Jurnal Mantik, 6 (3) (2022), ISSN 2685-4236 (Online)

Published by:Institute of Computer Science (IOCS)

Jurnal Mantik

Journal homepage: www.iocscience.org/ejournal/index.php/mantik

Measuring Knowledge Management Readiness Using AHP Method and KMCSF Model

Agustina Desi Ratnasari[1], Ronsen Purba[2], Andri[3]
[1,2,3]Department of Information Technology, Mikroskil University, Indonesia

A R T I C L E I N F O

Article history:

Received Oct 25, 2022
Revised Nov 15, 2022
Accepted Nov 25, 2022

Keywords:

AHP (Analytical Hierarchy Process)
Knowledge Management
KM Readiness
KMCSF

ABSTRACT

Knowledge is a very important asset for organizations. The successful implementation of KM (Knowledge Management) enables the organization to achieve its goals more effectively and efficiently. However, KM implementation is not easy, because the failure rate of KM projects reaches 70%. Failure is caused by factors that influence KM implementation. Efforts should be made to identify the readiness of organizational assets so that the organization can take preventive action by utilizing readiness information. The purpose of this research is to measure the level of readiness for the implementation of knowledge management in Mikroskil using the AHP (Analytical Hierarchy Process) method and the KMCSF model. Furthermore, it provides recommendations for increasing the level of readiness. Measurements were carried out on 6 respondents who were the leaders and data collection was carried out through a questionnaire. Then the questionnaire data was processed using AHP calculations with Microsoft Excel 2016 and Expert Choice V11. The result of this research concluded that the level of readiness for implementation of knowledge management is 62,58% or at level 4 (receptive) out of 5, which indicates that the KM process has provided benefits to the organization, the organization has its own rules, and standards, and is implemented efficiently. Where the results show that the greatest weight factor is the trust factor. This means that the trust factor is the most important and plays a big role in influencing the successful implementation of Knowledge Management, so the trust factor becomes the main priority factor.

Corresponding Author:

Agustina Desi Ratnasari,
Department of Information Technology,
Mikroskil University,
Jl. M.H. Thamrin No. 140, Sumatera Utara 20212, Indonesia
Email: agustina.ratnasari@mikroskil.ac.id

1. INTRODUCTION

Knowledge Management Readiness refers to an organization's or department's readiness to adopt, use, and implement Knowledge Management (KM) [1]. According to [2], KM is closely related to human participation, every member of the organization plays a role in creating KM. Based on [3], knowledge and human resources are very important assets for organizations. Successful KM implementation enables the organization to achieve its goals more effectively and efficiently [4]. However, according to [5], the implementation of KM in

an organization is not easy, because the failure rate of KM projects reaches 70%. According to [6], the failure factors for KM implementation include the lack of performance indicators and measurable benefits; inadequate management support; improper planning, design, coordination, and evaluation; inadequate knowledge and skills of managers and workers; and organizational culture. Various supporting factors are needed for the successful implementation of KM and efforts must be made to identify the readiness of the organization's knowledge assets so that the organization can realize the potential for setbacks and take precautions by utilizing readiness information.

To overcome the problems above, Rakhman, Hidayanto, Hapsari, Sandhyaduhita, and Budi [1] developed a framework that can be used to measure an organization's KM readiness using the AHP method. Data collection for the development of the framework is carried out through literature studies, mapping of Knowledge Management Critical Success Factors (KMCSF), and focus group discussions between experts. The results of the study concluded that there were twelve (12) factors with their respective weights and the framework was successfully implemented as a case study by the Deputy for Environmental and Pollution Control, Ministry of Environment. Satria, Munandar, Rizal, Cahyaningsih, Sensue and Noprisson [7] also conducted research related to KM implementation readiness, which refers to the Knowledge Management Critical Success Factor (KMCSF) and Underground Mining Training Center, Ministry of Energy and Mineral Resources of the Republic of Indonesia as research objects. and examine 11 critical success factors of KM implementation. As a result, the Underground Mining Training Center has KM readiness that has not reached 40% using the KM Readiness Level measure. However, Nugraha and Budi [8] conducted a study of 17 factors using a survey approach. Assessment of readiness using the Aydin & Tasci Scale as a measure and PLS factor analysis in the KM Socialization, Externalization, Combination, Internalization (SECI) process. The research concludes that technology service companies have reached level 4 or the level of receptive readiness.

