Edisi 1Volume 1 Bulan Februari 2016 ISSN :2089-9033

IMPLEMENTATION OF KNOWLEDGE MANAGEMENT SYSTEM AT SMP AL FALAH Dago

Muhammad Iqbal Al Hafidz

Teknik Informatika – Universitas Komputer Indonesia
Jl. Dipatiukur 112-114 Bandung
Email : iqbal.hafidz09@yahoo.com

ABSTRAK

SMP Al Falah Dago is one of the educational institutions under the authoity of the Islamic Boarding School, Al Falah Foundation. Improving the quality of a good teacher, SMP Al Falah sends their teachers to join training or workshops. Training joined by teachers are improving curriculum training, professional teacher and In House Training. Nowdays, problems which are occured at the SMP Al Falah are teachers who did not join the training can not find out the results of training and teacher on duty get the difficulty to learn material that will be given in class. If will lead to a teacher can not know the development of the new knowledge. Based on many problems that exists at SMP Al Falah now, it is needed necesssary a system to store the results of the training material, to store and to share of materials. Purposes of the bulding system are to convenien teachers to know the results of training and to facilitate picket teachers to know the material already to be presented in the class.

Knowledge Management System (KMS) is one of the implementation of e-learning. This system has the concept that can gather all the knowledge elements that are scattered in many forms a manageable materials shares files (explicit) and someone owned experience (tacit). The Knowledge Management System (KMS) can help the teacher to save the results of training, to save and to share contents, so the teachers who did not join training or teachers who are absent to take the incoming results and training material. The Knowledge Management System which will be built is going to be created as a system of Artificial Intelligence (AI), so searching the documents easy to do. The searching documents, expilicit knowledge and tacit knowledge. The Searching of documents process was built using Text Mining and Informatioan Retrieval (IR) Method.

Based on the test results it can be concluded that the system is already helping teachers who did not join the training to learn easily the results of training and picket teachers to know well materials that will be presented in class.

Keywords: Knowledge Management systems, Artificial Intelligence, text mining,Information

1. PENDAHULUAN

SMP Al Falah Dago is one of educational institution that been under shade boarding the foundation islamic falah who has stood since 1974 .Smp al falah dago is private schools in the city of Bandung, implementing the curriculum of the education and coupled with islamic education.

The work of the teaching and learning , one eye a taught many teachers .The learning process subject teachers who are not included can be replaced by teachers pickets as a substitute for teachers who give matter in the class .The total matter of a class seven 35 matter .Improve the quality of a teacher good, SMP Al Falah send teachers to conduct training or workshop, training followed by teachers are training curriculum, teacher training professional and in house training .Teachers who were told to follow the training out limited to two teachers , this causes teacher who stay cannot know the results of his training .

Based on the results of interviews with representatives of the principal areas of the curriculum of Mr. Arnaldy Akbar, m. Mpd. JUNIOR HIGH SCHOOL, the teachers of Al Falah who has attended a training workshop in their jobs or cannot save the results of training suffered to school because it has no storage media, as a result of teachers who do not follow the training not knowing the experience or the results of the training that has been traveled by other teachers , and teachers cannot share or sharing the results of the training to other teachers. A similar thing on a teacher who does not sign and could not give the material in the classroom, making teachers picket did not know the material to be delivered in the classroom, because the material to be submitted does not comply with the material never previously delivered to the students or the material to be delivered in the next.

Science becomes an obligation that should be owned by all parties, along with the development of the world, where globalization becomes a challenge for the human resources (HR) to face global competition, World Education has an important role

as a medium for building quality human resources. The development of information technology, emerging a few new systems in various fields including in the world of education, known as Knowledge Management System (KMS) which is one of the implementation of e-learning. This system has the concept that can collect all the elements of knowledge that is scattered in various forms of both are manageable because the shape files and documents as well as the difficult accessible due to the form of knowledge and learning. [1]

Based on the problems in junior high Al Falah Dago required Knowledge Management System (KMS) that can help teachers to save the results of training, saving material and sharing content, so that teachers who do not attend training or teacher can not're getting training and material results from Knowledge Management System SMP Al Falah Dago. Knowledge Management System that will be built will be created a system of Artificial Intelligence (AI) to search the document. This search to find documents or material explicit knowledge and tacit knowledge in knowledge management system. Search this document was built using text mining and information Retrieval (IR). Therefore, the authors are interested in doing the research, entitled "**Implementation Of Knowledge Management System At SMP Al Falah Dago**".

