THE IMPLEMENTATION OF KNOWLEDGE MANAGEMENT SYSTEM IN PRODUCT SUPPORT DIVISION AT PT. UNITED TRACTORS,TBK REPRESENTATIVE OFFICE BANDUNG

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ABSTRACT

PT United Tractors Tbk, Representative Office Bandung is the largest heavy equipment distributor. In addition to the sale of heavy equipment unit, PT United Tractors focus on Genuine Parts Sales and providing an educated and trained mechanics. The company have a special Division to handle service of heavy equipment and spareparts, known as Product Support Division. Problems that is often faced by the employees in this division is when they transfer their job to the other position. The transisition should be fast and the employees who had been transferred must completely working on different task. But until now, new employees often still working on their previous position, this happens because previous employees do not record the history of his work in the company so that the new employees have to learn the documents from the beginning. The management of knowledge modules are not stored properly and it is still owned by each employee and not yet belong to the company, so that when the employee need some modules, it will take a long time to locate and obtain documents from other employees. Employees are also facing difficulties in knowing knowledge and experience of other workers, because inadequate of media to facilitate the employee in terms of exchanging experiences.

Knowledge Management System of PT. United Tractors,Tbk Representative Office Bandung is the right solution to answer that problem. The advantages of this information system is a website which can be accessed online and can provide knowledge information directly to the employee of PT.United Tractors Tbk Representative Office Bandung.

According to the testing system result, the Knowledge Management System of PT. United Tractors,Tbk Representative Office Bandung has been able to help employees of product support division in gaining knowledge when the job transferring occurs, help employees to manage the knowledge such as create, renew, and share work document, knowledge modul and knowing the experiences of other employees as the best solution to solve problems.

Keywords : Knowledge Management System, Knowledge, product support division, knowledge module, knowledge document.

1. INTRODUCTION

PT United Tractors Tbk, Bandung representative is the largest heavy equipment distributor and leading in Indonesia, providing products from famous brands such asKomatsu, UD Trucks, Scania, Bomag, Tadano, and Komatsu Forest. In addition to the sale of heavy equipment unit, PT United Tractors focus on Genuine Parts Sales and providing an educated and trained mechanics.Perusahaan The company have a special Division to handle service of heavy equipment and spareparts, known as Product Support Division the number of employees of twelve people. The given Product Support Servicesinclude providing Parts, Service, and Solution.

Based on the results of the interview with Wahyu Khoeruttamam. Amd. as an employee of PT United Tractors Tbk Division Product support as After Sales Consultant, noted that to support the maximum Product Support program the company requires an educated human resources, skilled and expert. One of the methods used by the company is currently doing a rotation policy employees periodically with the hope that each employee have work experience in a variety of different branches. While the company conducts a policy of rotation of employees, handover work done quickly and employees who had already been demoted must have completely new task, but until now it is often the presence of overlapping jobs because new employees still work on the branch length, this occurs because the old employees do not retain his job in the document history company so resulted new employees must learn and understand document work from the beginning. The process of learning from the beginning will certainly seize a long time.

Based on the results of the interview with Mr. Karno as employees of PT United Tractors Tbk Division Product support as Supervisor, said that to

support the enhancement of the knowledge and skills of human resources, Product Support Division has the knowledge modules PT United Tractors Center consisting of module service and spareparts, service modules and spareparts very useful in assisting the work of each employee in the division's product support but there are some issues that are often encountered employee of the Division of product support that is the management of knowledge modules are not stored properly and it is still owned by each employee and not yet belong to the company, so that when the employee need some modules, it will take a long time to locate and obtain documents from other employees. Employees are also facing difficulties in knowing knowledge and experience of other workers, because inadequate of media to facilitate the employee in terms of exchanging experiences.

Based on problems that have been presented then it can be inferred that knowledge is an important asset to the product support Division of PT United Tractors Tbk, Bandung representative. The development of a company is not separated from knowledge that is owned by its employees. Therefore needed a knowledge management information system that can make it easy for employees to do the spread of knowledge and make it easy for employees in searching a document knowledge based on the content of document knowledge rapidly, appropriate and relevant, namely the use of text mining, while the similaritas level for the measurement of the content of the document with keywords (keywords) that sought to use the algorithm TF/IDF (Term Frequency-Inversed Document Frequency).

