KNOWLEDGE MANAGEMENT SYSTEM IMPLEMENTATION READINESS MEASUREMENT IN KNOWLEDGE MANAGEMENT ENABLERS OF CULTURE, PROCESS, AND INFORMATION TECHNOLOGY AT PDII

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Abstract
Organization readiness measurement is a very important step to be performed by *Pusat Dokumentasi Informasi Ilmiah* (PDII) before implementing Knowledge Management System (KM) system. The measurement is intended to help PDII in analyzing its capability to have effective knowledge sharing before PDII implementing KM system. Readiness measurement is done by lowering KM enablers into several dimensions. Dimensions are derived into indicators which serve as questionnaire statements that will be distributed to PDII employees. Readiness scale is using Aydin-Tasci readiness scale. Beside readiness measurement, priority weighting calculation using Analytical Hierarchy Process (AHP) is also done to see which KM enablers and dimensions have to be prioritized by PDII in implementing KM system. Generally, PDII has readiness score of 3.02 (more ready to implement KM system). The results of readiness measurement and priority weight are: Culture readiness score is 3.091 (more ready to implement KM system) with priority weight by 24%, Process readiness score is 2.617 (more ready to implement KM system) with priority weight by 43.6%, and Information Technology readiness score is 3.448 (ready with a few improvements to implement KM system) with priority weight by 32.4%.

Keywords: readiness score, priority weight, KM system implementation, KM enablers, dimensions, KM activities

1. Introduction

Organization which is considered superior and competitive today is an organization that is able to exploit the existing knowledge on each of its human resources and combining them into organizational knowledge, with the aim to achieve excellence and competitiveness at the most optimal level [1]. Knowledge Management (KM) has now become an important and integral part of an organization. KM plays an important role in an organization. KM plays a role in making tacit knowledge to be explicit knowledge within organization with the aim that organization itself can continue to learn and innovate [2]. KM is based on capturing and making documentation of individual explicit and tacit knowledge, and its dissemination within the organization [3].

An organization needs to implement a KM system in order to systematically accommodate the needs of knowledge sharing in an organization [4]. KM system is a system that contains a collection of IT-based knowledge repository that can be accessed by everyone in an organization that aims to create knowledge sharing and the knowledge can be implemented and disseminated throughout the activities within an organization [5].

Usually, an organization spends more time and effort to implement KM system project [6]. A measurement must be performed to measure an organization's readiness to implement KM system, so after the implementation of KM system is completed, the system implementation will not be in vain [7]. Measurement on organization's people, process, and technological infrastructure (popular to be known as KM Triad term) readiness can serve as a guideline for management to implement KM system [8]. KM system readiness measurement can help organization to analyze its capability to have effective knowledge sharing before the organization implements KM system [9].

Pusat Dokumentasi dan Informasi Ilmiah (PDII) is an institute under the auspices of *Lembaga Ilmu Pengetahuan Indonesia* (LIPI) in charge to carry out the development and provision of services documentation in accordance with the policies of scientific information that has been designated by chairman of *Lembaga Ilmu Pengetahuan Indonesia* (LIPI). PDII vision is to become the leading institution in the field of documentation and information in order to participate in building an intelligent, creative, integrative and dynamic knowledge-based and technology-humanistic society [10]. To realize the vision, PDII performs three main types of activities: documentation services, information services, and training and development, in the field of scientific information documentation.

A KM process must be managed properly so that tacit knowledge contained in the employee can be a useful asset for PDII. KM in PDII is directed in activities to obtain: (1) tangible information (documents, textual information) and intangible information (opinion and workers experience who have been years of working in PDII), (2) the mechanism of knowledge creation to support the new knowledge and innovation, and (3) PDII strategy to foster a culture of

knowledge sharing [11]. The way to do by PDII in order to manage and support the knowledge sharing is to build a KM system. A KM system is built to make knowledge codification, knowledge directory, knowledge sharing system, and the formation of knowledge networks inside an IT-based system to the entire level of PDII [12].

