by others project management in general.
- Digital ecology aspects that need to be discussed later will be: Human Resource, Software/Hardware Capability, Database, and Procedure.

CONCLUSION

Research Conclusion

- The factors that influence the satisfaction of KMS users in Pusilkom UI are the quality of the system, the quality of the content, the quality of context and relationships, and the subsequent use.
- The factors that influence the benefits felt by KMS users in Pusilkom UI are user satisfaction, where by fulfilling user satisfaction, indirectly the perceived benefits will be felt more.
- Personalization, community and service quality factors are not very influential in increasing user satisfaction which indirectly does not affect the perceived benefits.

Suggestion

- System quality: Provides good support regarding data backup and system security. Current conditions, Pusilkom UI does not yet have data backup procedures for JIRA and system security procedures are still not done well, such as in the case of providing passwords for employees, Pusilkom UI still provides default passwords for all employees at first and is not asked to change into a password only when first logged in.
- Content quality: Provides a "promote" feature from expert answers, to provide a ranking on the quality of knowledge provided.
- Quality of context and relationships: Required to build a good knowledge repository. Currently Pusilkom UI still uses one repository on the server and has not been linked to JIRA. So that there is a possibility of duplication, out of context, or even difficult to find knowledge information in this repository.
- Subsequent use: Integrating with other applications, such as Google. Because Google has integrated with smartphone owned by employees, so that if JIRA provides a deadline for project completion, Google calendar will automatically save the deadline date and employees can find out via smartphone.

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