2. RESEARCH CONTENT

2.1 Understanding Knowledge Management

The following are some understanding of knowledge management:

1. KM is an integrated process and mechanism in the storage, maintenance, organizing business information and jobs related to the creation of various intellectual asset information into an organization that is settled or permanent [1].
2. KM is a systematic approach to the request process to capture, structure, organize and disseminate knowledge throughout the organization with the objective of working more quickly, reuse best practice and lowering the cost of workmanship back between project to project [2].
3. KM is the way organizations manage their employees, identifying knowledge, save and share it to the team, improve the quality and value of the knowledge to knowledge-based innovation enghasilkan [3]. And what is meant by the description is data and information.
4. KMS is a tool that is intended to support and manage all knowledge within an organization as intellectual assets companies [2]

2.2 Knowledge Conversion

The Organization cannot create knowledge myself, having to deploy a tacit knowledge and accumulate ranging from the level of the individual. The deployment of the tacit knowledge is strengthened by the name knowledge spiral, where this is an interaction between the tacit knowledge with explicit knowledge [4]. The conversion process knowledge companies occurs due to the interaction between the tacit knowledge with explicit knowledge, through a process of socialization, externalization, combination, and internalization of the value on an ongoing basis, and this process is called knowledge spiral or knowledge conversion using the technology on the company [5].

1. Socialization is the conversion of tacit knowledge into tacit knowledge through face-to-face meetings (meetings, discussions, and monthly meetings). Through this face-to-face meetings, HR can share knowledge and experiences which have so that new knowledge is created.
2. Externalization is the process of articulating tacit knowledge will be a clear concept. Support for the process of externalization, be provided with the document the minutes of the meeting (the explicit form of knowledge that is created when holding a meeting) into electronic form for can then be published to interested employees.
3. The combination is to combine a variety of explicit knowledge is different for compiled into the KM system. Media for this process can be via the intranet, databases and the internet to obtain external resources. Enterprise portal features such as a knowledge organization system which has a function for this information, searches, and so forth are extremely helpful in this process.
4. Internalization is the conversion of tacit knowledge into explicit knowledge of all data, information and knowledge that is already documented can do the sharing. It can cause an increase in the knowledge of human resources. Sources of explicit knowledge can be obtained through the media intranet (database company), circular letter or decree, bulletin boards and the internet as well as the mass media as an external source can support this process. In addition the education or training can change a variety of explicit knowledge into tacit knowledge on employees. The following is a flow of knowledge conversion according to SECI can be seen in Figure 1.

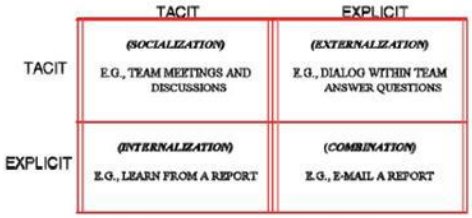


Figure 1 Knowledge conversion [6]

2.3 Knowledge Taxonomy

Knowledge taxonomy is the building of a knowledge and expertise. Taxonomy is the system of basic applications that are useful for exposing the concepts in the form of a Hierarchical Model. The higher pair has a concept, then the more common and can be outlined. Vice versa, the lower a concept, then the more specific name of a subclass. According to the essential Concepts, Dalkir outlines underlined taxonomy is the notion of the derivative. Each node is a sub group of the class it, it means that the higher the knot will be on the move from parent to child classes [6].

Research on knowledge taxonomy in product support Division of PT United Tractors Tbk, Bandung representation can be seen in Figure 2.

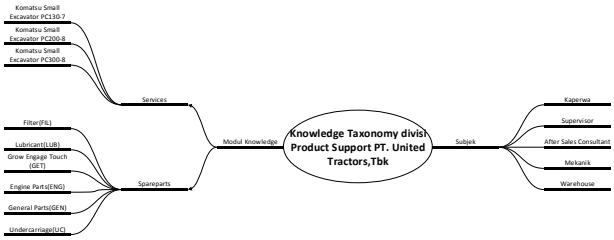


Figure 2 *Knowledge Taxonomy* PT. United Tractors,Tbk Representative Office Bandung

2.4 10 KM ROADMAP

Knowledge Management is a complex activity and such other things as well that are not going to give a positive impact if not well planned. This section will discuss the 10 steps of knowledge management roadmap that will guide the development, implementation of the knowledge management system. This roadmap is presented in Figure 3, see Phase 4 of the 10 steps, i.e. [8]:

1. Evaluation infrastructure
2. Analysis, design and development of KMS
3. Dissemination Systems
4. Evaluation

Development of the model of knowledge management system using 10 steps KM roadmap with restrictions on the use of phase that is just phase 1 to phase 2, stage 1 to stage 7.

