Knowledge Management Model for Nursing Services of Hospital

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Abstract. The purpose of this study is to produce a model that can be used as a reference by nursing managers in monitoring each action taken by nurses, updating Standard Operating Procedures (SOPs), and being able to assist the head of the room to share action experiences between nursing staff. Nurses as nursing services implementers have different knowledge in carrying out nursing services, even though the nursing services provided are in accordance with existing procedures. This can occur due to several factors such as differences in a work period, experience habits, and knowledge from various seminar or training that have been followed by each nurse. The difference in knowledge will greatly affect the quality of nursing services to patients in hospitals, so that good and correct handling through nursing knowledge management will be very helpful in terms of managing the resources they have. The model used for knowledge conversion uses the Nonaka and Takeuchi models which consist of processes of socialization, externalization, combination, and internalization (SECI). The method used to monitor the actions taken by nurses on patients is the text mining method, in which the stemming process used the Nazief and Adriani Algorithm and in the analysis process using the Jaro-Winkler algorithm to measure the level of similarity of a nurse's experience with Standard Operating Procedure (SOP). The results of this study are to recommend a model of knowledge management at hospital nursing services so that it can build learning organizations gained from sharing knowledge and experiences between nursing staff. The model is obtained by adopting the model presented by Nonaka and Takeuchi which is combined with the knowledge taxonomy of hospital nursing services.

1. Introduction
Field of Nursing is one part of the organizational structure that has the task of managing nursing services in hospitals. Form of nursing services in the form of meeting the needs of patients in terms of physiological, psychological, social and cultural. Management and development of nursing services for patients in a hospital is not an easy thing, given the development of increasingly intelligent knowledge of the community in assessing the quality of services provided, making hospitals need to create good quality nursing services so that the level of public trust in the hospital stay awake. Nurses as nursing services implementers have different knowledge in carrying out nursing services, even though the nursing services provided are in accordance with existing procedures. This can occur due to several factors such as differences in work period, experience, habits, and knowledge of various seminars or training that have been followed by each nurse. The difference in knowledge will greatly affect the quality of nursing services to patients in the hospital so that handling well and correctly through nursing knowledge management will be very helpful in terms of managing the resources they have.
Knowledge management (KM) is the process of creating, sharing, using and managing the knowledge and information of an organization [1]. Knowledge management is a formal process of determining what information a company has that can benefit others in the organization and making the information easily available for use by those who need it [2]. Knowledge Management System is a system that is able to classify existing knowledge, how it is easy to use (Disseminate Knowledge), how to store knowledge (store Knowledge), how to maintain knowledge, how to create knowledge, how to update knowledge (Capture Knowledge) and how existing knowledge is arranged so that it is easy to rediscover when needed[3, 4]. The results of the study put forward by Chun-Yao Tseng, state that knowledge input has a positive effect on innovation performance; the effects of knowledge overflow partially have a positive effect on innovation performance; and the absorption capacity of knowledge has a positive effect on innovation performance, and this study uses pooled regression analysis and tests with fixed effect model to analyze the effect of three sources of knowledge on innovation performance[5]. The knowledge management method used by Peter Sharp in his research is MaKe, where this method discusses how to align organizational performance with IT expenditure; adopt a reasonable balance between IT and human involvement; addressing problems originating from the top-down model of information strategies; help in business innovation; addressing value chain issues that are redefined in the world of web technology; realize the importance of virtual and intangible and physical things; create and apply new knowledge and be effective in continuous renewal of existing knowledge; involving people in a paradigm shift from industry-economic thinking and towards a knowledge perspective; linking business goals with initiatives to share knowledge and technology available to address them within a framework; and applying KM-centered people to all organizations or across organizations[6].

This research aims to produce a knowledge management model that can be used as a reference by nursing managers in monitoring each action taken by nurses, updating Standard Operating Procedures (SOPs), and being able to assist the head of the room to share action experiences between nursing staff. The recommended model adopting the SECI model proposed by Ikujiro Nonaka and Hirotaka Takeuchi combined with the knowledge taxonomy of hospital nursing services, in which the internalization process (explicit knowledge for tacit knowledge) applies the method of mining the text. Text mining is the process of analyzing text to extract information that is useful for a particular purpose. Text mining can be used in case of matching between two documents. One algorithm used to calculate the level of similarity between two documents using the Jaro-Winkler algorithm. The Jaro-Winkler algorithm is an algorithm for measuring the similarity between two strings. The higher the distance of Jaro-Winkler for two strings, the more similar the level of similarity between the two strings [7].

