

Determine supporting features for Mobile Application of NUSANTARA

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Abstract—Mobile Application of NUSANTARA which called m-NUSANTARA is an KM tools that design for supporting the KM process in government human capital management. This research is continuation of previous research focusing on the development of a model of knowledge management system for civil servant from three ministries in Indonesia (KEMENPAN&RB, BKN, and LAN) which called Government Human Capital Knowledge Management of Republic of Indonesia (NUSANTARA). Implementation of this KM model is conducted with web system, further development of this system still provides constraints from several sides in providing more optimal service against users requirements as well as limited accessibility and responsiveness. This paper aims to explore the supporting features that will be used to integrate pre-existing systems that build mobile knowledge management applications. Data were collected by interview from each expert in related institution. The CommonKADS method is chosen as a technique to explore the problems and knowledge of each organization. While, SMAPA method is used to validate the result from the experts and end users. Results of this work are determine seven recommended supporting features there are vision and mission view, activity notification, group discussion, search repository, upload document and document activities log.

Keywords—knowledge management; knowledge management system; NUSANTARA; SMAPA; CommonKADS;

I. INTRODUCTION

The management of government human capital (ASN) is essential for the realization of employees with integrity, professional, ethical profession, neutral, and free from political intervention. However the management still has not gained significant results, this is indicated by the ASN performance appraisal results that decline from 2014 KEMENPAN&RB 86, LAN 70 and BKN 65.07 to KEMENPAN 71.12 LAN 70 and BKN 56.54 in 2015. According to the previous study conducted by [1] said that this is due to several factors such as the loss of tacit knowledge, the development of inappropriate knowledge and the incomplete knowledge management process. According to [2], in order to obtain optimal performance then the element of human capital which is the main part in supporting the success of a human capital organization is required to be managed and

employed efficiently. In [3], defines the conceptual model which using ICT utilization by Knowledge Management Systems (KMS) known as Nusantara. The concept of Nusantara proposed as a design of knowledge management system in Indonesia. This method is able to produce the features which needed to support knowledge management process systems. However, utilization of Nusantara which used technology web still has constrains due to limitations of feature web base. Hence, the knowledge information cannot be obtained maximally. Analysis of mobile support is important because the need for knowledge is needed in time, place and every situation.

Nowadays, many web technology which developed to support mobile platform like HTML, HTML5, JavaScript, and CSS to develop mobile application that can run of different platforms and provides JavaScript API's to developers that allow the access to advanced device functionality such as accelerometer, barcode, Bluetooth, Calendar, Camera, Compass, Connection, Contacts, File, GPS, Menu, and Near Field Communication (NFC)[4].

However, it also have limitation include; It does not provide the possibility to have native user interface[5], the performance of the final application is far from the native application[5]. Hence, the feature for mobile Nusantara is considered with native platform to manage information more reliable. CommonKADS methodology is chosen due able to provide a suitable model of requirements for the knowledge-based systems of various knowledge[6] and is also the most established methodology for developing knowledge-based systems[7].

This paper is organized as follows. Section 2 describes supporting theories, section 3 present research methodology and section 4 discusses and analyzes the results of feature for mobile application of NUSANTARA. The last section explains conclusions and analyzes some future work.

II. LITERATURE REVIEW

A. Knowledge management (KM)

Knowledge management (KM) is group of activities to discover, capture, share and apply knowledge to gain

organizational objectives using their knowledge[8]. KM also determine as process for identifying, selecting, managing, transmitting, and disseminating information for problem solving, strategic planning and decision making[9]. KM practice can impact human resource management process. It's create, store, distribute and interpret knowledge in every organizational process[10]. Knowledge management in organization are connected to tacit and explicit knowledge. It represents how they were create new knowledge by acquired, represented, exchanged, maintained, integrated process[11]. Based on some definition above it can be conclude that KM is an exploration process of generate, capture, transfer, disseminate and implement knowledge from organizational knowledge resource for problem solving and decision to achieve organizational objectives. Those processes are relies on the organization member. Knowledge management can be successful implemented with human participation process.