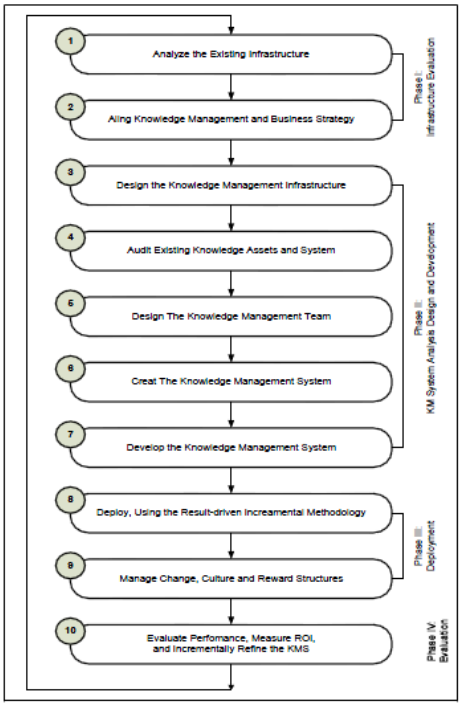


Figure 3 The 10-Step KM Roadmap [8]

2.5 Text Mining

Text mining is used to process the paperwork prior to the process of similarity. The process of text mining is divided into into three processes, i.e. text preprocessing, transforming text and pattern discovery [7]. The first thing that is done in text mining is text preprocessing. In this preprocessing text actions performed against documents, i.e. removing certain characters contained in documents, such as dots, commas, quotation marks, etc as well as change all capital letters into small letters. In addition, in the stage text preprocessing is done tokenization. Tokenization is the process of processing the token contained in the text [8]. So, the document has undergone removal of certain characters and the conversion of all capital letters into small letters will be broken down into a term.

The next step is transforming text. In the process of transforming this text do stopwordsremoval and stemming. Stopword is a word that often appear in the document but has no meaning which means [7]. Examples include stopword: some, any, no, yesterday, I, and, in, with, to. Stemming is the process of eliminating the prefix and suffix of the word to get basic word [8]. In this study the algorithm that will be used in the process of stemming algorithm is Nazief & Adriani. The next stage is pattern discovery. At this stage of pattern discovery is done measurement of similarity between documents. The stages are done in this process is to calculate the weight of a term. In this research, conducted using the term weighting algorithm TF-IDF.

2.6 Term Frequency – Inverse Document Frequency (TF/IDF)

TF-IDF is a way to give the weight of the relationship of a word or term against a document [9]. This algorithm combines two concepts for calculation of weighting, i.e. the frequency of occurrences of a word in a particular document or TF and inverse document frequency containing those words or the IDF [10]. Based on that explanation, the search to find the relevant documents, the method palgoritma TF/IDF gives more weight to the term more important. the more important term in question is the term if it appears on a document then the document may be considered relevant to the query. This method will calculate the weight of each document with the formula:

$$W_{dt} = tf_{dt} * IDF_t \quad (1)$$

Where :
d: documents to-d
t: the word to-t from keywords
W: weight of the document to the word against the d-to-t
tf: the number of words that are searched on a document
IDF: Inversed Document Frequency
IDF values obtained from
IDF: log2 (D/df) where
D: Total documents
DF: many of the 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 similaritas the document to keywords, and vice versa.

2.7 Penyelarasan Strategi Dengan KMS

The alignment of the existing strategies in PT United Tractors Tbk, Bandung Representation can be seen in table 1.

