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Hybrid Soft System Methodology (SSM) and Becerra Approach for Modeling Knowledge Management System

Santun Irawan[1] and Samsuryadi[2]

[1]Informatic Engineering, STMIK Global Informatika MDP, Palembang, Indonesia
[2]Informatic Engineering, Sriwiyaya University, Palembang, Indonesia

E-mail: [1]santunirawan03@gmail.com and [2]syamsuryadi@unsri.ac.id

Abstract. Knowledge management is considered as a systematic entity that seeks to expand, process, and apply available knowledge by adding value to the entity in achieving its goals. This research develops Knowledge Management System (KMS) process by combining Soft System Methodology with its holistic view and Becerra approach with its contingency view. Becerra's approach considers the problem by determining the contingency factors in a structured way, while the SSM approach views the problem holistically on the problem, both structured and unstructured. The results of this research will get a KMS model that can be used as a reference for the development of KMS for universities in managing knowledge. KMS has features such as chats, discussion forums, online library, and document management. The result of study is a KMS prototype with good category.

1. Introduction
The success of a company lies not only in resources such as money, buildings, people, equipment and technology, but rather how the company can manage existing knowledge so that it does not only depend on certain parties[1]. The Transferred then begins to be stored in documentary form ashumans discover writing technique and writable objects. The History begins when civilization recognizes writings anddocuments its activities and experiences[2]. The knowledge through Knowledge Management System (KMS),which aims to transform tacit knowledge into explicitknowledge that the knowledge possessed by each individualemployees can be transferred to another individual employeesthrough the process of knowledge management or knowledge presentation[3].Knowledge is the best asset of the organization that aims to make the organization act intelligently to secure overall continuity and success[4]. In [5]stated that "Knowledge Management is defined as the management function responsible for the regularselection, implementation and evaluation of goal-oriented knowledge strategies that aim at improving an organization'sway of handling internal and external knowledge to the organization in order to improve organizational performance". When an organization conducts training to improve one's ability, then its ability will become subjective for individuals.If the individual no longer supports the company, then the Company will lose the knowledge possessed by the individual.To prevent this from happening, the knowledge gained does not depend on certain individuals.To get new knowledge can be done through knowledge transfer activities, where people will share their knowledge with others.In addition to knowledge transfer, companies must also have a good documentation system to manage existing knowledge.If there are new members of the organization, it will be faster and easier for them to adapt to existing conditions and the existing knowledge can be well integrated for further use by members in need.

Research on knowledge management builds a model that is used to identify internal and external aspects of satisfaction with the use of KMS. This study found that the satisfaction of doctoral researchers in using KMS depends on the external aspects of the trust directly and depends on the external aspects of extrinsic reward indirectly [6]. Research on knowledge management designs KMS to support existing e-learning. The design of KMS in this study was carried out by integrating between KM processes with knowledge services that already existed in the previous system to support web-based e-learning at Tsinghua University [7]. According to Martelo-Landroguez,Barroso and Cepeda said that the combination of the two knowledge management processes builds a dynamic or higher-order capability that results in the creation of superior value for customers and they research explores

customer valuecreation through the organizational capacity of knowledge management, and proposes that recombination processes constitute themselves a higher-order capacity which contributes to increase customer value[8]. Research on knowledge management aims to find out the problems that occur in hospitality in Purbalingga by developing a Customer Knowledge Management (CKM) model using the SSM approach. The resulting model is a combination of KM processes and CRM processes so that it becomes an effective CKM model to be applied to hospitality in Purbalingga. The KM process in this study was conducted in three areas of CKM competence, namely supportive IT-systems, organizational systems, and environment support. This study produced a CKM model that provides recommendations for improving service quality and hotel performance by utilizing the website to the fullest [9].This study will combine two research methods, namelySoft system methodology with the Becerr Approach andthis study will produce a KMS model whose results will be better than each method before the combination.

2. Literatur Review
2.1. Soft System Methodology
Soft System Methodology (SSM) is an Action Research approach that is able to capture the complexity of a phenomenon. Action Research is an approach in research that functions to generate new knowledge through finding solutions or improving problem situations in real life practices [10].