B. Knowledge Management Systems (KMS)

KMS intend to manage knowledge and user to use the knowledge to perform their organizational task[12]. While, according to [13],[8] KMS well known as an IT-based system that used to support, develop and enhance organizational KM process. The process can be applied in some various IT tools and technologies[13]. KMS accommodate some tools and technologies for manage the organizational knowledge asset and KM process which align with organizational business process. This technology is able to integrate knowledge information in KM process[14]. Hence, [8] assume that KMS is a solution to achieve organizational KM process and it integrates in KM mechanisms and technologies which consist four type as follow:

- a) Knowledge Discovery System: technologies which support activities of creating innovative tacit and explicit knowledge from data and information.
- b) Knowledge Capture Systems: facilitate acquire knowledge both tacit and explicit around people and organizational entities. This system also can collect knowledge from inside and outside organization.
- c) Knowledge Sharing Systems: promote communication activities of tacit and explicit knowledge with using exchange and socialization process.
- d) Knowledge Application Systems: contribute the utilize process of individual knowledge into another individual without directly retrieve or learn the knowledge.

KMS can be represented in various kinds of ICT based on each government KM process which held to manage their organizational knowledge.

C. NUSANTARA

Government human capital knowledge management of Republic Indonesia (Nusantara) is a knowledge management system for managing the government human resource process. This application used to support the KM process using the information and communication technologies[3]. Result from Nusantara is interpreted with web technology, web based application of Nusantara which consist of some KMS features which have been verified and validates by the experts.

Limitation of work Nusantara is related to the government human capital management which is specific to human resource process and bureaucracy culture in Indonesian government institutions.

D. CommonKADS

Common Knowledge Analysis and Design System, or CommonKADS in short, is a comprehensive methodology for the developing knowledge-based system [15]. CommonKADS describes the foundation, technique, modeling language and document structure for develop the knowledge based system[16]. This methodology has been widely used for develop many types of system, for example expert system and knowledge management system to solve problem in organizational environment [17]. It also often used for organizational knowledge management system development[18].

Some strength of the commonKADS methodology are flexible to use, represent knowledge (organizational, domain, task, inference), complete, powerful, accurate, comprehensive, represent the KM process and systematic[18]–[29]. CommonKADS is consisted of three layers of model which have relationship among model. Three layers of model of CommonKADS are context layer, concept layer and artifact layer. The more detail of the layer of model respectively is presented in following explanation [30]:

- **Context layer.** This layer of model is consisted of three models, i.e. organizational model, task model, and agent model. Organizational model is used to formulate framework of problems, business processes, stakeholders and potential solutions based real condition within organization environment. Task model is focused on the purpose of business process that related to the required resources, competence, achievement and so forth. Agent model represented assignment of a person, system information, knowledge and culture.
- **Concept layer.** This layer contained two models, including knowledge model and communication model. Knowledge model presents type, rule and structure of knowledge. Communication model describes about the requirement of agents to accomplish their task and knowledge transfer between them.
- **Artifact layer.** This layer is represented by design model which describes technical things of system or software, i.e. architecture, the used algorithm, data structures and hardware.

E. Previous Study

CommonKADS methodology has been used in several sector such as agriculture[27], [31], tourism [19], education [24], medical [20], [21], industry [18], [28], [25], [29], software development [23], [26] and bioinformatics [22].

GeoOasis is one of tourism knowledge based which developed using the CommonKADS methodology to define the ontology of knowledge. This knowledge based provides the tourism information [19]. While, CommonKADS also can be used for determine the requirement analysis [27], share and

transfer natural knowledge engineering in software development [24] and incremental validation process[26].

Other research used CommonKADS to determine the knowledge metamodel, integrates several knowledge, develop expert system, and systematic capture of knowledge expertise[20], [23], [24]. In agriculture sector the CommonKADS develop the design of irrigation system [27], [31]. Hence, this methodology also can define the strategic collaboration of construction virtual business[22]. Then, in medical sector CommonKADS contribute the general framework for the aforementioned problem [20], [21].

III. RESEARCH METHODS

Methodology of this research consists of five phases, in the first phase of the study literature to build a conceptual foundation of the research study, the next stage is to identify the issue raised in the form of weakness of conceptual design implementation of Nusantara with the web system that has been built.

