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Procedia Manufacturing 4 (2015) 216 – 223

Procedia
MANUFACTURING

Industrial Engineering and Service Science 2015, IESS 2015

Knowledge management system implementation readiness measurement in PDII LIPI based on people and organizational structure factors

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Abstract

Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework to create value in organization and give competitive advantage. When that key individual leave organization, knowledge will disappear and the competitive advantage of the organization will be lost. Knowledge Management System (KMS) is information system that applied to manage organizational knowledge by supporting and enhancing the organizational process of knowledge creation, storage/retrieval, transfer and application. In the implementation of Knowledge Management System, organization requires significant amount of arrangement such as organization structure and people.

This research will be calculating readiness level of KMS implementation in PDII LIPI based on people and organization structure concepts with questionnaire data and analytical hierarchy process for priority weighting. KMS readiness is expressed in Aydin and Tasci scale. Output of this research will be used to evaluate and gave recommendation for PDII LIPI to implement KMS. From questionnaire processing, People and organization structure score are 3.272 and 2.818 so the conclusion for both factors is in the level of 'not ready need some work'. From analytical hierarchy process, knowledge management system implementation readiness concept's priority weight is extracted. The concept of people (84.6%) is more important than organization structure (15.4%).

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Peer review under responsibility of the organizing committee of the Industrial Engineering and Service Science 2015 (IESS 2015)

Keywords: Knowledge, knowledge management system, implementation readiness, analytical hierarchy process, Aydin & Tasci scale, PDII LIPI

1. Introduction

Knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information that already originates and is applied

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in the minds of individual [1]. Knowledge already becomes valuable asset that can become the main competitive advantage that differ one organization to the other. When that individual leaves organization, knowledge the competitive advantage of the organization will be lost [2]. Therefore, knowledge hoarding among employee can harm the organization. In the other hand, process of sharing and collaboration are allowing organization capturing and storing knowledge. That is why it is important for organization to capture knowledge and experiences from individual knowledge into organizational knowledge [3]. Knowledge Management System (KMS) is information system that applied to manage organizational knowledge by supporting and enhancing the organizational process of knowledge creation, storage/retrieval, transfer and application [4]. This type of information system major purpose is to facilitate the sharing and integration of knowledge. In the implementation of Knowledge Management System, organization requires significant amount of arrangement such as organization structure and people. If the arrangement is poor, not only make the knowledge management system inefficient and unprofitable, but also it will incur harmful effect to the organization [5]. According to Frost [6], the failure factors of KMS are include lack of performance indicators and measurable benefits; inadequate management support; improper planning, design, coordination, and evaluation; inadequate skill of knowledge managers and workers; and organizational culture. Many kind of facilitating factors are required to success in implementing knowledge management system. Even though there might be no perfect measure, there must be some effort to identify the readiness of knowledge assets of organization so organization can realizes the potential setback and do the prevention by leveraging it. In Table 1, the comparison of each knowledge management readiness factors from previous researches is showed.

Table 1. Research Comparison from Previous Researches

KM Triad with Burke and Litwin Dimensions[7]	Lee and Choi [8]	Razi and Karim [9]
People (Organization Culture; Leadership; Work Unit Climate; Motivation; Task Requirement Individual Skill and Ability)	Culture (Collaboration; Mutual Trust; Learning)	Organization Culture (Collaboration; Learning; Business strategy; Management Support)
Process (Vision, Mission and Strategy; Management Practices; Policies and Procedures System Structure)	Structure (Decentralization; Informal)	Organizational Structure (Decentralization; Informal)
Technology (Online Infrastructure)	People (T-Shaped Skills)	IT Infrastructure (IT support; ICT use)
	Information Technology (IT support)	Individual Acceptance (Performance Expectancy; Effort Expectancy)

From Table 1, the important factors of knowledge management system are organizational culture, organizational structure, people, IT infrastructure and process. Dimensions in individual acceptance concept were categorized as the people concept because the definition of the concept itself is willingness to accept and use available systems [10]. *Pusat Dokumentasi dan Informasi Ilmiah* (PDII) is one of the institutions in of *Lembaga Ilmu Pengetahuan Indonesia* (LIPI) organization,, which concerns in creating and developing the scientific information document service based in LIPI policy. PDII LIPI wants to be a leading institution in the field of documentation and information of scientific and technology based document in order to build the creative, intelligent, innovative and dynamic society. For realizing the goal of this organization, it is supported by 150 employees. Furthermore, 45% of this number has functional position librarian, archivist, researcher, manager, public relation, human resource and computer technicians. This research will identify the knowledge management system implementation readiness of PDII LIPI and give recommendation of additional preparation PDII LIPI must do to be ready in KMS implementation.