Measuring and analyzing PDII readiness for implementing a KM system is a very important step before PDII starts implementing KM system [4]. The measurement is intended to assess PDII readiness, in terms KM factors or KM enablers related to successful implementation of KM which are culture, information technology [13], and process (KM Triad of people, process, and information technology [14]) to implement a KM system. Readiness measurement is useful to see whether PDII is said to be ready or not to implement KM system. Readiness measurement can be done by using Aydin & Tasci [15] readiness scale. KM Enablers' priority weight also needs to be considered in order for PDII can determine which KM Enablers become the most important aspect within PDII. One of the priority weighting calculation can be performed by using Analythical Hierarchy Process (AHP) calculation method [16]. In this research, the PDII organization readiness measurement will be focused only on KM enablers of organization's culture, process, and information technology infrastructure. Through this study, PDII will get an overview of the organization's readiness from KM enablers of culture, process, and information technology as well as the priority weight for each KM enablers. Recommendations will be given so PDII is able to increase the readiness level of its organization in implementing KM system.

2.   Research Conceptual Model

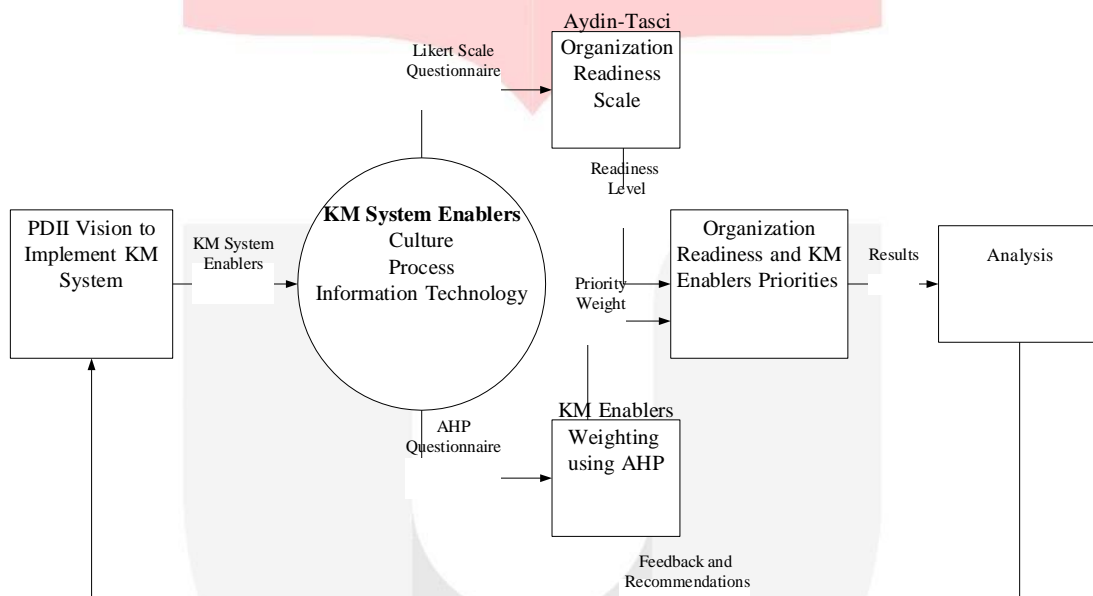Conceptual model for this research is contained in Figure as follow.

Figure 1. Conceptual Model

This research measures PDII readiness in the vision of PDII's KM system implementation.. PDII is going to implement KM system so this system can be a tool that can be used by employees in PDII to support KM activities. Measurement of KM system implementation readiness lowered into concepts of KM enablers by Lee and Choi [13], Razi and Karim [17], and KM Triad's dimensions [14]. Those KM enablers are Culture, Process, and Information Technology. Each KM enablers has its own dimensions and indicators respectively.

KM enablers will be made into indicators which can be used as questionnaires. Questionnaires will be formed into two types of questionnaire: (1) weighting questionnaires or comparison questionnaire using AHP [16] for experts in PDII, and (2) questionnaires using Aydin-Tasci Readiness scale to every indicators of KM enablers for employees in PDII.

The result of weighting questionnaires using AHP is priority weight for every KM enablers. The greater the priority weight of KM enablers, the greater priority to one of KM enablers. The result of questionnaires using Aydin-Tasci Readiness Scale is score of readiness to each KM enablers for KM system implementation. Priority weight and readiness score can be the basis for making recommendations and feedback for KM enablers to PDII in order to increase its organization readiness in implementing KM system.