While the goals to be achieved in this research are:

1. to help teachers who do not attend training in order to find out the results of training
2. Help teachers the same subjects for sharing materials.
3. Help teachers picket to learn material that will be presented in class.

1.1 *Knowledge Management System* (KMS)

Knowledge Management System or abbreviated KMS is IT applications used to support and enhance the process of the creation of knowledge in the Organization along with the storage, retrieval, transfer and its implementation.

As for the components of the KMS can be divided into several components including:

1. Repositories
   The repository is a medium for storing knowledge. The content of the repository is a formal knowledge of where the knowledge can be accumulated, validated, maintained, added with new knowledge, and distributed.
2. Collaborative platforms
   Collaborative platforms are the platform that supports in the process of distributing knowledge where these platforms are related to how knowledge is shared, what kind of knowledge is stored, and how to communicate such knowledge.
3. Network
   Network support in communication and conversation. The focus of the network that is associated with the network infrastructure that is owned by the company.

Knowledge is divided into two types, namely of explicit knowledge and tacit knowledge, which can be outlined as follows:

Explicit Knowledge

Explicit knowledge is knowledge that can be a component with raw language scientifically in the form of documents, databases, and so on. This type of knowledge can be passed on from one individual to another individual of formal and systematic way.

Tacit Knowledge

Tacit knowledge is personal knowledge. Tacit knowledge is both personal and difficult formulated so that it is very difficult for the communicated or communicated to others.

1.2 *Siklus Knowledge*

The creation of knowledge is achieved through the introduction of the synergy relationship between tacit knowledge and explicit knowledge. Both types of knowledge, by Nonaka and Takeuchi (1995) can be converted through four types of conversion process, namely: Socialization, Externalization, combination and Internalization. The fourth type of conversion process is called SECI Process (S: Socialization, Externalization, E: C: Combination, and I: Internalization) as depicted on the picture figure 1 Four models of conversion of knowledge, namely: [4]

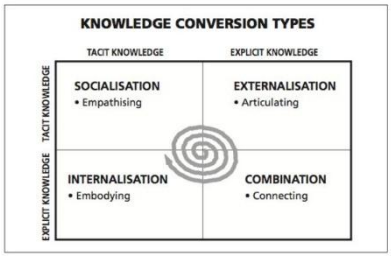


Figure 1 conversion of Knowledge

The following is an explanation of each of the stages of conversion of knowledge contained in Figure 1 :

1. *Sharing Tacit Knowledge (Socialisation)*
   Socialisation is the process of converting tacit knowledge so that the knowledge can be distributed to many people. The knowledge that is shared may include experience or learning while working. This tacit knowledge can be a way of thinking, culture, norms, and view against it.

2. Converting Converting tacit knowledge into explicit knowledge (Externalisation)
   For an organization of knowledge must be in the externalization of so it can be used by others. It means that to do modelling of knowledge becomes explicit form.
3. Systematic combining of explicit (Combination)
   It is the combination of explicit knowledge conversion processes into a set of explicit knowledge. An example is the merger of ways that are not standards, designation and the preparation of knowledge may be created of explicit knowledge. This combination is the key to communication and systematization of knowledge.
4. *Internalising new knowledge as tacit knowledge by the organisation (internalisation)*
   The internalisation of the new knowledge is the process by which tacit knowledge converted into explicit knowledge through the organization. The conditions that must be met before is that the individual should be involved in the formation of new knowledge

1.3. *Text Mining*

Text Mining is the process of retrieving data from a source text in this document is the source. With text mining can be searched keyword yan kat-can represents the content of a document and then analyzed and matching between documents with keyword database that has been created to determine or select a category to a document. Text mining can be thought of as a two-stage process that begins with the application of the structure against the data source and text information extraction is continued with the relevant knowledge of the data structure of the text, using this technique and text mining tools such as automatic document categorization, summarize, pengugusan text. The purpose of text mining is to get useful information from a set of documents. The data source that is used on text mining is a set of text that has a format that is not structure or at least semi structure.