Sensue, Siregar, Ansis, Lusa, and Prima [4] used KM enablers, individual acceptance, and SECI KM processes to develop research models and instruments in case studies of government agencies, namely the Directorate of Bilateral Negotiations of the Ministry of Trade. The research model to measure KM readiness was developed based on previous related studies by accommodating the analysis of 14 factors in the research model. The results of the study using the Aydin & Tasci Scale as a measure of readiness, indicate that the level of KM Readiness of the Directorate of Bilateral Negotiations, Ministry of Trade is "ready but needs a little improvement". Arief, Sensue and Wahab [9] conducted the same research with reference to KMCSF and the local government agencies of the Archipelago: South Halmahera, East Indonesia as research objects, and tested 15 factors. As a result, KM readiness is still low at 34% of the KMCSF factor and the assessment is carried out using KM Readiness Level as a measure of readiness, meaning that it still requires careful planning and better strategies in the future. Prabowo, Sensue, and Lusa [10] conducted a study to measure the level of knowledge management readiness in the STIS Statistics Polytechnic case study using the KM readiness framework and the Analytic Hierarchy Process (AHP) method on 13 factors that affect KM implementation readiness. Research refers to the Rao scale as a measure of success. The results showed that the readiness of KM implementation at the STIS Statistics Polytechnic (STIS Polstat) was 71% or at the pleliminary level.

This study proposes using the AHP method and the Knowledge Management Critical Success Factor (KMCSF) model. The advantage of this study compared to previous studies is that it combines 32 factors derived from previous studies. Then, using the KM Readiness Scale as a measure of readiness for KM implementation [9]. The KMCSF model is used to map the critical success factors of KM implementation into 3 aspects of KMCSF, namely abstract, soft and hard [9]. The AHP method is used to obtain weights on aspects and factors. The greater the weight, the greater the importance of these aspects and factors in

supporting the successful implementation of KM [10]. The results to be achieved in this study are expected to get better results than in previous studies, namely in the form of KM Readiness Level and strategies to improve KM Readiness, and can be used as a reference in reducing the risk of failure in KM implementation.

2. RESEARCH METHOD

The method used in this study measures the readiness of Knowledge Management (KM) implementation using the AHP (Analytical Hierarchy Process) method and the KMCSF model. Where the KMCSF model is used to map the factors that influence the success of KM implementation. The AHP method is used to calculate the weight for each factor and aspect so that calculations can be carried out to measure the level of readiness for KM implementation. As for the stages carried out in this study, there are 7 steps where step 1 is mapping with the KMCSF model, 2 is building the AHP hierarchy, 3 is preparing the questionnaire, 4 is distributing the questionnaire, 5 data collection, 6 is testing with the AHP method, 7 is analyzing the results. The stages of the research method to be carried out are described in the form of a flowchart in Figure 1.