3. Data Collecting and Data Processing

3.1 Data Collecting

There are two types of questionnaires that will be deployed: questionnaires to respondents and AHP questionnaire for experts. Questionnaire to respondents contain indicators as the questionnaire statements which are derived from KM enablers and dimensions. The statements are filled with Likert Scale from 1 until 6 (strongly disagree to strongly agree). AHP questionnaire contains priority comparisons between KM enablers and comparisons between dimensions.

Respondents for questionnaire are employees in PDII. Respondents to the questionnaire are employees working in *Bidang Dokumentasi, Bidang Diseminasi Informasi*, and *Bidang Sarana Akses Informasi*. Respondent selection is based on the job description of *Bidang Dokumentasi, Bidang Diseminasi Informasi,* and *Bidang Sarana Akses Informasi,* which are representing the main tasks of PDII: documentation services, information services, and training and development in the field of scientific information documentation. The number of employees for each Bidang or working units is described as follow.
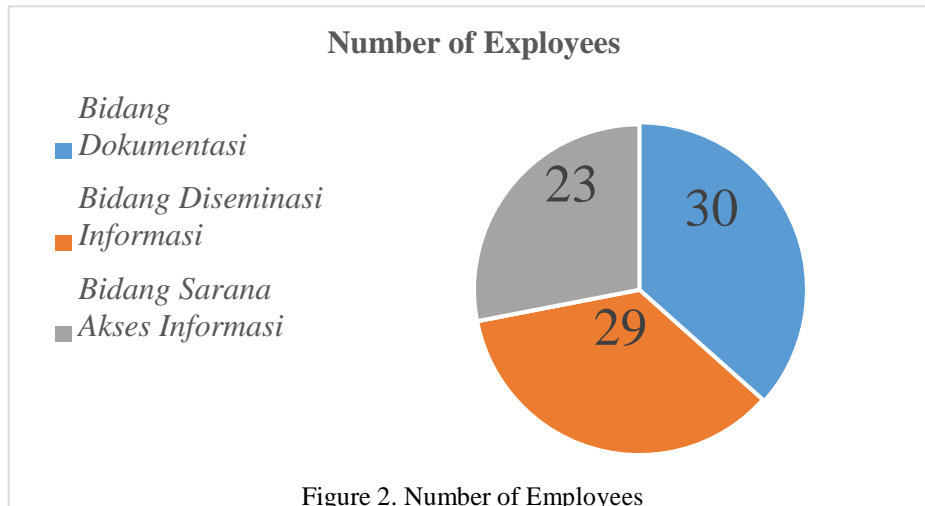

Figure 2. Number of Employees

The sampling technique used is nonprobability sampling of saturation sampling, the sampling technique which uses the entire population as the sample (Sugiyono, 2013). Population for questionnaire respondents is employees in strata III and IV working class (*Pegawai Negeri Sipil golongan III dan golongan IV*). The reason is that employees at this working class have the understanding about the questionnaire contents and the purpose of questionnaire. Data is collected from 41 questionnaire respondents from employees in strata III and IV working class (*Pegawai Negeri Sipil golongan III dan golongan IV*). Detail of the respondents is represented in Table as follow.

Table 1. Questionnaire Respondents

No	Category	Sub Category	Frequency	Total
1	Working Unit	*Sarana Akses Informasi*	14 respondents	41 respondents
		Disseminasi Informasi	14 respondents	
		Dokumentasi	13 respondents	
2	Length of Working	<1 year	3 respondents	41 respondents
		1-5 years	6 respondents	
		5-10 years	5 respondents	
		10-15 years	3 respondents	
		>15 years	24 respondents	

Expert respondents are head of *Bidang Diseminasi Informasi* and head of *Bidang Sarana Akses Informasi*. Expert respondents are detailed as follow.

Table 2. Expert Respondents

No.	Working Years in PDII	Occupation
1	>15 years	Head of *Bidang Diseminasi Informasi*
2	>15 years	Head of *Bidang Sarana Akses Informasi*

The reason for choosing the experts above is based on their occupation as Head of *Bidang* in PDII. Head of *Bidang* is a person who leads and manages a unit or division. Head of *Bidang* is selected as expert respondents because Head of *Bidang* knows the work process as a whole in his unit or division. Head of *Bidang* also knows the actual working conditions and knows the employees behavior in his unit or division. Head of *Bidang* has achieved more than 15 years of working, which makes them have long working experiences and knows the developments and working dynamics that occurs within PDII.