1.4 *Information Retrieval*

Information Retrieval (IR) is how to find a document from unstructured documents that provide the information needed from a huge collection of documents stored in the computers [5]. The purpose of the IR system is to meet the information needs of users with me ¬-retrieve all documents that might be relevant, at the same time as me-retrieve as little as possible the documents irrelevant. A good IR system allows users to determine quickly and accurately whether the contents of the received documents meet his needs, the research method using TF-IDF

1.5 *Term Frequency – Inversed Document Frequency* (TF-IDF)

TF/IDF (Term Frequency – Inversed Document Frequency) is used to calculate the weighting (W) each document to keywords with the formula:

$$W_{dt} = tf_{dt} * IDF_t$$

Where:
D = d-to document
T = t-from Word to key word
W = weight of the document to the word against the d-to-t
Tf = bantaknya Word searched for on a document
IDF = inversed Document Frequency
IDF = log (D/df)
D = total documents
df = the number of documents that contain the word you're looking for

After weighting (W) each document is known, then the sorting process is performed where the larger the value of W, the greater the level of similarity the document to keywords, so instead [6].

1.6 *Stemming*

Stemming Stemming is the process of the formation of basic words from the words that have been getting a modification in their use. The use of the word in the sentence is structured among them have affix which consists of a prefix, suffix or inserts. Stemming is part of reprocessing, i.e. the last phase after tokenization and stoplist removal. The process of stemming is different in each language because in the formation of words have the difference in each language. There are several algorithms that can be used in the process of stemming algorithms, Nazief-adriani and Porter Algorithm. According to Ledy Agusta, the English text of document stemming algorithm porter takes less time compared with algorithms, but nazief – adriani process stemming English text documents using the algorithm accuracy percentage have porter (precision) smaller than the stemming algorithm nazief-adriani [9]. Here's an explanation of the algorithm Nazief-adriani Algoritma Nazief Adriani

Nazief algorithm and stemming algorithms or adriani Nazief and Adriani developed based on the Indonesian Language morphology rules assign the prefix be a prefix (prefix), interpolation (infix), suffixes (suffix) and a combined prefix suffix (confixes). This algorithm uses a dictionary word and support the recording, which is reshaping the words that undergo the process of stemming overproduction. The rules of the morphology of Indonesian Language suffixes grouped into several categories as follows:

1. Inflection suffixes i.e. groups who do not change the suffix to the basic Word form.For example, the word "duduk" given the suffix "-lah" will be the "duduklah". This group can be divided into two :
   a. Particle (P) or particles, namely the stated purpose in it "-lah", "kah", "tah" dan "pun"
   b. Possessive pronoun (PP)
   or pronouns belong to, termaksud venue "-ku","-mu", dan "-nya".
2. Derivation suffixes (DS) i.e., a collection of original indonesian suffixes that are directlyadded to the basic word suffix i.e. "-i","-kan", dan "-an".
3. Derivation with prefixes which (DP) i.e. the set of prefixes that can be directly given on the basis of pure words, or on the basis of the words already get the addition of up to two prefixes, including are :
   i. prefix can morphology ("me-", "be-","pe-" dan "te").
   ii. The prefix that does not morphology ("di-","ke-", dan "se-").
   Based on the classification of the suffixes-affixes in the top, then the form of words in the Indonesian Language suffixes ber can be modelled in Figure 2 as follows:

[DP + [DP + [DP +]]] Kata Dasar [[+ DS] [+PP]

Figure 2 Model said in the Indonesian Language suffixes

Keterangan :
DP : *Derivation prefixes*
DS : *Derivation Suffixes*
PP : *Possessive pronoun*

Indonesian Language model with the above and the basic rules of Indonesian Language morphology, rules that are used in the process of the algorithm Nazief &Adriani as follows :

1. Not all combinations of prefixes and suffixes are allowed. Combination-a combination of the prefix is not allowed, i.e. "be-i", "ke-i", "ke-kan", "me-an", "se-i", "se-kan" dan "te-an".
2. Use the same prefix repeatedly is not allowed.
3. If a Word consists of only one or two letters, then the process is not done.
4. The addition of a specific prefix can change the form of the original Word, or prefixthat has been previously granted on the basis of the words in question. For example,the prefix "me-" can be turned into "meng-", "men-", "meny-", and "mem-". Therefore required an order that is able to address the problem of morphology.