2. Research methodology

2.1. Defining research dimension and element

The dimension of this research is based from concept in the other similar research that suitable to PDII LIPI as an organization.. Table 2 show concepts and indicator used in this research to assess the readiness level of KMS implementation in PDII LIPI.

Table 2. Operational definition of people and organizational structure

Concept	Dimension
Organizational Structure is organization way to divide and managing task to support knowledge management [8][9].	Decentralization is degree of distribution of authority and control over decision [8][9].
	Informal is the degree of flexibility in formal rules, procedures and standard policies [7][8].
People , this concept is every concept that defining the human, main elements of the process of knowledge creation and knowledge sharing within an organization [8].	T-Shaped Skills: diverse knowledge, skills, and competencies owned by a person, where this knowledge, skills, and competencies can be combined with other disciplines, so it will result new knowledge, and this kind of person will share the knowledge to other people within an organization [9].
	Task Requirements Individual Skills and Ability : The compatibility between the skill and individual knowledge with the needs that must to be possessed to complete the task especially to do knowledge management cycle [9].
	Effort Expectancy : KM Degree of ease associated with the involvement in KM process [9].
	Performance Expectancy: Knowledge Management is degree to which an individual believes that involving in KM process will help him/her to attain gains in job performance [9].
	Work Unit Climate : The hope and relationship among the work unit that involve in knowledge management cycle and affect it [7].
	Motivation : Trend in the behavior of people within an organization to take the necessary action to achieve particular goals. Such behavior can cause, direct, and organize behavior of people in the organization, especially in carrying out the process of KM in daily activities [7].
	Leadership: leaders' behavior in an organization in providing direction to the rest of the people in the organization and encourage them to implement the KM process [7].

Variable identification is the process of translating the concept to make it measurable. For doing this researcher must defining the variable of concept based on literature study or previous research. This concept related to things that significantly affect the knowledge management readiness in organization. Indicators of each dimensions in the Table 2 are defined based on previous research in Table 1.

2.2. Data collecting and processing

Data collecting method of this research is questionnaire. Questionnaires collected are divided into two, which are expert questionnaires and Likert Questionnaires. The expert respondents were defined and got the AHP questionnaire. In this research, expert is must have high structural position of department in PDII LIPI and have already serve PDII LIPI for long time. Results of AHP experts questionnaires is a priority for every concept and dimension of the readiness in the organization according to experts. If the results are inconsistent AHP questionnaire, a questionnaire is not valid. This cycle will be repeated until a questionnaire consistent. Likert questionnaires for employees of PDII LIPI are questionnaires used to obtain the value of PDII LIPI readiness to implement KMS based on a scale of Aydin and Tasci. The questionnaires of this research developed using 6-point customized Likert scale. Successive interval method is a procedure in which a psychological scale stimulus classified into successive intervals in accordance with the level defined attributes with the value they have. A continuum defined psychological and values scale is taken as the median of the distribution on the continuum of psychological assessment. It is assumed that the distribution of votes for each stimulus are normal in the psychological continuum [11]. With this method, ordinal data will become interval data. It is necessary because ordinal data is qualitative data no quantitative data.

2.3. Analyzing PDII LIPI knowledge management system readiness level using Aydin and Tasci scale

Data from any concept or dimension is analyzed using Aydin & scale Tasci scale. Aydin and Tasci instruments set up to help users surveyed readiness of KMS implementation in an organization. The answers of the respondents will be generated in the range of 1 to 5 points. Figure 1 shows Aydin and Tasci scale [11].

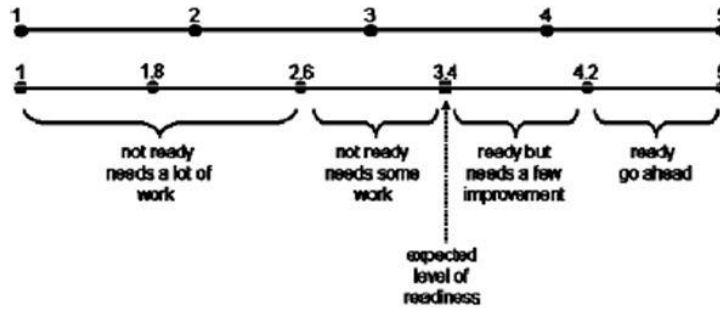


Fig. 1. Aydin and Tasci Scale

The first line from the top is representing the score of KMS readiness based on data processing. Second line is representing each category of readiness level. The expected score for organization to become ready to implement knowledge management system is 3.41.