Next phase we do done the data collection using deep interview to the expert for discovering the requirement of mobile application features related to the expert experiences. The data collection consists of primary and secondary data, primary data in the form of draft results interview conducted against the three state institutions namely LAN, BKN and MENPAN&RB.

The next stage is done by analysis with CommonKADS method to explore the knowledge assets and needs of the system to develop. The elaborations of five model development in CommonKADS are organizational, task, agent, knowledge, communication and design.

Hence, the research result was validated using the SMAPA methods which validated by experts and end users. The validation process used the SMAPA questionnaire instrument. Then, final stage is the conclusion of the research result.

IV. RESULT AND DISCUSSION

Interview conducted to collect the expert data. While, the respondent distributions are expert from BKN 4 experts, LAN 3 experts and MENPAN&RB 2 experts. The interview result is elaboration of the development of five models: organizational, task, agent, knowledge, communication and design. The Organizational Models (OM) are define problem, context and the solution based on the interview result. The organization model can be seen in Table 1.

Table 1 shows the problems, context organizational and solutions offered to the problem. After the next stage OM is defining the task model. A summary of the modeling agent and not the model elaborated is shown in Table 2. Table II determine each tasks that have been defined are assigned to actors who have received tasks in Table 1. The analysis of tasks and actors is also defined into *use cases* which can be seen is shown in Figure 1. Figure 1 describes the use case of mobile KMS Nusantara which have six actor and six use cases.

The actors are admin, chief of knowledge article, co.admin, validator, expert and visitor, while the use case consist of manage article, manage document, online discussion, find article and document, download document, view article, view user log, manage member, view member list, send message, update expert profile, update validator, give article, document and document verification.

TABLE I. ORGANIZATIONAL MODEL PROBLEM IDENTIFICATION

Organization model	Problems : Worksheet OM-1
Problems	Knowledge management problems 1. Lack of motivation to learn 2. The creation of KM processes and cultural sharing 3. The existing knowledge gap between ASN management staff 4. Not all leaders can be role model 5. Lack of employees who have IT knowledge 6. Lack of commitment both from the side of employees and leaders 7. Loss of expert knowledge Technological problems Lack of IT infrastructure support
Organizational context	External common factors 1. Government and legal regulations 2. Organizational culture factors 3. Uneven employee recruitment rate
Solution	1. Provide an offering of knowledge management tools that are used at any time and at an affordable cost 2. Conceptual costume needs for knowledge management

TABLE II. SUMMARY OF TASK MODEL AND AGENT MODEL

No	Task	Agent	Knowledge Asset
1	Manage validator members, Manage experts, monitor user logs	Chief of Knowledge Officer	Knowledge of validator member data
2	Manage articles, manage documents, conduct discussions to users, search articles	Admin	Document of civil servant manpower management manuscript, document of research journals
3	View the user list and send messages to members	Co. Admin	-
4	Updating profiles, viewing members list, sending messages between members	Expert	Document of civil servant manpower management manuscript, document of research journals
5	Verify documents, view members list, send messages between members	Validator	Information on document data authenticity
6	Download documents, view or read articles	Visitors	-

After defining the task and agent model, the next step is to define the knowledge model. the knowledge model is used Conceptual Modeling Language (CML) as can be seen in Fig. 2.