Algorithm Nazief and Adriani has following stages: [10].

1. Find the word in the dictionary if it is found then it is assumed that the word is the Word Basic. The algorithm stops. If not found then do step 2
2. Remove the Inflectional Suffixes when there is. Starting from inflectional particle ("-lah", "-kan", "-tah" and "-pun"), Then possessive pronoun ("-ku", "-mu", dan "-nya"). Search a word in the dictionary if it found the algorithm stops, if the word is not foundin dictionaries do step 3.
3. Removed derivation suffixes ("-an", "-i" and "-kan"). If in the "-an" deleted and the akiran found"-k ", the suffix"-k "removed. Search a word in the dictionary if it found the algorithm stops, if the word is not foundthen do step 4.
4. In step 4 there are three iterations.
   1) Iteration stops if:
      a. The discovery a combination of prefix is not allowed based on the prefix

Table 1 prefix suffix combinations are not allowed

Prefix	suffix are not permitted
be-	-i
di-	-an
ke-	-i, -kan
me-	-an
se-	-i, -kan

      b. Prefix is detected at this time is equal to the prefix that was previously removed.
      c. Three prefixes have been omitted
   2) Identify and remove the prefix type. The prefix is composed of two types:
      a. Standard ("di-", "ke-", "se-") that can be directly removed from the word.
      b. Complex ("me-", "be-", "pe-", "te-") is the prefix types that can be mofologicorresponding basic words t hat follow
   3)Search a Word has been omitted awalannya. If not found, then the step 4 is repeatedagain. When found, the algorithm stops.
5. If after step 4 basic Word has not yet been found, the process of recording was done with reference to the rules. Recording is done by adding characters recordingthe

beginning of words to be deleted. The character of the recording is the small letter after a hyphen ('-') and sometimes it is preceding the parenthesis. For example, the word nangkap was
beheaded after being caught. Because it is not valid, then therecording is done and generate Word catch..

6. If all measures fail, then input the words tested on this algorithm is considered as thebasic Word.

2. CONTENT OF RESEARCH

2.1 Infrastructure Design

The design of infrsastruktur KM done development architecture design combinesinfrastructure and with the results of the analysis of the infrastructure. The infrastructure used is the network infrastructure that is in the SMP Al Falah in support of knowledge management system and knowledge management system willmake use of the website. The design of the infrastructure with integrated knowledge management system that will be used as in Figure 3

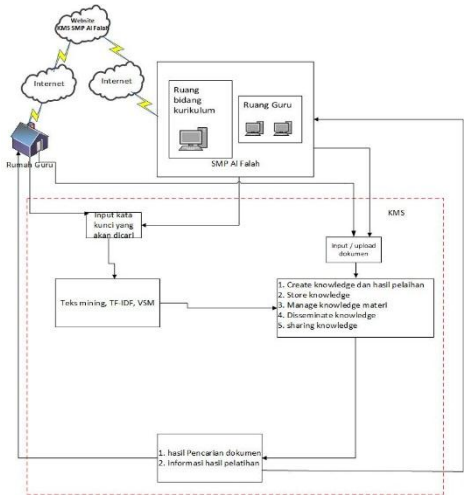


Figure 3 Infrastructure Design KM

2.1 Audit and analysis of Knowledge

Based on the needs of the knowledge that has been gained in the analysis of thedesign and analysis
of infrastructure requiring adjustment km kms with features that will be created in the knowledge management system. the proposed analysis that's been done before. Proposal or analysis of its features in explained in table 2:

Table 2 proposed Feature in knowledge management system

Features	Description
Material	Part of the knowledge management system that enabled it to store, organize and search for materials matapelajaran in junior high so that it is stored properly, do notspread and is not lost. Material such as subject material is stored properly in order to be used again as a basis for teaching in the classroom. Here teachers can add materialand to download the materials..
Training	Part of the knowledge management system that is an encyclopedia of knowledgerelated to the results of the training that was done by the teacher. Here the user can access the training any time and adding training into the knowledge managementsystem to be accessed by other users.
Forum	Bagian Part of the knowledge management system designed as a media share knowledge andcommunicate with each other online for all teachers in SMP Al Falah with different topics. Here user can reate new topics or threads, see threads,commenting in a thread and give a rating or like towards existing comments.
Search	Part of the knowledge management system is a search using information retrieval so
that teachers can search the material sought based on the content of the material.