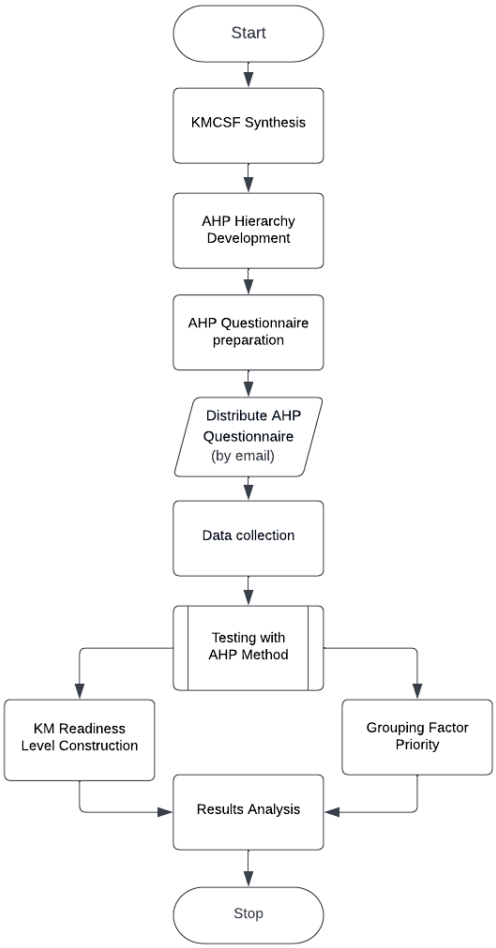

Figure 1 Flowchart of Research Stages

2.1 KM Readiness Level

Determination of these levels is analyzed by the formula:

$$P = \frac{Sn}{Sm} \, x \, 100\% \quad (1)$$

Information:

P: is the percentage level.

Sn: is the number of scores multiplied by the weight obtained.

Sm: is the total weight multiplied by the maximum score.

The level of KM readiness can be seen in the image below [9]:

Figure 2. *KM Readiness Scale*

3. RESULTS AND DISCUSSIONS

The results of the research to measure the readiness of implementing knowledge management with the AHP method and the KMCSF model is as follows.

3.1 Results of data processing with AHP

After looking for the geometric average, pairwise comparison, finding the normalized matrix, and preference vector, and calculating the consistency of the weights, we get the weights for each aspect and global factor.

Table 1 Results of Global Weight Calculations in Microsoft Excel

Aspect	Factor		Global weighted score
Abstract	Socialization	0.020	0.560
	Externalization	0.029	
	Combination	0.030	
	Internalization	0.043	
	Trust	0.107	
	Performance Expectancy	0.056	
	Effort Expectancy	0.043	
	KM Understanding	0.056	
	KM Initiative	0.055	
	Leadership	0.075	
	Openness to change	0.044	
Soft	Performance Measurement	0.008	0.236
	Organizational Structure	0.005	
	Processes	0.020	
	Organizational Culture	0.018	
	Management Support	0.014	
	Communication	0.021	
	Informal	0.006	
	Reward	0.008	
	IT Support	0.017	
	Collaboration	0.015	

	Decentralization	0.008	
	Organizational Learning	0.025	
	Motivational Encouragement	0.028	
	Financial Support	0.012	
	Strategy	0.029	
Hard	Security	0.041	0.205
	Physical Environment	0.017	
	IT Use	0.045	
	Technical Infrastructure	0.038	
	Knowledge Sharing Place	0.037	
	Building Design	0.026	

3.2 Scoring for Readiness Factor

To assess the level of KM Readiness, [1] formulate criteria for each factor at each level:

a) Level 1: Management is not aware of the need for KM in the organization.
b) Level 2: Management has recognized the need for KM in their organization
c) Level 3: Management already has support for KM implementation.
d) Level 4: Management already has support for KM and preparation for KM initiation.
e) Level 5: Have started KM.

The results of the analysis of each factor can be seen in the table below:

Table 2 Score Table for Factors

Factor	Readiness Score for Each Factor
Socialization	2
Externalization	3
Combination	3
Internalization	3
Trust	4
Performance Expectancy	4
Effort Expectancy	3
KM Understanding	4
KM Initiative	4
Leadership	4
Openness to change	3
Performance Measurement	1
Organizational Structure	1
Processes	3
Organizational Culture	3
Management Support	2
Communication	3
Informal	1
Reward	1
IT Support	2
Collaboration	2
Decentralization	1
Organizational Learning	3
Motivational Encouragement	3
Financial Support	2
Strategy	3
Security	3
Physical Environment	1
IT Use	3
Technical Infrastructure	3
Knowledge Sharing Place	3
Building Design	2

3.3 KM Readiness Level Construction

From the score results for the factor, the KM Readiness Level is calculated. Then, the global weighting results are multiplied by the scores for the factors that have been determined in the previous stage.

