

# Organizational Knowledge Representation Using Flowcharts with POS Tagger Techniques for Bahasa

Rizki Dwi CAHYANI<sup>1</sup>, Rahmat Izwan HEROZA<sup>2\*</sup>, Dwi Rosa INDAH<sup>3</sup>, Annisa  
SEPTIANI<sup>4</sup>, and Niffari Meirina BERNOVA<sup>5</sup>

<sup>1,2,3,4,5</sup>*Department of Information System, Universitas Sriwijaya, Indonesia*

*\*Corresponding author : rahmatheroza@unsri.ac.id*

## ABSTRACT

PT. Pupuk Sriwidjaja Palembang is one of the State-Owned Enterprises companies as a pioneer of national fertilizer producers in Indonesia. This company has done a lot of employee turnover, knowledge based on experience that contains information about how to use and maintain the machines while producing urea fertilizer was valuable. Not everyone has this knowledge, so knowledge management is needed to capture knowledge based on experience. Using the POS Tagger to process and classify each word from the knowledge and represent it with a flowchart. The final result of this research is a web-based application that can share and access knowledge easily.

**Keywords:** *knowledge, knowledge management, POS Tagger*

## INTRODUCTION

Knowledge is something humans use to understand the world, which can be changed based on the received information [1]. Experiential knowledge is an important asset for improving the quality of the company. Knowledge management is needed to manage tacit knowledge based on experience that only exists in the human brain [2]. Many things have been done by the company to improve employee performance by maintaining knowledge. One of them is knowledge capture as a process of eliciting tacit knowledge that may reside in people, artifacts, or organizational entities [3]

Knowledge capture is used in the company because someone else experience is useful for the company's progress. PT Pupuk Sriwidjaja Palembang, a fertilizer producer company that has been established for a long time and has valuable knowledge called knowledge based on experience. This knowledge contains information about how to use and maintain the machines while producing urea fertilizer. Knowledge management is needed to capture knowledge based on experience because not everyone has this knowledge. Using POS Tagger to process knowledge taken from the experts or senior employees, so the information of the knowledge can be easier to understand.

Based on the description above, to solve the knowledge based on experience problems, knowledge management will be built to capture and represent the knowledge with a flowchart using the POS Tagger technique. The knowledge that acquires from experts or senior employees expresses in the description text form and then change into a list of process form when the knowledge is being represented using a flowchart. Employees will understand knowledge easily and POS Tagger will show the object, criteria of the object, what to do with the object, etc.

## RELATED WORKS

### *Tacit Knowledge*

Tacit knowledge is a kind of knowledge residing in human brains and being difficult to tell, imitate and disseminate. Tacit knowledge is personal and based on individual experiences and activities. Experience is often regarded as the source of tacit knowledge or a part of tacit knowledge [2].

### *Knowledge Capture*

Knowledge Capture is a system designed to help stored and modeled, both tacit and explicit knowledge. Knowledge can be captured using a mechanism or technology so the captured knowledge can be shared and used by others [3].

### *Knowledge Representation*

Knowledge representation determines what kinds of relations modeled in the knowledge and how these relations connect the elements of the knowledge. Knowledge representation is important as it affects knowledge's expressiveness, readability, and machine operability [2].

### *Part of Speech (POS) Tagger*

Part of Speech also called the world-class tag or grammatical tag serves to assign parts of speech (such as nouns, verbs, adverbs, adjectives) to words in the text. To process and identify the results of knowledge acquires from the expert, POS Tagger will be used as the pre-

processing. POS Tagger is a process to classify the words in a sentence or text into certain tags. Table 1 shows the

tags used in classify words [4]:

Table 1. Types of Tags for Bahasa Annotations

POS Tag	Description	Example
VB	Verb	Close, Take
NN	General Nouns	Pump
NNP	Specific Nouns	Palembang, Indonesia
NEG	Negation	Not, No
FW	Foreign Word	<i>Discharge</i>

ideas in the implementation of knowledge management.