3.2 Data Processing

Data processing is the step of processing collected data for doing the research. Before questionnaire data is processed, data is tested with normality test, validity test, reliability test, and data is transformed into interval data using successive interval method. After data is transformed, data is adjusted from 1-6 Likert scale into 1-5 scale in order so data can be analyzed using Aydin-Tasci readiness scale.

Normality testing is a test to see the normal distribution of data. Shapiro-Wilk test is used to test normality distribution, because the respondents are less than 50 [18]. Normality testing is performed on each dimensions. Normality Test is done using SPSS 20.

Validity test is the extent to which an instrument or a questionnaire accurately measures what it purposes to measure [19]. Validity test is done by looking at data distribution. If the data is normally distributed, then validity testing is carried out by Pearson correlation test [20]. If the data is not normally distributed, then validity test is carried out by Spearman correlation test [21].

Reliability test is the degree of which an instrument or a questionnaire is consistent to measure what it purposes to measure [19]. Validity test is prerequisite to reliability test. If an instrument or a questionnaire is not valid, then reliability of instrument or questionnaire is dispute. Validity and reliability testing are done using SPSS 20.

Successive Interval Method is used to transform ordinal data (data that has been collected through questionnaires using 1-6 Likert Scales) into interval data [22]. Successive interval needs to be done because ordinal data cannot be processed with mathematical operation (such as division, multiplication, addition, subtraction, etc.). Likert scale only symbolize disagree and agree with the numbers 1-6. Thus, the results of questionnaire data collection should be carried out with successive interval method so that data can be averaged to get readiness score.

After successive interval, the results of each indicators' readiness score in one dimension are summed then averaged. After averaging, the calculation result is transformed into the form of 5-scale, so the calculation results can be analyzed using Aydin-Tasci readiness scale. This calculation is done to get readiness score for each dimensions. Likewise for calculating the score readiness KM enablers, dimensions in each KM enablers are summed then averaged.

4.   Results and Analysis

4.1 Readiness Score Results and Analysis

Aydin-Tasci made a readiness scale that can be used to measure the extent to which an organization is ready to implement KM system. The level of readiness by Aydin-Tasci are categorized into 4 categories as follow.

1) Index (1-2.59)   : Organization is not ready to implement KM system thus organization needs a lot of works.
2) Index (2.6-3.39) : Organization is more ready to implement KM system but still needs some works.
3) Index (3.4-4.19) : Organization is ready to implement KM system but still needs a few improvement.
4) Index (4.2-5)   : Organization is ready to implement KM system.

Readiness scale is compared to readiness score on each dimensions. Overall, by summing readiness score on each KM enablers and averaging the total score, PDII level of readiness in implementing KM system has score 3.02, which is, according to Aydin-Tasci categorized as more ready to implement Km system but still needs some works. Readiness score for each KM enablers are represented in Table as follow.

Table 3. KM Enablers Readiness Score

KM Enablers	Level of Readiness	Aydin-Tasci Readiness Scale Categorization
Culture	3.091	More ready to implement KM System
Process	2.617	More ready to implement KM System
Information Technology	3.448	Ready to implement KM System but still needs a few improvements
PDII Readiness Score	**3.02**	**More ready to implement KM System**

Culture concerns about the formation of collective behavior towards employees in PDII. Culture is employees' habituation in doing something within an organization. In KM context, habituation which has to be implanted to employees is knowledge sharing. Successful KM activities depend on knowledge sharing activities. Derived from the readiness score, Culture embedded in PDII is deemed to be on track toward readiness in implementing KM system because Culture readiness score of 3.091 is in index (2.6-3.39). In order to increase readiness score to reach minimum readiness score of 4.2, some improvements and recommendations are needed for KM Enablers of Culture. According to L. Tobing [23], many organizations in western countries have been used to store knowledge in written forms or other explicit forms, so that the knowledge can be easily transferred and be used. Whereas on many organizations in eastern countries, knowledge which is stored in explicit form as in writing or digital media is more limited. Knowledge is mostly stored in the minds of certain people who already have a lot of experiences. Those people tend to be not accustomed in knowledge sharing activities. When such knowledge is going to be accessed, a cultural approach is more needed. A cultural approach means an approach through habituation in KM activities.