According to [11] explained that the basic process of SSM is a learning cycle that starts from looking for problematic situations and determines actions to make improvements to the problems that occur, which are known as the basic SSM processes.SSM process can be seen in Figure 1.
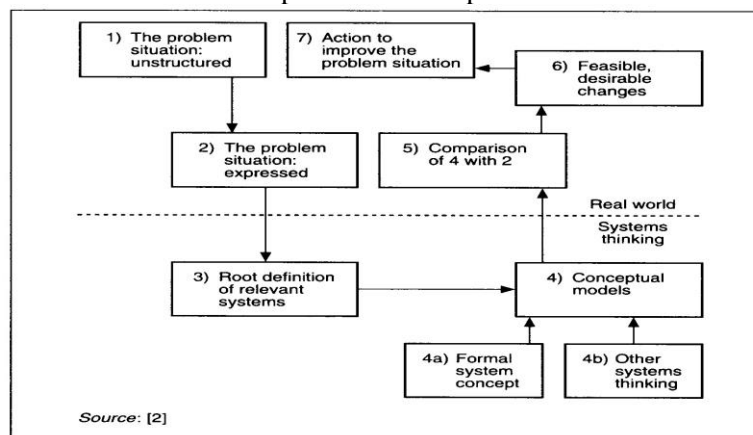
Figur 1. Stages of Soft System Methodology

2.2. Becerra approach
In[1] recommends a methodology for identifying appropriate knowledge management solutions in organizations.There are seven steps in the methodology, namely:
- Determine contingency factors.
- Identification of knowledge management processes.
- Prioritize the knowledge management process needed.
- Identify the current knowledge management process.
- Identification of additional knowledge management processes needed.
- Assess knowledge management infrastructure.
- Develop KMS that is needed along with mechanisms and technology.

3. Research Methods
3.1. Proposed approach
This research proposedhybrid SSM and Becerra approach. Based on the second stage of this methodology, the proposed approach to this research is proposed in accordance with Table 1.

SSM	Becerra
1. Identify the problem	
	2. Identification of contingency factors
	3. Identification of knowledge management processes based on contingency factors
	4. Prioritizing the knowledge management process based on contingency factors
	5. Identify the current knowledge management process
	6. Identification of additional knowledge management processes needed
	7. Analysis of knowledge management infrastructure
	8. Technology Mapping of KM Processes
	9. KM mechanism
10. Root definition formation	
11. Formulation of a conceptual model	
12. Change identification based on problem identification	
13. KMS model	

Figur 2. Proposed Approach

3.1.1. Identification of Problems

At the stage of the interview process will be conducted with several educators. Broadly speaking, this stage is to know clearly the problems that occur, regulations, and the scope of the research object. These problems are then explained in the rich picture diagram. The results of the identification of this problem will be a benchmark in the identification phase of change.

3.1.2. Identification of Contingency Factors

The identification process will be carried out by using a contingency factor identification questionnaire which contains questions about task characteristics, trends in tacit and explicit knowledge, and tendencies towards declarative and procedural knowledge.

3.1.3. Identification of KM Process Based on Contingency Factors

Contingency factors that have been identified. When identifying the management process, the process will be carried out using a contingency factor analysis table[1].

3.1.4. Prioritization of KM processes based on contingency factors

At this stage a prioritization process will be carried out from the results obtained after analyzing contingency factors. This priority process will later be used to provide recommendations for the knowledge management processes needed to be developed into KMS.

3.1.5. Current KM Identification

The identification process is carried out using a questionnaire. The following are the stages in the current KM identification process.
- Identify the ongoing knowledge management process.
- Identify existing support facilities for knowledge management processes.

3.1.6. Identification of Additional KM Processes Needed

At this stage priority values will be given for development by using the rule of comparison (high / medium / low) prioritizing the needs of the knowledge management process based on contingency factors and the level of current knowledge management development needs.

3.1.7. KM Infrastructure Analysis

This stage aims to get an explanation of the current condition of knowledge management infrastructure based on organizational structure, organizational culture, IT infrastructure and special knowledge.

3.1.8. Technology Mapping of KM Processes

In this process, technology mapping will be carried out so that it will be known what are the relevant aspects of the knowledge management process that have identified development priorities through the process of contingency factors.