## RESEARCH METHOD

### Method of Collecting Data

- *Interview*

The author does the question and answers directly to the parties in the Urea Production Department, especially the experts about the IT used and how the process of knowledge management. Then the author also interviewing by asking how the previous knowledge capture process and what kind of knowledge will be shared by the experts and how often the knowledge management process will be carried out.

- *Observation*

The author seeks data and comes directly to the company to find out the current system and search for what will be needed in representing Knowledge using the POS Tagger technique at PT Pupuk Sriwidjaja Palembang later.

### System Development Method

The system development method used in this research is waterfall model. The stages do in a systematically or sequentially starting from Communication, Planning, Modeling, Construction, and Deployment. This research only does the stage of Communication, Planning, Modeling, and Construction. Fig. 1 is the stages of the waterfall model system by Pressman [5].

- *Communication (Project Initiation and Requirements Gathering)*

In this stage, communication will be done with interviewing and observing the Urea Production Department to knows the current knowledge management system so the author can analyze system requirements and users, and create strategic

- *Planning (Estimating, Scheduling and Tracking)*

The next stage is the planning stage that explains the proper planning of the concepts made before, making the application of knowledge management by determining the data needed such as, existing problems, functional and non-functional requirements, determining user, input and output and determining the process stages from system planning.

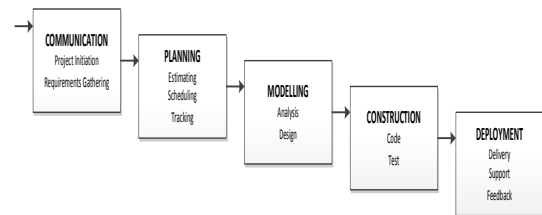


Figure 1 Waterfall Model By Pressman (2013: 39)

- *Modeling (Analysis and Design)*

After determining the problems, requirements, and processes that will guide the making of the system, then the problem analysis will be carried out using the Ishikawa diagram and requirements analysis based on functional and non-functional requirements and design for data structure and interface.

- *Construction (Code and Test)*

Coding and other stages would be done after analyzing and designing the system to unify the data structure, database, coding, and interface. In this stage, knowledge capture applied to gain knowledge from the expert, then process it with POS Tagger and describe the knowledge. The final stage of construction is conducting trials and testing of the developed system.

**Knowledge using Part of Speech (POS)**

**Tagger**

Here is an example of the classification of words in knowledge using POS Tagger.

A. Example:

Jaga minimum *flow* dengan mengatur kontrol bukaan *valve* FV-705

B. To be:

Jaga : NN  
 Minimum : NN  
*Flow* : FW  
 Dengan : SC  
 Mengatur : VB  
 Kontrol : NN  
 Bukaan : NN  
*Valve* : NNP  
 FV-705 : NNP

From the example above it can be seen that the words "Jaga", "Minimum", "Kontrol" and "Bukaan" are general nouns classified as "NN". The words "Valve" and "FV-705" are classified as "NNP" which is a specific noun. While the word "Flow" is a foreign word in English, the word "Dengan" is a conjunction and the word "Mengatur" is a verb classified as "VB".

**REPRESENTATION OF KNOWLEDGE**

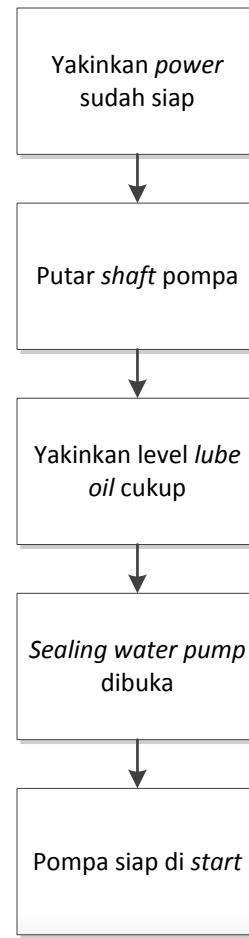
Knowledge representation is part of the knowledge capture that stores and models the knowledge. Knowledge representation helps to clarify the process of knowledge given by the expert. A flowchart is a tool that can be used in knowledge representation and here an example of knowledge representation:

An example of knowledge :

**“Persiapan start pompa”**

Pompa penggerak dengan motor  
 Yakinkan *power* sudah siap  
 Putar *shaft* pompa  
 Yakinkan level *lube oil* cukup  
*Sealing water pump* dibuka  
 Pompa siap di *start*

An example of knowledge representation will be shown in Fig. 2 using a flowchart.



**Figure 2** Example of Knowledge Representation

**RESULTS AND DISCUSSION**

**Functional and Non-functional Requirements**

• *Functional Requirements*

Functional requirements are presented by several features on the system, as in Table 2.

• *Non-Functional Requirements*

Non-functional requirements are additional requirements that don't have input, process, and output. However, this non-functional requirement should be fulfilled because it will determine whether the system is going to be used by the user or not. Non-functional requirements are seen in Table 3.

Table 2. Functional Requirements

ID	Features	Services	Descriptions
KM- F01	Log In	Log In	The user authentication feature is used to determine the access rights for users consist of admin, employee, superintendent and manager.
KM- F02	System Access Management	Employee Data Management	This feature is owned by the admin to manage all user's data of the system.
		Personal Data Management	This feature is owned by each user to manage user's personal data in the system.
KM- F03	Knowledge Capture	Knowledge Capture and Knowledge Representation	This feature used to capture the knowledge owned by the experts in the form of procedures and rules for the use and maintenance of the machine during production so it can be easily understood by other employees then represented into a step-chart step.
KM- F04	Access to Knowledge	Accessing Knowledge and Procedure Flowcharts	Features that allow accessing the data and information from the documented knowledge through the system and shown in flowcharts or diagrams form.
KM- F05	Knowledge Validation	Knowledge Validation	The feature used by the superintenden to validate the knowledge.
KM- F06	Comments	Comments	Features used to make the system more interactive and interesting.

Table 3. Non-functional Requirements

Types of Non- Functional Requirements	Explanation
<i>Performance</i>	Speed up and simplify access to the knowledge needed by employees.
<i>Information</i>	Integrating the knowledge and information of each employee in the database.
<i>Economic</i>	Reducing the costs of paper used and providing discussion activity for knowledge sharing.
<i>Control</i>	Authenticate users to use the system, back up data and do the data security.
<i>Efficiency</i>	Submission and search for knowledge are delivered more precisely and quickly.
<i>Service</i>	Providing accurate and complete knowledge of data, the data displayed is easy to understand and structured and user-friendly system.

**Logic/Object Design**

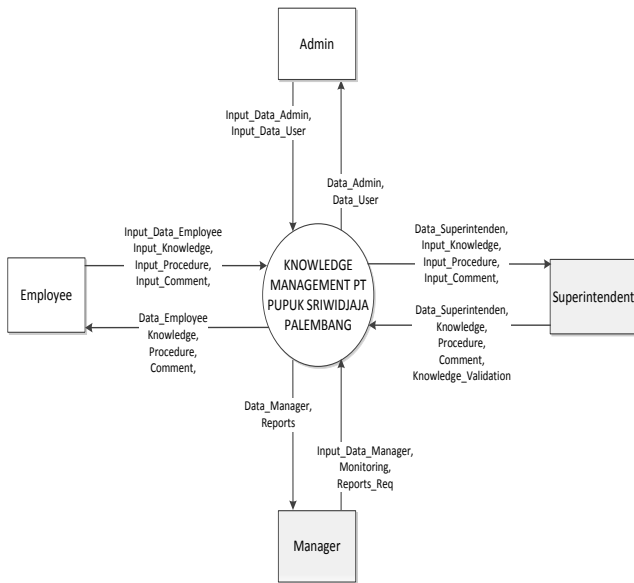
- *User's Design*

- The user's design proposed for the system are :
1. Manager Operasi P-IIB: the person in charge of monitoring knowledge in the system.
  2. Superintendent: the person in charge of checking and validating the knowledge data entered by other employees.
  3. Employee: Employees who will later use the system to access the Knowledge.
  4. Admin: people who will manage data employees who are users of the system.