3. Result and conclusion

3.1. Validity and reliability test

Indicators for each of the dimensions examined in this study are included in the appendix. In order to be a good measuring instrument, questionnaires data validity and reliability test. Data are collected from three main departments of the institution and gathered 41 data. Distribution PDII LIPI old respondents work in organizations PDII LIPI shown by Fig. 2.

The function of validation test in this research is to know is it the questionnaires of this research is valid to become instrument of measurement. Validation test is conducted by finding correlation of each score from respondent answer and total score of its variable. According to Sugiono [12], instrument validation test is divided into construct validity and content validity. The questionnaire pass the construct validity test by learn from previous research, consulting with expert and conducting validity test to 30 samples from population. Content validity result are shown in Table 3.

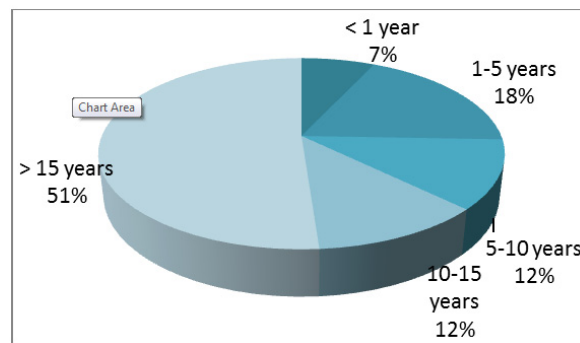


Fig. 2. The work length of PDII LIPI respondent

Table 3. Content validity test

Indicator	If the significance value > 0.467, the indicator is valid. If the significance value < 0.467, the indicator is not valid	
	<i>Significance value</i>	<i>Valid/ Not Valid</i>
T-ShapedSkills_1	0.884	Valid
T-ShapedSkills_2	0.761	Valid
T-ShapedSkills_3	0.716	Valid
T-ShapedSkills_4	0.642	Valid
TaskRequierements_1	0.865	Valid
TaskRequierements_2	0.674	Valid
TaskRequierements_3	0.818	Valid
EffortExpectancy_1	0.653	Valid
EffortExpectancy_2	0.759	Valid
EffortExpectancy_3	0.754	Valid
EffortExpectancy_4	0.792	Valid
EffortExpectancy_5	0.775	Valid
EffortExpectancy_7	0.650	Valid
PerformanceExpectancy_1	0.685	Valid
PerformanceExpectancy_2	0.539	Valid
PerformanceExpectancy_3	0.657	Valid
PerformanceExpectancy_4	0.749	Valid
PerformanceExpectancy_5	0.607	Valid
PerformanceExpectancy_6	0.499	Valid
PerformanceExpectancy_7	0.820	Valid
PerformanceExpectancy_8	0.834	Valid
WorkUnitClimate_1	0.771	Valid
WorkUnitClimate_2	0.847	Valid
WorkUnitClimate_3	0.831	Valid
WorkUnitClimate_4	0.865	Valid
Motivation_1	0.952	Valid
Motivation_2	0.941	Valid
Leadership_1	0.871	Valid

Indicator	If the significance value > 0.467, the indicator is valid. If the significance value < 0.467, the indicator is not valid	
	Significance value	Valid/ Not Valid
Leadership_2	0.920	Valid
Leadership_4	0.924	Valid
Decentralization_2	0.784	Valid
Decentralization_3	0.681	Valid
Decentralization_4	0.598	Valid
Informal_1	0.821	Valid
Informal_2	0.875	Valid

Table 3 shows that all of the indicators used in this research are valid because the significance value is exceed 0.467. This 38 questionnaires item can be used in this research. After all the questionnaires are proven valid, all of indicator must pass reliability test. Reliability is the degree of reliability of the indicator in questionnaire as the measurement tool. To know the reliability level of questionnaire, consistency test of questionnaire result must be performed. Table 4 shows result of analysis reliability test using IBM SPSS.

Table 4. Reliability test result

Indicator	If the Cronbach's alpha > 0.7, the indicator is valid. If the Cronbach's alpha value < 0.7, the indicator is not valid		
	Cronbach's alpha	Number of Item	Valid/ Not Valid
T-Shaped Skills	0.729	4	Valid
Task Requirements	0.774	3	Valid
Effort Expectancy	0.893	7	Valid
Performance Expectancy	0.804	8	Valid
Work Unit Climate	0.835	4	Valid
Motivation	0.897	2	Valid
Leadership	0.958	4	Valid
Decentralization	0.722	4	Valid
Informal	0.751	2	Valid

From Table 4, all of the Cronbach's Alpha value from calculation pass the 5% significance limit because its bigger than 0.7, the significance limit if the number of questionnaire. From this result, all of variable are reliable to do this research.