Table 1 The Result Of The Alignment Strategy With KMS

Strategi	*knowledge management system*
1. Menerapkan manajamen pengetahuan 2. Menyediakan sarana dan wadah sharing pengetahuan 3. Menjaga dan meningkatkan pengetahuan sumber daya manusia 4. Menjaga dan meningkatkan pengetahuan karyawan	1. Membuat sebuah wadah atau dengan menerapkan sistem informasi yang mendokumentasikan pengetahuan seperti modul *knowledge service* dan *spareparts*,data pelatihan *(skill)* , dokumen *pending job* , serta pembuatan dokumen pengetahuan yang berkaitan dengan modul *service* dan *spareparts* sehingga memudahkan akses pengetahuan tersebut. 2. Menerapkan Manajemen pengetahuan untuk meningkatkan kualitas sumber daya manusia yang ada di divisi product support PT. United Tractors,Tbk perwakilan Bandung yaitu dengan menerapkan fitur forum , fitur penyimpanan dokumen *pending job* serta pencaran dokumen dengan cepat, tepat dan relevan yang mewakili isi dari suatu dokumen berdasarkan kata kunci *(keywords)* yang dicari.

2.8 Analysis Of *Knowledge Taxonomy*

The procedure was performed to analyze the existing knowledge on the product support Division of PT United Tractors Tbk, Bandung representation by mapping the knowledge into knowledge taxonomy, so that knowledge can be known about anything contained on the product support Division. Knowledge taxonomy can be seen in Figure 4

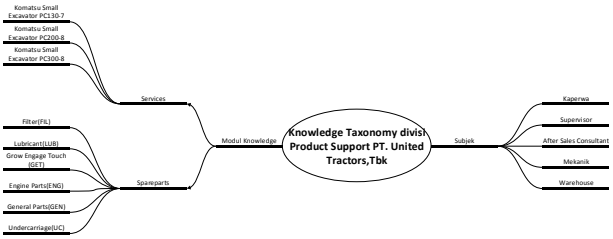


Figure 4 *Knowledge Taxonomy* PT. United Tractors,Tbk perwakilan Bandung

2.9 Analysis Of The Adjustment KM with SECI Model

Adjustment of knowledge conversion model with SECI taxonomy be used i.e., socialization, externalization, combination, internalization. Here is a conversion model of the SECI on Knowledge Management System of PT United Tractors Tbk, Bandung representation can be seen in Figure 5.

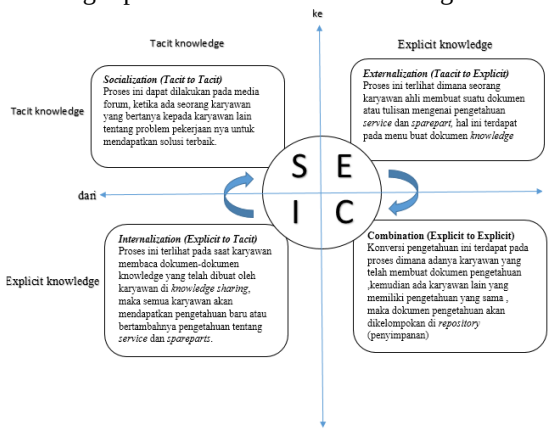


Figure 5 Knowledge Conversion SECI PT. United Tractors,Tbk

Advanced stage is adjustment features knowledge; system into four models of SECI, namely socialtization, eksternalization, combination and internalization. In Figure 5 is described in socialization is converting tacit knowledge into tacit knowledge that is the use of discussion forums. Then on externalization is converting tacit knowledge into explicit knowledge, the process is visible when employees create a document expert knowledge service and taking. Then in cell Combination is converting explicit knowledge into explicit knowledge, the process is visible when the presence of an employee who has made the documents, then there are other employees who have knowledge of the same, then the documents will be collected and stored

in the repository. The last stage is the explicit knowledge internalization that is converting to tacit knowledge, the process is visible when employees read the documents of the knowledge that has been made employee of the Division of product support on knowledge sharing, so that all employees will gain new knowledge.

2.10 Analysis Of *Text Mining dan Algorithm TF/IDF*

The system to be built is a knowledge management system which is accessed via the web that in its text mining methods implemented in the document Knowledge Services and taking care to optimize the search. His goal is to similaritas the contents of the documents of the Knowledge Services and taking care to keywords entered. The stages in the manufacture of similaritas the ranking of this document there are two namely preprocessing, and analyzing. Preprocessing stage is a stage where do the selection of data to be processed in each document. 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 performed on the stage of the preprocessing that is case folding, tokenizing, filtering and stemming. Analyzing phase is the phase of determining how far the relationship between words antaara doumen. In this stage sought the weighting of each document to keywords by using the method of TF/IDF.