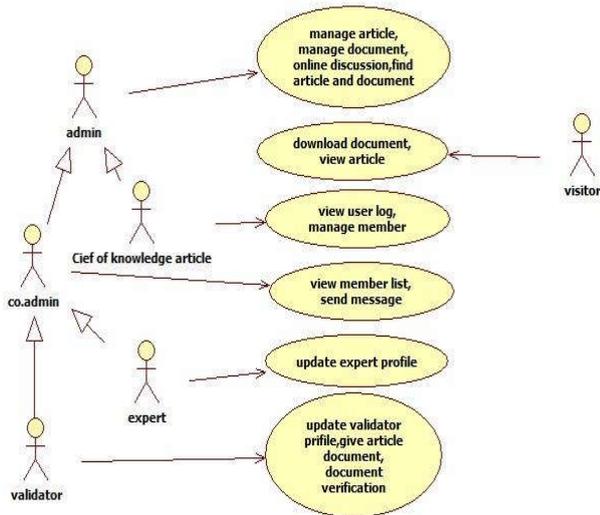


Fig. 1. Use case of mobile KMS Nusantara

Figure 2 show the example of conceptual model which describes in CML 2 languages. Hence, the next phase is determining the communication model; example of communication model can be seen in Table 3.

```

CONCEPT document
DESCRIPTION the attributes of a document
ATTRIBUTES:
    document ID: long
    title: string
    tag: string
    file_name: string
    date: date
    contributor: string
    ...
END CONCEPT document
    
```

Fig. 2. Example of conceptual model with CML2

Table III describes the example of communication model for each agent which determine in table II. The last stage of the CommonKADS model is a design model, at this stage is defined architecture, system support tools and features that can be used to develop mobile system KMS Nusantara. For interaction component systems can be seen in Fig. 3.

TABLE III. EXAMPLE OF COMMUNICATION MODEL

Communication model	Transaction description worksheet CM-1
Transaction identifier/Name	Management documents
Information object	Information needed to execute system commands are: document id, title, tag, file name, date, contributor, status, year, type, knowledge, source, num download
Agent involved	Admin, Validator, Expert
Communication plant	Expert, admin, validator selects the document manage menu, the document is uploaded read or download

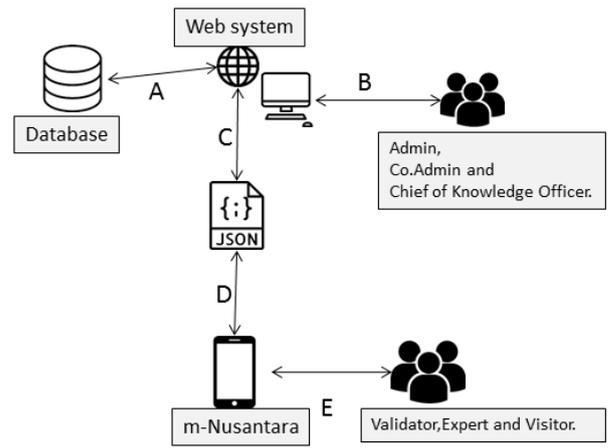


Fig. 3. Interaction among component system mobile KMS Nusantara.

Figure 3 show the interaction among the component system of mobile KMS nusantara based on the database, web system, actors and the mobile application. Each of interaction between point will be describes as follow:

- Interaction A is the communication between the database with the web system, the database using *MySQL* while the web system utilize *PHP* as the source code
- Interaction B display data in the form of web makes it easy for content managers to manage information more effectively.
- Interaction C in obtaining data from storage required "capture data" mechanism using *JSON* format.
- Interaction D data that has been converted into *JSON* form is then captured by *M-Nusantara* mobile app, this mechanism occurs in exchange of data from mobile device to database.

TABLE IV. LIST FITUR MOBILE KMS NUSANTARA

No	List Feature	Information
1	View ASN vision mission	This feature is submitted in the form of a menu that can show the vision of ASN mission
2	Activity notifications and updated information in ASN environment are news articles	This feature deals with providing up-to-date information on ASN developments in the form of notifications on android devices that will be integrated into ASN website pages
3	Group Discussion, chat from chat members.	This feature provides services to users in sharing efforts regarding matters relating to the scope of ASN
4	Searching of data files (repository)	This feature is provided to help find the required archive data in pdf format which can be seen important point2 part of the archive
6	Upload Document	Upload documents are used to store data owned by the practitioner document that will be saved can be a file.
7	Documentation of activities log	This menu aims to document the activities performed, data storage in the form of photos and information about the activities undertaken.

- Interaction E ASN information services obtained by validators, experts and visitors. This service allows users to obtain additional information and features not provided on the WEB Nusantara service.

Besides it also defined supporting features that can support the mobile system on mobile devices KMS Nusantara as seen in table 4.

Table IV determines seven lists of features and brief information above that define based on the CommonKADS analysis. Finally, the last phase is developing the mobile application interface and programming codes. The result of system design can be seen on Fig. 4.