3.1.9. KM Mechanism

At this stage, a knowledge management mechanism will be designed to support the KMS development process.

3.1.10. Root Definition Formation

This process is carried out after a series of identification of the knowledge management process needed until the proposed knowledge management technology. Root definition is made using the PQR Formula approach[11].

3.1.11. Conceptual Model Formulation

This process is carried out after the proposed knowledge management technology. Root definition is made using the PQR Formula approach.

3.1.12. Change Identification

The results of the identification of problems that have been carried out in the initial stages of research will be used for the process of identifying changes after the model is formulated. After knowing the changes are likely to occur, an interview with related parties is carried out.

3.1.13. Knowledge Management System Model

This stage is the process of the last stage of the formulation of the KMS model. This stage is carried out after identifying changes to the initial formulation of the KMS model and then agreeing on the final model of the KMS which will be the basis for the development of the Knowledge Management System prototype.

3.2. Index value analysis

Index value analysis is carried out on data generated from questionnaires that use a Likert scale. Index value is obtained by summing the multiplication results between the Likert scale and the number of scales according to choice, then divided by the number of scales [12].

$$I = ((F_1 \text{ x } 1) + (F_2 \text{ x } 2) + (F_3 \text{ x } 3) + (F_n \text{ x n})) / \text{n} \tag{1}$$

3.3. Contingency Factor Analysis

In this contingency factor analysis will be carried out by creating a contingency factor analysis table based on sources from the research of [1].

3.4. Model Evaluation Method

Model testing was carried out using expert judgment using a questionnaire developed by [13]. This method focuses on developing usability evaluation systems. The assessment used in the web use method is determined by finding the usability value (x) through Equation 2.

$$x = \frac{Score\ of\ study\ result}{The\ highest\ score\ expected} \tag{2}$$

The highest score expected is obtained by assuming that all experts provide maximum value for each statement depending on the questionnaire used. The highest expected score is the number of respondents multiplied by the maximum value and number of statements.

$$\text{The highest score}_{expected} = \text{number of } respondents \times \text{maximum value} \times \text{number of statements} \tag{3}$$

4. Results and Discussion

4.1. General Description of Respondents

Respondents in this study are all employees and lecturers amount 102 persons. Each respondent fulfils questionnaires with descriptive data included age, gender, last education, length of work and position. Respondents have a variety of ages with more nominated by employees 20-35 years old as much as 74%, 36-50 years old as much as 18% and 51-65 years old as much as 8%. Respondents have 56% male and 44% female. The differences between male and female are nosignificant. Education of respondentshave master degree (S2) 54%, undergraduate degree (S1) 35%,

high school and diploma degree 9% and 2% respectively. Lecturers have S2 and other degrees for employees.

4.2. Formulation of a Conceptual Model and Knowledge Management System Model

   This stage formulates a conceptual model that fits the mapping of technology and mechanism of KM. The formulation of KMS model that is in according to process of KM as shown in Figure 3.
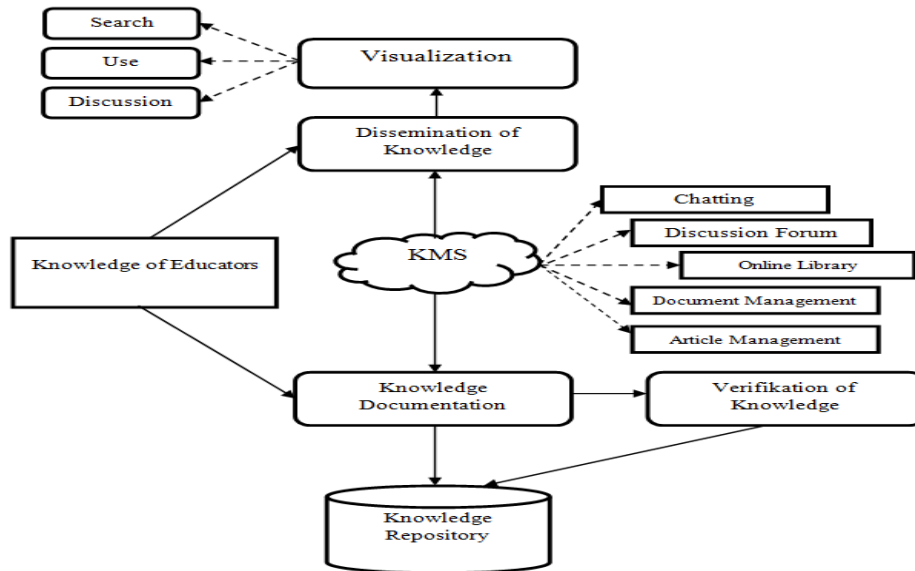