2.10.1 Case Folding

In this stage the incoming document will be changed to lowercase letters only the letters ' a ' to ' z ' are just accepted. Characters other than letters, numbers or both sympbol-another symbol will be removed and considered as a delimeter.

Table 2 The Results Of The Process Case Folding

Dokumen *Service* Pertama (D1)

didalam *service* program terdapat program analisa pelumas program pemeriksaan mesin program pemeriksaan *undercarriage hose* dan *wiring* dan *backlog management*

Dokumen *Service* Kedua (D2)

backlog management terdiri dari terminologi *backlog backlog* strategi *backlog organization* dan *backlog* monitoring

Dokumen *Service* Ketiga (D3)

maintenance adalah suatu kegiatan perawatan alat berat yang dilaksanakan secara teratur

2.10.2 *Tokenizing*

Tokenizing phase is also referred to as parsed, i.e. cutting the cutting stage input string based on every word constituting. Because in the previous phase of all characters and symbol has been eliminated except the letter ' a ' until ' z ' then this parsing phase delimiter used sebai cutting is a space. Results of tokenizing process can be seen in table 3

Table 3 The Results Of The Process *Tokenizing*

Tokenization		
Service Program	*Backlog Management*	Definisi *Maintenance*
Di	backlog	maintenance
Dalam	management	adalah
Service	terdiri	suatu
Program	dari	kegiatan
Terdapat	terminologi	perawatan
Program	backlog	alat
Analisa	backlog	berat
Pelumas	strategi	yang
Program	backlog	dilaksanakan
pemeriksaan	organization	secara
Mesin	dan	teratur
Program	backlog	
pemeriksaan	monitoring	
undercarriage		
hose		
Dan		
wiring		
backlog		
management		

2.10.3 *Filtering*

Filtering stage is the stage of taking important words from the token. The algorithm used is the stoplist (discard the words is less important) or wordlist (save important words). Stoplst/stopword is a word that is not descriptive in its approach can be discarded bag of words. In the disposal of words that are not important are the result of parsing checked with the dictionary (collection) stopword. If there is the same parsing words with stopword then said will be removed/deleted.

Table 4 The Results Of The Process *Filtering*

Filtering (Removing Stopwords)					
Service Program		Backlog Management		Definisi Maintenance	
Kata	Frekuensi	Kata	Frekuensi	Kata	Frekuensi
pemeriksaan	2	Backlog	5	teratur	1
hose	1	organization	1	dilaksanakan	1
wiring	1	Monitoring	1	alat	1
backlog	1	Strategi	1	perawatan	1
management	1	terminologi	1	maintenance	1
undercarriage	1	management	1		
mesin	1				
analisa	1				
pelumas	1				
service	1				

2.10.4 *Stemming*

The process of stemming on the system to be built is used to find the Word Basic. On the process of stemming using algorithms Nazief & Adriani.

Table 5 The Results Of The Process *Stemming*

Stemming					
Service Program	Hasil Stemming	Backlog Management	Hasil Stemming	Definisi Maintenance	Hasil Stemming
Pemeriksaan	periksa	backlog	backlog	teratur	atur
Hose	hose	organization	organization	dilaksanakan	laksana
wiring	wiring	monitoring	monitoring	alat	Alat
Backlog	backlog	strategi	strategi	perawatan	rawat
management	management	terminologi	terminologi	maintenance	maintenance
undercarriage	undercarriage	management	management		
mesin	mesin				
analisa	analisa				
pelumas	pelumas				
service	service				

2.10.5 Calculation TF/IDF

The formula used to calculate the weighting (W) each document to keywords are:

$$W_{dt} = tf_{dt} * IDF_t \quad (1)$$

Table 6 The Results Of The Process TF/IDF

Token	Tf				df	D/df	IDF = log10 (D/df)	W			
	kk	D1	D2	D3				kk	D1	D2	D3
periksa	0	2	0	0	1	3	0.48	0	0.95	0	0
hose	0	1	0	0	1	3	0.48	0	0.48	0	0
wiring	0	1	0	0	1	3	0.48	0	0.48	0	0
backlog	1	1	5	0	2	1.5	0.18	0.18	0.18	0.88	0
management	1	1	1	0	2	1.5	0.18	0.18	0.18	0.18	0
undercarriage	0	1	0	0	1	3	0.48	0	0.48	0	0
mesin	0	1	0	0	1	3	0.48	0	0.48	0	0
analisa	0	1	0	0	1	3	0.48	0	0.48	0	0
pelumas	0	1	0	0	1	3	0.48	0	0.48	0	0
service	0	1	0	0	1	3	0.48	0	0.48	0	0
organization	0	0	1	0	1	3	0.48	0	0	0.48	0
monitoring	0	0	1	0	1	3	0.48	0	0	0.48	0
strategi	0	0	1	0	1	3	0.48	0	0	0.48	0
terminologi	0	0	1	0	1	3	0.48	0	0	0.48	0
atur	0	0	0	1	1	3	0.48	0	0	0	0.48
laksana	0	0	0	1	1	3	0.48	0	0	0	0.48
Alat	0	0	0	1	1	3	0.48	0	0	0	0.48
rawat	0	0	0	1	1	3	0.48	0	0	0	0.48
maintenance	0	0	0	1	1	3	0.48	0	0	0	0.48
Total								**0.36**	**4.67**	**2.98**	**2.39**

2.11 The Design Of Data

Following are the results of the design data on the knowledge management system that will be built on figure 6.

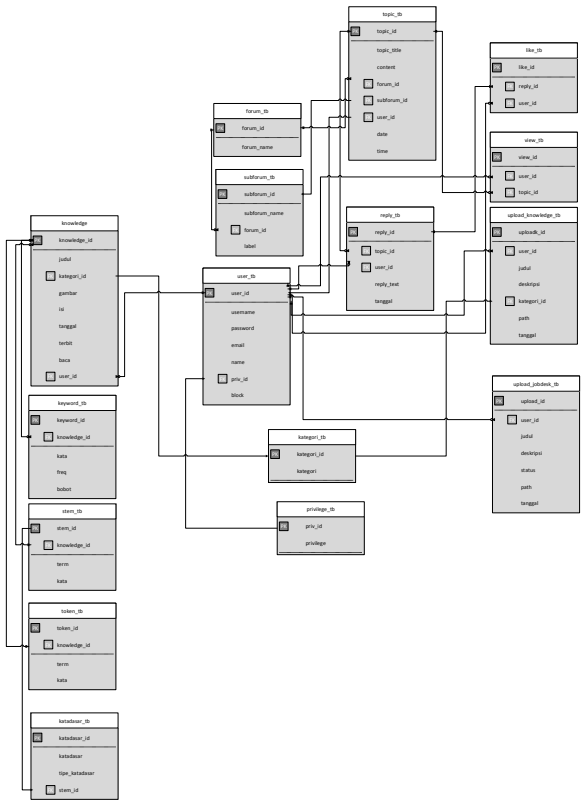


Figure 6 Knowledge Management System Tables Diagram Of PT United Tractors Tbk, Bandung Representative

2.12 Beta Testing

Based on beta testing, can be drawn the conclusion that functionally these systems can already produce the expected output that is able to assist employees in obtaining product support Division at knowledge in the event of the transfer of jobs of employees who will be rotated to the successor who will be replaced by the company to occupy the position in question. Product support Division assist employees in conducting knowledge management i.e. create, renew, as well as share documents module training and knowledge. Product support Division employees help in knowing the experience of other employees as the best solution in solving a problem.

3. CLOSING

3.1 Conclusion

Based on the results obtained in the manufacture of this final task, then a conclusion can be drawn as follows:

1 Knowledge Management System in product support Division of PT United Tractors Tbk, Bandung representatives can run in accordance with its purpose, i.e. a knowledge management system that can help employees Division product support in gaining knowledge in the event of the transfer of jobs of employees who will be rotated to the successor who will be replaced by the company to occupy the position in question.

2 Knowledge management system can help employees Division product support knowledge management in doing that is to create, renew, as well as share documents module training and module knowledge.

3 Knowledge management system can help employees Division product support in knowing the experience of other employees as the best solution in solving a problem.

3.2 Sugestion

In order for the system to be built can work better, do the following:

1 With the existence of a Knowledge Management System on product support Division of PT United Tractors Tbk, Bandung, then representative need knowledge and training routine for users to run it so that employees are motivated to contribute his knowledge so that it can be created a culture of knowledge sharing between employees.

2 Knowledge Management System in product support Division of PT United Tractors Tbk representative of Bandung which had been built to be used as guidelines for further system development.

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