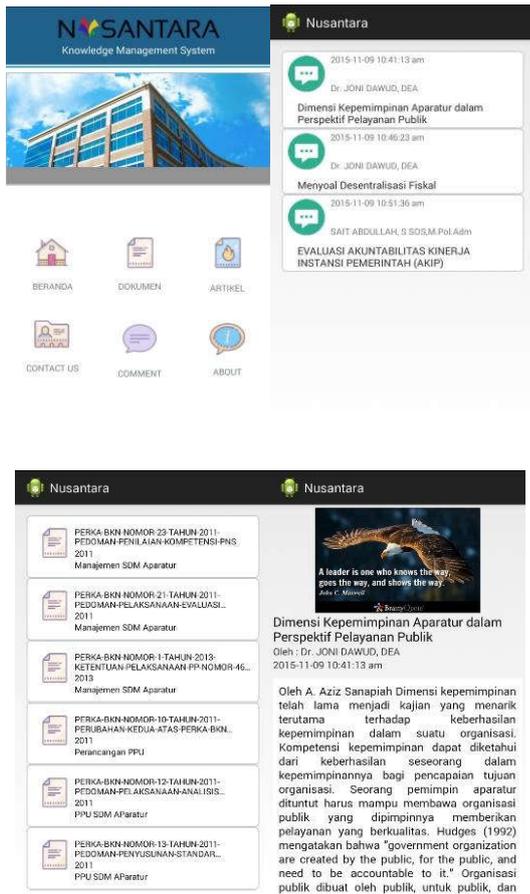


Fig. 4. Mobile application interface of KMS Nusantara.

Figure 4 show the prototype of mobile application interface which is named M-NUSANTARA. In this stage, the prototype was evaluated to measure satisfaction level of user to the application that was developed using NUSANTARA and CommonKADS. SMAPA method was employed as a based to design of questioner with liker scale. The final result was obtained using Aiken method (1).

$$V = \frac{\sum s}{n(c-1)} \tag{1}$$

$$S = r - lo \tag{2}$$

V is value of content validity, where s is the value of r that was given by the expert, c is the highest value validity. Then, lo is the lowest value which given by the expert and n is the number of expertise. Coefficient of V is value from *content validity* which range from 0 to 1. According to six end users and expert samples obtained result can be seen in table 5

TABLE V. CONTENT VALIDITY WITH SMAPA

No	Sub-characteristic SMAPA	Content-Validity(V)
1	Transaction convenience	0.78125
2	Customizing service	0.84375
3	Differentiating function	0.8125
4	Consistency	0.75
5	Efficiency	0.78125
6	Reasonableness	0.75
7	Usability	0.8125
8	Creativity	0.78125
9	Customer Attraction Evaluate	0.875
10	Customer Convenience	0.78125

Table 5 shows result of the SMAPA analysis. Based on the result analysis, customizing service indicator was the highest score (0.84375). It means that mobile NUSANTARA has capability to manage knowledge, otherwise reasonableness and consistency indicator got the minimum score (0.75) due to the incomplete application. The results showed that all of items were obtained were valid, based on Aiken criteria >0.75 .

V. CONCLUSION

Research finding that seven features that recommended to be implemented in the mobile application of NUSANTARA which called m-NUSANTARA. Those features are ASN vision and mission view, activity notifications and updated information in ASN environment such as a news articles, group discussion, chat from chat members, searching of data files (repository), upload document and documentation of activities log.

The m-NUSANTARA expected to be used as a solution in the management of knowledge in the environment or scope civil state apparatus to manage the expert knowledge. The implementation of m-NUSANTARA in human capital managers (BKN, KEMENPAN&RB and LAN) can disseminate their organizational knowledge to develop the organizational competitive advantages related to the human capital management process.

CommonKADS methodology is used for developing the mobile application features which can give the reliable result of recommended feature align with the expert validation that m-NUSANTARA have a capability to manage the expert knowledge well.

Limitation of this study is specifically used for the human capital management experts which managed by three ministries. Future research can be developing other mobile features and using another approach with widely research area in public or private sector.

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