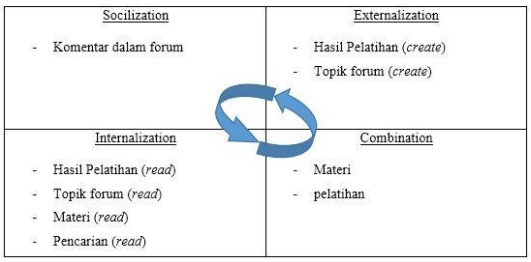


Figure 4. SECI in Knowledge Management System SMP Al Falah Dago

Audit and analysis stage of knowledge is carried out to analyze the document management knowledge based on queries that sought by the user and to measurethe level of similaritas between the existing documents in SMP Al Falah. Implementation of Knowledge management system audits and analysis of this knowledge, the teacher menginputkan the document or the material results in the form oftraining. doc, examples of material that uploaded material, i.e. three

Document 1 (D1)
The title of the : toleransi.doc
The content of the document : Hak wewenang yang dilakukan memiliki tenggang rasa antar manusia baik di Rumah maupun di Lingkungan Rumah

Document 2 (D)
The title of the: memaknai HAM.doc

The content of the document : Letak dasar Hak Asasi Manusia tidak hanya dimilik oleh orang barat, akan tetapi harus dimiliki oleh warga Indonesia dengan memahami Hak Asasi Manusia.

Document 3 (D3)
The content of the document: keluarga sejahtera.doc
The content of the document : Hak wajib melindungi keluarga baik dari lingkungan rumah maupun lingkungan luar, sehingga menjadi Keluarga Sejahtera.

The above document if the document will be looking upon this query using textmining and information retrieval. Te xt mining can be searched for key words that can represent the content of a document and then analyzed and matching betweendocument with the query and keyword. Keyword that is used in the document, extractprocess for measuring results the level of similaritas documents with keywords thatget the results then used text mining method used in the process which the TF-IDF(Tram Frequency-inversed Document Frequency) of Information Retrieval. To make the search stage or stages of the document there are two namely preprocessing andanalyzing

2.2 Preprocessing

Tahap Preprocessing stage is a stage where do the selection of data to be processed in eachdocument. Each sentence will be broken down into small parts of structures that would later have a narrow meaning. There are several things that need to be done in stages:preprocessing

1. *Case Folding*

Case folding change all the letters of the document be lowercase.
Examples of application of case folding on the case on the material on the subjects ofcivic education can be seen in table 3

Case Folding		
toleransi.doc	memaknai HAM.doc	keluarga sejahtera.doc
Hak wewenang yang dilakukan memiliki tenggang rasa antar manusia baik di Rumah, maupun di Lingkungan Rumah.	Letak dasar Hak Asasi Manusia tidak hanya dimilik oleh orang barat, akan tetapi harus dimiliki oleh warga Indonesia dengan memahami Hak Asasi Manusia.	Hak wajib melindungi keluarga baik dari lingkungan rumah maupun lingkungan luar, sehingga menjadi Keluarga Sejahtera.

From the results of case folding can be seen the results of case folding has changed the all capital letters into small letters.

2. *Tokenizing*

Tokenizing phase or also called parsing, i.e. the input string truncation phase based onevery word the devised. Because in the previous phase of all sentences are alreadyconverted to lowercase, so this step will eliminate all tetentu characters such aspunctuation marks and numbers. can be seen in table 4

Table 4. Results Of Tokenizing

Tokenizing			
Toleransi.doc	Memaknai HAM.doc		Keluarga sejahtera.doc
Hak	Letak	warga	Hak
Wewenang	dasar	indonesia	Wajib
Yang	hak	dengan	melindungi
Dilakukan	asasi	memahami	keluarga
memiliki	manusia	Hak	baik
tenggang	tidak	asasi	Lingkungan
rasa	hanya	manusia	rumah
antar	dimiliki		maupun
manusia	oleh		lingkungan
baik	orang		sehingga
di	Barat		menjadi
rumah	Akan		keluarga
maupun	tetapi		sejahtera
di	harus		
lingkungan	dimiliki		
rumah.	Oleh		

Visible results of tokenizing has removed all punctuation characters and numbers.