2. Methods
The knowledge management model in this study used the SECI model, which was presented by Ikujiro Nonaka and Hirotaka Takeuchi which consisted of socialization, externalization, combination and internalization process. The process of socialization (tacit knowledge to tacit knowledge) is the process of sharing and creating tacit knowledge through direct interaction and experience, externalization processes (tacit knowledge to explicit knowledge) are articulating tacit knowledge into explicit knowledge through a process of dialogue and reflection, combination processes (explicit knowledge to explicit knowledge) is the process of converting explicit knowledge into explicit knowledge that is new through the systemization and application of explicit knowledge and information, and the final process is the process of internalization (explicit knowledge to tacit knowledge) is the process of learning and knowledge acquisition conducted by organizational members through their own experience so become a tacit knowledge of member of the organization[8,9].

3. Results and Discussion
Nursing services that are used as case studies in this study are public hospital nursing services located in a district Bandung, Indonesia. The SECI model used in this study covers the socialization process (collaboration features such as electronic discussion), externalization (the existence of document storage media organized in a repository so that it is easy to be rediscovered by users), combinations (categorizing...
information and search functions) and internalization (media that can help nurses in reading stored knowledge). Knowledge taxonomy of nursing services to be built, as shown in Figure 1.

**Figure 1.** Knowledge Taxonomy of Nursing Services in Regional Public Hospitals
Source: comes from one of the Regional Public Hospitals in Bandung District

The process of monitoring every action taken by nurses is done by comparing service action documents filled by nurses with SOP of hospital nursing services using the concept of text mining and to calculate the level of similarity between two documents and query with these documents can use the Jaro-Winkler algorithm. The flow of the preprocessing process for hospital nursing services at the knowledge management model that will be recommended can be seen in Figure 2.

**Figure 2.** Preprocessing Process [10]

The knowledge management model of hospital nursing services recomended adopts the SECI model combined with the knowledge taxonomy of nursing services. The model image can be seen in Figure 3.
The model in figure 3 is a reference that can be used by nursing services in one of the Bandung district general hospitals in monitoring the actions taken by a nurse and managing the knowledge of the nurses, where later the nurses can share knowledge and get solutions to the problems faced when handling a patient. The explanation of the SECI model in Figure 3 is as follows:

a) Socialization is the transfer of tacit to tacit knowledge which is used to share knowledge and experience between nurses by utilizing forum technology.

b) Externalization is the transfer of tacit to explicit knowledge such as nurses' action records by utilizing the technology of nursing service SOP, nurse action records, training documents or hospital web if available.

c) The combination is the transfer from explicit to explicit knowledge by doing the process of converting explicit knowledge to new explicit knowledge based on the taxonomy of knowledge that has been made, such as managing documents, by utilizing database technology that can download and upload a document.

d) Internalization is the process of learning, and knowledge acquisition carried out by nurses on explicit knowledge that is disseminated to all hospital nursing services through their own experience so that it becomes tacit knowledge from these nurses, the technology used based on Text Mining uses the Nazief and Adriani Algorithms on stemming process. Stoplist algorithm is an algorithm used to eliminate non-descriptive words and use stoplist for Indonesian such as pronouns, conjunctions, and so on. The complete list of stoplist uses a list created by Tala, (http://static.hikaruyuuki.com/wp-
The stemming stage is the process of combining or solving each variant of word into a basic word in Indonesian. This stage uses the Nazief and Adriani Algorithms, where the algorithm groups the affix into the following categories:

1. Inflection Suffixes are suffix groups that do not change the basic word form, this group can be divided into two:
   i. Particle (P) or particles, including the “-kah”, “-lah”, “-tah”, and “-pun”
   ii. Possessive Pronoun (PP) including “-ku”, “-mu”, and “-nya”

2. Derivation Suffixes (DS) is a collection of endings that can be directly added to the base word. Included in this type are “-i”, “-kan”, dan “-an”

3. Derivation Prefixes (DP) is a collection of prefixes that can be directly given to pure base words, or to basic words that have added up to 2 prefixes. These include prefixes that can be morphological (“me-”, “be-”, “pe-”, dan “te-”) and prefixes that are not morphological (“di-”, “ke-” dan “se-”)

The process of measuring the level of similarity between nurse action documents and nursing Standard Operating Procedure (SOP) using the Jaro-Winckler algorithm and the results will be measured using the Assessment Indicator as shown in Table 1.

| No | Indicator | Explanation            |
|----|-----------|------------------------|
| 1  | Dw < 0.50 | Very Inappropriate     |
| 2  | 0.75 < Dw > 0.50 | Less Appropriate       |
| 3  | 0.90 < Dw > 0.75 | Quite Appropriate      |
| 4  | Dw > 0.90 | Exactly                |

There are three reasons why management knowledge is important in the health sector: 1. facilitates decision-making capabilities; 2. builds learning organization; and 3. stimulates cultural change and innovation [12]. An effective Knowledge Management System can give companies the competitive advantage needed to be successful, and for that reason, knowledge management projects must be a high priority [13].

4. Conclusion

Knowledge management can be used by hospitals, especially in nursing services in sharing experiences among nurses or can be used by the head of nursing services in monitoring the suitability of SOPs with actions taken by nurses in carrying out their work.

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