3.2. Questionnaire result

Valid and reliable questionnaire of KMS implementation readiness in PDII LIPI with 38 indicator questions are transformed into interval data using successive interval method. The average of the result of each indicator will

become the value of KMS implementation readiness in PDII LIPI. Aydin and Tasci scale is in the range of 1-5, so the average value of T-shaped skill indicator must be converted to 5-point scale. Figure 3 shows the score of PDII LIPI readiness in people dimension.

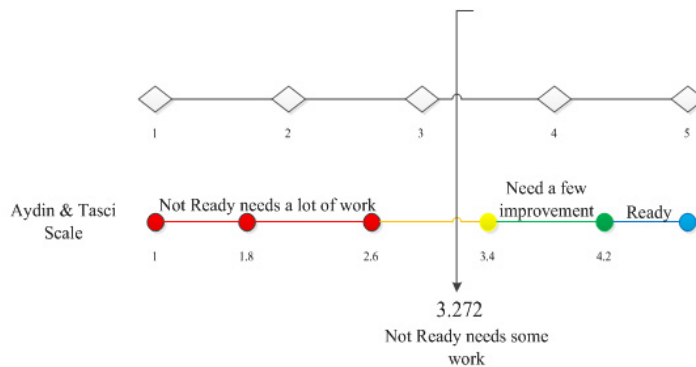


Fig. 3. The value of implementation of KMS readiness in people dimension

From Fig.3, the value of Implementation of KMS Readiness in people dimension is 3.272. In the range of 2.6 until 3.4 the readiness level based on Aydin and Tasci is “not ready needs some work”. It means some adjustment must be done in order to ready for implementation of KMS. From 41 respondent data the dimension that below the readiness value threshold is (1) leadership, (2) T-shaped skill and (3) task requirement, individual ability and skill. Figure 4 shows the score of PDII LIPI readiness in organization structure dimension.

From Fig. 4, the value of Implementation of KMS Readiness in organization structure dimension is 2.818. In the range of 2.6 until 3.4 the readiness level based on Aydin and Tasci is “not ready needs some work”. It means some adjustment must be done in order to ready for implementation of KMS. From 41 collected respondent data, both of dimensions measured occur below the readiness value threshold. It means organization needs change in informal and decentralization dimension.

3.3. Analytical hierarchy process result

Analytical Hierarchy Process questionnaire is collected from two experts of PDII LIPI. There are 3 main focus of priority weighting of this research which are knowledge management enablers, people concept’s dimension and

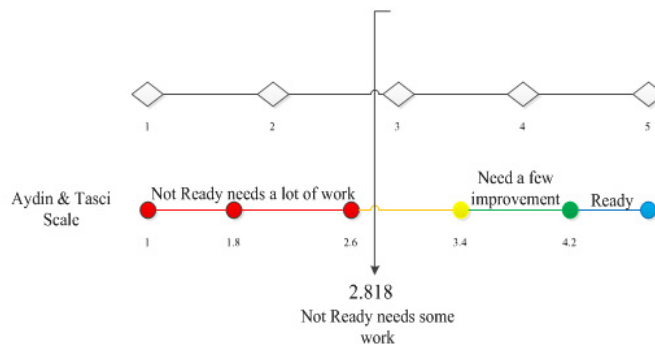


Fig. 4. The value of implementation of KMS readiness in organization structure dimension

organization structure concept’s dimension. From Table 5, for PDII LIPI people concept is more important than organization structure. For the people concept the most important dimension is T-shaped skill.

Table 5. Analytical Hierarchy Process result

		Weight	
Concept	Concept Weight	Dimension	Dimension Weight
People	84.6%	T-Shaped Skill	30.7%
		Task Requirement	16.5%
		Effort Expectancy	5.1%
		Performance Expectancy	5.1%
		Work Unit Climate	8.2%
		Motivation	13.5%
		Leadership	20.9%
Organizational Structure	15.4 %	Decentralization	20.5%
		Informal	79.5%

4. Recommendation

Firstly, PDII must appoint knowledge management position as a Chief Knowledge Officer (CKO) that has several responsibilities such as promoting and introducing knowledge management system and its benefit, coordinating knowledge management training both for management level and for employees and connecting management and employees by collecting input for KMS from employees and motivating employee to contribute in knowledge management project. Then, PDII should define organization's knowledge management strategy such vision, mission, performance indicator and procedure as simple as possible to reduce complexity and formality. Next, documenting the strategy in ways that employees would aware of it such as manual book, poster, banner or frame and organizing employee oriented knowledge management forum are important to leverage the level of readiness. Last but not least PDII should provide rewarding mechanism for those who outstanding in participation of knowledge management process informal reward such as knowledge management employee of the months badge or frame or formal reward such as incentives to evaluate knowledge management system performance.

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