3. *Filtering*

This stage is to take the words of important or related to a case of problems from the results of tokenizing. This stage can be called stage stopword removal due toeliminate unimportant words in a text. If the word tokenizing process of anyonestopword lis t is found at, then the Word will be omitted or deemed as not important, can be seen the results of the process of filtering in the table 5.

Filtering		
Toleransi.doc	Memaknai HAM.doc	Keluarga sejahtera.doc
hak	Letak	Hak
wewenang	dasar	Wajib
dilakukan	hak	melindungi
memiliki	asasi	keluarga
tenggang	manusia	baik
rasa	Dimiliki	lingkungan
antar	orang	rumah
manusia	Barat	lingkungan

baik	Dimiliki	keluarga
rumah	warga	sejahtera
lingkungan	indonesia	
rumah.	memahami	
	Hak	
	asasi	
	Manusia	

4. Stemming

This stage is used to search for a word or remove the prefix, it uses the Dictionary listStemming Word berimbuhan wh ich has basic Word by way of comparing the words that have been through the stages of tokenizing. The process of stemming shallNazief using algorithms and Adriani as already described earlier regarding the stagesof the process. the following stages of the process of stemming:

Stemming					
Toleransi.doc		Memaknai HAM.doc		Keluarga sejahtera.doc	
	Hasil *stemming*		Hasil *stemming*		Hasil *stemming*
hak	hak	Letak	letak	hak	Hak
wewenang	wewenang	dasar	dasar	wajib	Wajib
dilakukan	lakukan	hak	hak	melindungi	Lindungi
memiliki	milik	asasi	asasi	keluarga	Keluarga
tenggang	tenggang	manusia	manusia	baik	Baik
rasa	rasa	dimiliki	milik	lingkungan	Lingkungan
antar	antar	orang	orang	rumah	Rumah
manusia	manusia	Barat	barat	lingkungan	Lingkungan
baik	baik	dimiliki	milik	keluarga	Keluarga
rumah	rumah	warga	warga	sejahtera	Sejahtera
lingkungan	lingkungan	indonesia	indonesia		
rumah.	rumah	memahami	pahami		
		hak	Hak		
		asasi	asasi		
		manusia	manusia		

After going through the stage of stemming can be seen with the affix Word will be converted to the basic algorithm, when the said nazief and adriani.

2.3 Analyzing

Stages of analyzing or weighting (weighting) are to determinethe tingakat similaritasbetween documents . Stages will be sought in the weighting of each document againstthe keywords entered by the user. Stage to determine the level of similaritas betweendocuments using TF-IDF

1. Metode TF-IDF

Method of tf-idf weighting relationship search is a word (term) against the document.Weighting search words will retrieve the documents stemming from the. the followingis an example document that has been done on the previous stage, namely the stage of stemming:

Document 1 (D1)
The title of the : toleransi.doc
Isi dokumen : hak wenang lakukan milik hormati manusia

Document 2 (D2)
The title of the : memaknai HAM di indonesia.doc
Isi dokumen : letak dasar hak asasi manusia dunia hak asasi indonesia

Document 3 (D2)
The title of the : keluarga sejahtera.doc
Isi dokumen : hak wajib lindung keluarga sejahtera

The word you're looking for : “hak asasi Manusia”

Examples of keywords that will be searched is: “ hak asasi manusia ”, It will be done the counting stage or searching for a word weighting towards the document using tf-idf, tf-idf calculation results can be seen in table 7

	Td					Idf	W			
Term	Q	D1	D2	D3	Df	Log (n/df)	Q	D1	D2	D3
Hak	1		2		2	0.176	0.176	0	0.352	0
wenang		1			1	0.477	0	0	0	0
lakukan		1			1	0.477	0	0	0	0
Milik		1			1	0.477	0	0	0	0
hormati		1			1	0.477	0	0	0	0
manusia	1	1	1		2	0.176	0.176	0.176	0.176	0
Letak			1		1	0.477	0	0	0.477	0
Dasar			1		1	0.477	0	0	0.477	0
Asasi	1		2		2	0.176	0.176	0	0.352	0
Dunia			1		1	0.477	0	0	0.176	0
indonesia			1		1	0.477	0	0	0.176	0
Wajib				1	1	0.477	0	0	0	0.477
Lindung				1	1	0.477	0	0	0	0.477
keluarga				1	1	0.477	0	0	0	0.477
sejahtera				1	1	0.477	0	0	0	0.477
Total							0.528	0.176	2.126	1.908