Table 3. Calculation of KM Readiness Level

Aspect	Factor	Global weighted score	Readiness Score for Each Factor	Global Weighted score * Readiness Score for Each Factor
Abstract	Socialization	0.02	2	0.04
	Externalization	0.029	3	0.087
	Combination	0.03	3	0.09
	Internalization	0.043	3	0.129
	Trust	0.107	4	0.428
	Performance Expectancy	0.056	4	0.224
	Effort Expectancy	0.043	3	0.129
	KM Understanding	0.056	4	0.224
	KM Initiative	0.055	4	0.22
	Leadership	0.075	4	0.3
	Openness to change	0.044	3	0.132
Soft	Performance Measurement	0.008	1	0.008
	Organizational Structure	0.005	1	0.005
	Processes	0.02	3	0.06
	Organizational Culture	0.018	3	0.054
	Management Support	0.014	2	0.028
	Communication	0.021	3	0.063
	Informal	0.006	1	0.006
	Reward	0.008	1	0.008
	IT Support	0.017	2	0.034
	Collaboration	0.015	2	0.03
	Decentralization	0.008	1	0.008
	Organizational Learning	0.025	3	0.075
	Motivational Encouragement	0.028	3	0.084
	Financial Support	0.012	2	0.024
	Strategy	0.029	3	0.087
Hard	Security	0.041	3	0.123
	Physical Environment	0.017	1	0.017
	IT Use	0.045	3	0.135
	Technical Infrastructure	0.038	3	0.114
	Knowledge Sharing Place	0.037	3	0.111
	Building Design	0.026	2	0.052
The total weight multiplied by the score				3.129

From the calculation of table 3, the total weight multiplied by the score is 3,129. Then the next step is to calculate the KM Readiness Level with the formula:

$$P = \frac{Sn}{Sm}\ x\ 100\%$$

$$P = \frac{3.129}{5}\ x\ 100\%$$

$$P = 62{,}58\%$$

Based on the calculation results above, the KM Readiness Level is 62.58% or is at level 4 of 5. This result indicates a receptive level. This means that there is still a possibility of failure to implement knowledge management in the organization. However, it shows that the KM process has provided benefits to the organization, the organization has its own rules and standards, and is implemented efficiently.

3.4 Grouping Factor Priority

At this stage, the factors that have the greatest role in supporting the successful implementation of KM are grouped.

Table 4 Priority Factors

No	High Factor
1.	Trust
2.	Leadership
3.	Performance Expectancy
4.	KM Understanding
5.	KM Initiative

3.5 Discussion

This section will explain the results of hypothesis testing that has been carried out as follows, a). Assessment of KM Readiness is expected to be able to assist organizations in knowing the level of readiness for KM implementation within the organization. From the results of the research conducted, the readiness level of KM Readiness within the organization is at level 4 on a scale of 5 or equivalent to 62.58%. This result indicates an intermediate level of readiness. This means that there is still a risk of failure in the implementation of knowledge management in the organization. b). Pairwise comparison, weighting, and scoring of aspects and factors with the AHP method are used to determine which aspects and factors have the greatest role in supporting the successful implementation of KM. From the results of pairwise comparison, the results show that the abstract aspect is the aspect that has the greatest weight. This means that the abstract aspect is the most important and has a major role in influencing the successful implementation of Knowledge Management (KM Readiness), so the abstract aspect becomes the top priority aspect. As for the factors, the results show that the trust factor is the factor that has the greatest weight. This means that the trust factor is the most important and plays a large role in influencing the success of Knowledge Management (KM Readiness) implementation, so the trust factor becomes the top priority factor. d). By grouping priority factors into factors that have the biggest role in supporting the success of KM implementation, it is found that the factors of trust, leadership, performance expectancy, KM Understanding, and KM Initiative are the factors that have the most weight (top priority). The following is a strategy recommended by researchers to increase KM Readiness level:

Table 5. Recommendations for Increasing KM Readiness

Factor	Recommendation
Trust	Improve communication between individuals within the organization. Increasing individual participation in knowledge exchange within the organization, for example conducting socialization related to KM. Ensure security regarding the exchange of information within the organization.

Leadership	Form a team responsible for managing KM within the organization. Creating a work environment with high motivation to produce productive individuals.
Performance Expectancy	Increase individual desire to achieve work performance. For example by giving appreciation. Provide ongoing feedback and support on individual performance.
KM Understanding	Raise awareness about the importance of KM among individuals within the organization. Providing facilities such as a place to exchange knowledge, brainstorm, and build a library for knowledge exchange in the form of knowledge documentation. Organizing training or seminars related to KM.
KM Initiative	Understand the important role of KM in helping to integrate organizational resources and align organizational business processes. Increase initiatives to have a competitive advantage.

4. CONCLUSION

Based on the research that has been done, it can be concluded: The level of readiness for the implementation of knowledge management is 62.58% or at level 4 (receptive) of 5, which indicates that the KM process has provided benefits to the organization, the organization has its own rules and standards, and is implemented efficiently. The results show that the abstract aspect is the aspect that has the greatest weight. This means that the abstract aspect is the most important and has a major role in influencing the successful implementation of Knowledge Management (KM Readiness), so the abstract aspect becomes the top priority aspect. As for the factors, the results show that the trust factor is the factor that has the greatest weight. This means that the trust factor is the most important and plays a large role in influencing the success of Knowledge Management (KM Readiness) implementation, so the trust factor becomes the top priority factor. Based on the priority grouping factors, a strategy is recommended to increase KM readiness on the factors of trust, leadership, performance expectancy, KM Understanding, and KM Initiative.

REFERENCES

R. D. Rakhman, A. N. Hidayanto, I. C. Hapsari, P. I. Sandhyaduhita, and I. Budi, "for Measuring Knowledge Management Readiness in Government Institutions," Int. Conf. Inf. Technol. Syst. Innov., pp. 1–6, 2016.

E. Cahyaningsih, D. I. Sensuse, and W. P. Sari, "Critical success factor of knowledge management implementation in government human capital management: A mixed method," 2015 Int. Conf. Inf. Technol. Syst. Innov. ICITSI 2015 - Proc., 2016.

D. I. Sensuse, N. Qodarsih, J. S. Lusa, and P. Prima, "Critical Success Factors of Knowledge Management: A Systematic Literature Review," 2018 Int. Conf. Inf. Technol. Syst. Innov. ICITSI 2018 - Proc., pp. 26–31, 2018.

D. I. Sensuse, J. R. R. Siregar, R. Ansis, J. S. Lusa, and P. Prima, "Measuring knowledge management readiness of Indonesia ministry of trade," Int. Conf. Electr. Eng. Comput. Sci. Informatics, vol. 2018-Octob, pp. 531–536, 2018.

A. Hedar, D. I. Sensuse, and P. Sandhyaduhita, "Knowledge management readiness of research agencies: A case of BATAN Indonesia," 2016 Int. Conf. Informatics Comput. ICIC 2016, no. Icic, pp. 78–83, 2017.

S. I. Pradana, A. Kurniawati, and N. Ambarsari, "Knowledge Management System Implementation Readiness Measurement in PDII LIPI Based on People and Organizational Structure Factors," Procedia Manuf., vol. 4, no. Iess, pp. 216–223, 2015.