Process concerns a set of alignment of PDII vision and mission with KM objectives, rules, directions, and strategies to achieve the goal of KM activities in PDII. Process will direct all employees to perform KM activities and to take consequences occurred when employees establish KM activities. Within Process, it also contains KM strategies that will be implemented by PDII, so that the employees can be oriented by such strategies in implementing KM activities. Process embedded in PDII is deemed to be going on track toward readiness in implementing KM system because Process readiness score of 2.617 is in index (2.6-3.39). However, this readiness scores nearly enters index (1-2.59). This can be an indication that Process in PDII is still not related enough to accommodate KM activities. Employees feel that rules, policies, and strategies which are referral to perform KM activities are unclear and unrelated to PDII existing condition. PDII needs to make adjustments on rules, policies, and strategies to make them related to PDII KM objectives.

Information Technology concerns in IT support to KM activity and the level of IT usage by employees in their daily working activities. IT support will accommodate KM activities through IT such as internet network, virtual database of information and knowledge, as well as forum for communication and collaboration between employees. Readiness of Information Technology will facilitate PDII to implement KM system, which is KM activities facilitated by Information Technology. With the support of IT, employees will be helped in doing activities that are remotely located with other employees or people outside PDII. According to Information Technology readiness score of 3.448 which is in index (3.4-4.19), IT support and the level of IT use by employees are quite ready to implement KM system. Information Technology readiness score also depicts that PDII has already had intranet infrastructure for employees. To achieve the minimum readiness score of 4.2, PDII needs to prepare a KM system design so that PDII can be ready to implement KM system. Information Technology readiness score also indicates that despite the majority of employees are accustomed to use IT in their daily working activities, there are also employees who are lack in using IT. PDII needs to persuade employees to be more frequent on using IT in their daily working activities.

4.2 Priority Weighting Results and Analysis

The following Table shows KM enablers and dimensions priority weight.

Table 4. KM Enablers and Dimensions Priority Weight

KM Enablers	Priority Weight	Dimensions	Priority Weight
Culture	24%	Collaboration	37.5%
		Mutual Trust	9.7%
		Learning	16.4%
		Management Support	20%
		Organization Strategy	16.4%
Process	43.6%	Reward	37.5%
		Vision, Mission, and Strategy	32%
		Policies and Procedures System	30.5%
Information Technology	32.4%	IT Support	20.5%
		IT Use	79.5%

From AHP calculation, priority weight for KM enablers and priority weight for dimensions are obtained. KM Enablers priority weight is used to determine which KM Enablers is considered the most important factor in implementing KM system. From priority weight calculation result, it can be derived that Process is the most important factor to implement KM System because Process gains the largest priority weight result from experts. Process, in accordance with priority weight result which gets the greatest weight, gets the smallest readiness score compared with

other KM Enablers. The experts agree that Process is the most important KM enablers that should be prioritized in preparing for KM system implementation. There are procedures, regulations, strategies, and reward for KM activities in Process, so PDII employees will be expected to establish KM activities on their daily working. Smallest readiness score and largest priority weight from experts can become the strong consideration for PDII to prioritize Process in preparing for KM system implementation. Reward is a dimension in Process which gets the greatest priority weight. The expert agrees that in establishing KM activities, the most powerful encouragement for employees are increasing in salary and bonus, promotion, and secured guarantees employment position mechanism.

According to experts' judgment, alignment on PDII vision and mission with KM strategy of PDII and Policies and Procedures System of KM actually have no big difference in priority weighting. Both of them can be said to be almost have the same importance. However, if judging from both priority weighting calculation results, PDII first has to arrange KM strategy, then align it PDII vision and mission, so that employees will be aware with the purpose of KM activities. After KM strategy arrangement and alignment with vision and mission have been done, PDII has to make rules, guidelines, and policies about KM activities, so that employees have guidance to follow and PDII can achieve its KM objectives.

Information Technology occupies the second priority in KM Enablers priority weighting calculation results. The experts believe that the important KM Enablers after Process in preparing KM system implementation is the readiness of Information Technology within PDII. IT support will facilitate KM activities with KM system. KM with IT support or KM system, according to experts' judgment, is expected to assist the process of KM which supports remote collaboration activities, remote knowledge sharing activities, and knowledge repository storage in virtual systematic database. Still, according to experts, IT support does not contribute significantly to the passage of KM activity. Although PDII will prepare qualified KM system, it does not guarantee that KM activities through the system will run well. KM activities using KM system will run properly when employees are accustomed to use IT support in their daily working activities. Therefore, IT use gains greater priority weight rather than IT support priority weight.