Weight (W) to D1 = 0 + 0.176 + 0 = 0.176
Weight (W) to D2 = 0.352 + 0.176 + 0.352 = 0.88
Weight (W) to D3 = 0 + 0 + 0 = 0

The results of the above calculation, rank the level of similarity of document with the query " hak asasi manusia ", which is as follows:

Table 8 calculation result tfidf

D1	D2	D3
0.176	0.88	0
Rank 2	Rank 1	Rank 3

From table 8. the results of calculations can be seen tfidf document 2 (D2), is the document that match the keywords that are searched on "human rights". The results of the above calculation are used at the time of the teacher finding documents in knowledge management systems, search this document based on the contents of the document, so that the documents sought by the teachers will comply with the keywords have been inputed. These search results will be shown in the knowledge management system on the search based on the results of the calculation.

5. CONCLUSION

After doing the analysis, design, and testing. Then the conclusion can be obtained as follows:

1. Knowledge Management System can help teachers who do not attend training in order to find out the results of the training.
2. Knowledge Management System can help the teacher the same subjects for sharingmaterials.
3. Knowledge Management System can help teachers picket to know the material to be delivered in the classroom

6. BIBLIOGRAPHY

[1] Mardhotillah. Shinta, 2011, "Analisis dan Perancangan Knowledge Management System Berbasis Web dan Wap," *Jurnal Informatika*, vol. I.

[2] Tiwan. Amrit, 1999, The Knowledge Management Toolkit, USA: Prentice Hall PTR.

[3] Saragih. Hoga, Darmanto. Tony, Reza, Boby and Setiyadi. Setiyadi, 2012, "Sistem Informasi Knowledge management pada Perguruan Tinggi STMIK Widya Dharma Pontianak," *Jurnal Teknik dan Ilmu Komputer*, pp. 423-437.

[4] Tobing. Paul. L, 2007, Knowledge management, Yogyakarta: Graha Ilmu.

[5] Pardede. Jasman, Barmawi. Mira. Musrini, and Pramono. Wildan. Denny, 2013, "implementasi metode generalized Vector space model pada aplikasi information retrieval," *Jurnal informatika*, vol. IV, pp.57-68.

[6] Hermansyah. Adhit, "Aplikasi pengkategorian dokumen dan pengukuran tingkat similaritas dokumen menguunakan kata kunci pada dokumen penulisan ilmiah Universitas Gunadarma," *Jurnal Sistem* Informasi,

[7] Amin. Fathul, 2012, "Sistem Temu Kembali Informasi dengan Metode Vector Space Model," *Jurnal Sistem Informasi* , vol. II, pp. 78-83.

[8] Pardede. Jasman, 2014, "Implementasi Multithreading Untuk Meningkatkan Kinerja Information Retrieval dengan Metode GVSM," *Jurnal Sistem Komputer*, vol. 4, pp. 1-6

[9] Agusta. Ledy, 2009, "Perbandingan Algoritma Stemming Porter dengan Algoritma Nazief & Adriani untuk stemming Dokumen Teks Bahasa Indonesia," *Jurnal Informatika*, pp. 196-201.

[10] Firdaus. Azhar, Ernawati dan Vatresia. Arie, 2014, "Aplikasi Penteksi Kemiripan pada Dokumen teks menggunakan Algoritma Nazief & Adriani dan Metode Cosine Similarity," *Jurnal Teknologi Informasi*, Vol. X, pp. 96-109. [Online] Tersedia: http://research.pps.dinus.ac.id/lib/jurnal/Vol%2010.1%20096-109.pdf [7 September 2015]

[11] Rangkuti, F. (2006), Analisi SWOT : Teknik membedah kasus bisnis, penerbit PT Gramedia Pustaka Utama: jakarta

[12] Sugiyono. 2011, *Metode Penelitian Kombinasi (Mixed Methods).* Bandung : Alfabeta