W. I. Satria, I. Munandar, I. G. K. Rizal, E. Cahyaningsih, D. I. Sensuse, and H. Noprisson, "Analysis

of knowledge management readiness in government institution," Proceeding - 2017 3rd Int. Conf. Sci. Inf. Technol. Theory Appl. IT Educ. Ind. Soc. Big Data Era, ICSITech 2017, vol. 2018-Janua, pp. 222–225, 2017.

P. A. Nugraha and I. Budi, "Analysis of knowledge management implementation readiness in a technology services company," Proceeding - 2017 3rd Int. Conf. Sci. Inf. Technol. Theory Appl. IT Educ. Ind. Soc. Big Data Era, ICSITech 2017, vol. 2018-Janua, pp. 602–607, 2017.

A. Arief, D. I. Sensuse, and I. H. A. Wahab, "Knowledge Management Readiness in Local Government of Archipelago: A Case of South Halmahera, Eastern Indonesia," Proceeding - 2018 Int. Conf. ICT Rural Dev. Rural Dev. through ICT Concept, Des. Implic. IC-ICTRuDEv 2018, no. 81, pp. 38–42, 2018.

Y. B. Prabowo, D. I. Sensuse, and S. Lusa, "Analysis of knowledge management readiness level: A case study in STIS polytechnic of statistics," 2019 Int. Conf. Adv. Comput. Sci. Inf. Syst. ICACSIS 2019, pp. 403–408, 2019.

R. R. J. Putra and B. L. Putro, "Knowledge Management System (KMS) readiness level based on group areas of expertise to improve science education and computer science quality (cross-fertilization principle) (Case study: Computer science program course FPMIPA UPI)," Proceeding - 2017 3rd Int. Conf. Sci. Inf. Technol. Theory Appl. IT Educ. Ind. Soc. Big Data Era, ICSITech 2017, vol. 2018-Janua, pp. 701–705, 2017.

M. R. Shihab and Y. Wulandari, "The influence of knowledge management tools utilization towards knowledge management readiness," 2016 Int. Conf. Inf. Technol. Syst. Innov. ICITSI 2016 - Proc., 2017.

A. Kurniawati, T. M. A. A. Samadhi, and I. I. Wiratmadja, "Indicators of knowledge management cycle in Indonesian small and Medium Enterprises," 2016 IEEE Int. Conf. Manag. Innov. Technol. ICMIT 2016, pp. 198–202, 2016.

P. Wichawong and P. Chongstitvatana, "Knowledge management system for failure analysis in hard disk using case-based reasoning," Proc. - 18th IEEE/ACIS Int. Conf. Softw. Eng. Artif. Intell. Netw. Parallel/Distributed Comput. SNPD 2017, vol. 2017-Augus, pp. 1–6, 2017.

J. Gast, K. Gundolf, R. Harms, and E. Matos Collado, "Knowledge management and coopetition: How do cooperating competitors balance the needs to share and protect their knowledge?," Ind. Mark. Manag., vol. 77, no. December 2018, pp. 65–74, 2019.

W. R. Fitriani, A. G. Putra, Di. Tanaya, H. N. Rochman, E. Cahyaningsih, and D. I. Sensuse, "Assessing knowledge management implementation readiness in Faculty of Computer Science, Universitas Indonesia," 2016 Int. Conf. Adv. Comput. Sci. Inf. Syst. ICACSIS 2016, pp. 171–180, 2017.

R. H. Ansah, S. Sorooshian, and S. Bin Mustafa, "Analytic hierarchy process decision making algorithm," Glob. J. Pure Appl. Math., vol. 11, no. 4, pp. 2393–2400, 2015.

H. Taherdoost, "Decision Making Using the Analytic Hierarchy Process (AHP); A Step by Step Approach," Int. Journel Econ. Manag. Syst., vol. 2, no. January 2017, pp. 244–246, 2018.