Culture occupies the third position in priority weight calculation results. Experts put the culture in the last priority because experts agree that PDII first needs to create rules, regulations, policies, strategies, vision mission alignment with KM objectives, and reward system (Process) related to KM activities. Second, PDII should prepare the Information Technology for supporting KM system. Process is the reference of regulation in KM activities, while Information Technology is the support of KM system implementation. After both Process and Information Technology are prepared, then PDII needs to form employees' habit to perform KM activities based on Process and using KM system. This habituation is formed through cultural approach.

There are five dimensions which priority weighting calculations have also been carried out within Culture. According to experts, in establishing KM activities in PDII, the most important dimensions is the employees should be willing to collaborate with one another within working unit or with different working unit. The experts agree that the most important thing that can establish KM activities among employees is collaboration among employees themselves. Collaboration means that the employees have to be able to work together with other employees, have to mutually support each other in terms of working, help each other when there are difficulties in works, and take responsibilities in failure. Those habits will cause openness among employees. From this openness, employees will be willing to share their knowledge and experiences to other employees.

Collaboration cannot exist by itself. Employees need role model to habituate their collaboration. The role model can be employees who work at management level in PDII. Therefore, the experts put management support on the second priority after Collaboration. Employees at management level, according to experts, should exemplify and practice the collaboration habit within working unit or different working units, so that employees will absorb such habit. Employees at management level should also be willing to undertake the KM activities, both between levels as well as with other employees. Gradually, employees in PDII can see it as useful things for themselves and for continued employment. It will also increase the familiarities among employees and enrich employees with different knowledge and experiences across PDII.

Once the culture of collaboration and mutual support have started to arise consistently among employees, according to experts, PDII should make clear strategic plans and objectives about KM activities. PDII should also reflect these objectives into PDII's mission statement, so that employees will understand the purpose and the importance of KM activities. Strategic plans and objectives of KM activities should be designed clearly in order for employees to reflect the purpose KM activities into their daily habitual Collaboration. Another dimension that is equally important with Organization Strategy based on priority weighting results is the culture of Learning in PDII. Learning culture will result knowledgeable employees and will provide knowledge and experience for employees to support their daily working activities. Those knowledge and experience are expected by PDII to be shared and absorbed among employees through Collaboration culture. In consequence, Organization Strategy and Learning have the same priority weight because both are the content and direction for employees in habituating a culture of collaboration.

Mutual Trust is merely the result which is obtained when another dimensions in Culture have successfully entrenched. Lowest priority weight does not conclude that Mutual Trust is not prioritized, but Mutual Trust is more about the consequence of successful practice of Collaboration, Management Support, Learning, and Organization Strategy Culture among employees in PDII.

5. Recommendations for PDII

Recommendations which will be given are more to operational plans, so the recommendations can be defined clearly and can be implemented by PDII policies decision makers. Recommendations are given based on the consideration from priority weight results and readiness score of each dimensions. There are 6 proposed recommendations aimed for increasing PDII readiness score to implement KM system. The recommendations are as follow.

1) KM team design (recommendation to increase Vision, Mission, and Strategy dimension and Organization Strategy readiness score).
2) Rewarding or incentives system for employees' involvement in KM activities (recommendation to increase Reward and Management Support readiness score).
3) KM activities' policies establishment (recommendation to increase Policies and Procedures System readiness score).
4) KM system design guidelines (recommendation to increase IT Support readiness score).
5) Management involvement in habituating the use of KM system (recommendation to increase Management Support and IT Use readiness score)
6) Interactive knowledge club for employees (recommendation to increase Learning, Collaboration, and Mutual Trust readiness score).

6. Suggestions

6.1 Suggestions for PDII

Through this research, PDII will get an overview of organization's existing readiness level. Dimensions which are not yet ready and ready are illustrated from this research. KM enablers and dimensions' priority weighting are also depicted from this research. PDII is suggested to consider the results and recommendations of this research in order to increase readiness score in implementing KM system.

6.2 Suggestions for Further Research

Suggestions for further research are as follow.

1) Further research can discuss about technical implementation of KM system in PDII.
2) Further research can conduct feasibility analysis of KM system implementation in PDII.
3) Further research can propose technical recommendations for PDII to implement KM system.

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