Figure 3. Conceptual Model Formulation

   After the model is formulated, by referring to the identification of the problems carried out at the initial stage of the research, and by taking into account the root definition that has been formulated, this stage identifies the desired changes from the model that has been formulated. This change identification is done by interviewing experts. The results of the interview generally approved the proposed model, but suggested a few changes. As for the proposed changes, the KMS article management feature is combined into one into an online library.Based on the identification of changes that have been made, the formulation of the KMS model is the research question of this study as in Figure 4.
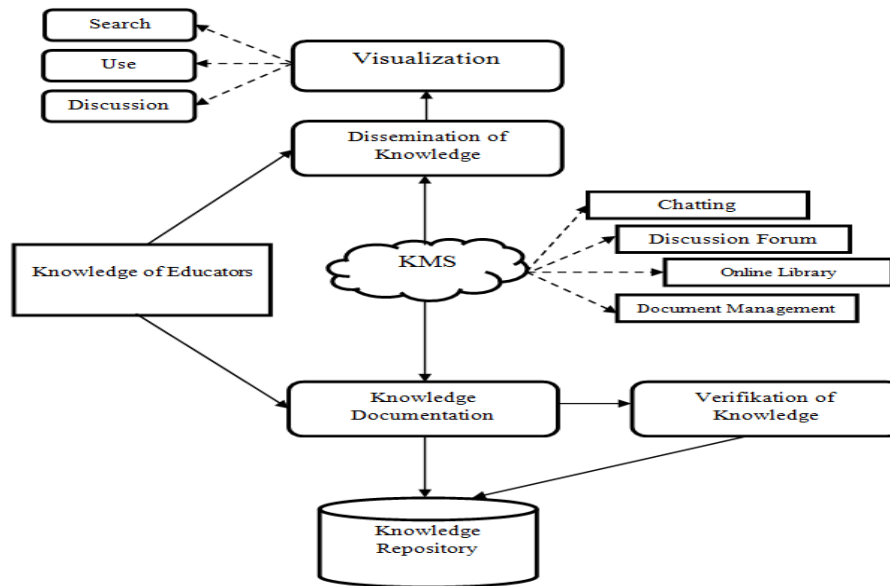
Figure 4.KMS Model

4.3. Evaluation of KMS Model

Model testing was carried out using expert judgment using a questionnaire developed by [13].This questionnaire is analyzed with web use method calculations [14].The initial step in determining the score of research results is by calculating the number of assessments given by the respondent. The results of calculation for number of assessments are used to calculate the score of research results, namely the number of judgments multiplied by the value itself. The value of x which has been obtained is interpreted in the form of predicate according to Table 2.

Table 1. Interpretation of Usability Value (x) into Predicate Form

Usability value (x)	Predicate Form
$0.0 \leq x \leq 0.2$	Very bad
$0.2 < x \leq 0.4$	Bad
$0.4 < x \leq 0.6$	Fair
$0.6 < x \leq 0.8$	Good
$0.8 < x \leq 1.0$	Very Good

Based on result of the questionnaire data has research score of 812 and the highest score expected 1064, using Equation (2), we get the usability value (x) is 0.76 or good category.

5. Conclusion

Hybrid SSM and Beccerra approach can form good KMS that continuously supports the process of KM socialization for knowledge discovery and internalization activities in capture activities, routines on application activity, socialization for knowledge sharing on sharing activity, combination on discovery activity, externalization on capture activity, exchange on sharing activity, and direction on application activity.KM process is obtained based on the priority recommended by the Becerra approach and confirmed by the SSM. The KMS feature, which consists of chat, discussion forum, Online Library, and Document Management, was built to support the KM process and the results of the tests performed on KMS prototype got a value of 0.76.

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