- *Contextual Diagram*

Contextual diagram is an overview of the knowledge management process at PT Pupuk Sriwidjaja Palembang. The contextual diagram in Fig. 3 shows the contextual diagram that will be proposed consisting of four users as admin, employee, superintendent, and manager. Each

User has a different task, starting from the admin in charge of managing user's data of the system, employees who can access knowledge and Superintendent validate the acquired knowledge so the knowledge is accurate, and the Manager can monitor the process of knowledge management process in PT Pupuk Sriwidjaja Palembang.



**Figure 3** Proposed Contextual Diagram For The System

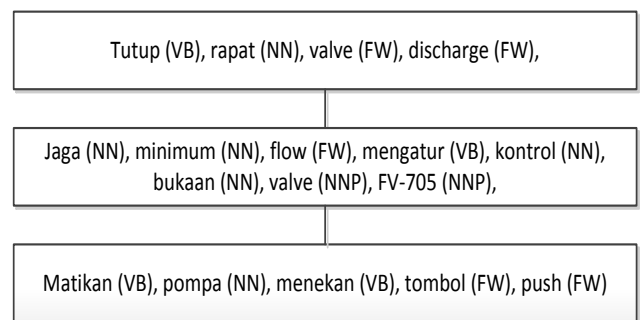
• *Interface Design*

Fig. 4 shows a flowchart of the steps from the knowledge given by the experts. This flowchart clarifies the procedures of existing knowledge along with the POS Tagger of each word. In the picture is a Procedure of Stop Return Condensate Pump from the Start/Stop Return Condensate Pump (GA-107) knowledge, seen in each stage there are "VB, NN, NNP, NEG, FW, etc." tags that classify each word. The first stage is "tutup" with (VB) tag for the verb. Then "rapat" with (NN) tag is classified as general nouns, while valve and discharge with (FW) tag is a tag for foreign word.

Fig. 5 is a clearer version of the flowchart from Fig. 4. At first, this knowledge acquired in the description text form like a paragraph in a short story. Knowledge representation using a flowchart changes the description text form into a list of the processes and makes employees easier to understand and execute the knowledge. With the tags given by POS Tagger in each word will show the object, criteria of the object, what to do with the object, etc. On figure 5, the first stage of procedure shows "Tutup (VB), rapat (NN), valve (FW), discharge (FW) it means the employee must close the valve discharge. The object is "valve discharge", do "tutup" into the object, and the criteria to do with the object is "rapat".



**Figure 4** The Interface Of Knowledge Representation Using A Flowchart



**Figure 5** Knowledge Representation Using Flowchart With POS Tagger's Tag

**CONCLUSION**

Knowledge management in PT Pupuk Sriwidjaja Palembang used to capture and share knowledge was done manually. They hold a discussion activity that presents experts or senior employees as a speaker to share knowledge based on their experience while working at PT Pupuk Sriwidjaja. The manual system requires a lot of money, didn't provide knowledge anytime and ineffective. The result of this research is a "semi-automatic" information system used as a place for experts or senior employees to share their knowledge while working at PT Pupuk Sriwidjaya Palembang so other employees or new employees can access the knowledge information easily. The knowledge acquired in description text form and using a flowchart it changes into a list of processes and makes employees easier to understand and execute the knowledge. POS Tagger uses tags to classify each word and gives information about the object, criteria of the object, what to do with the object, etc. This "semi-automatic" information system will give PT Pupuk Sriwidjaja benefits such as reduce the cost and time of discussion activity as a part of knowledge management, knowledge shared from the experts can be accessed anytime and anywhere by other employees, and reduce errors caused by humans.

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