InovasiDesa: an Android Application Design for Rural Innovation Knowledge Sharing

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***Abstract*— Education in utilizing village funds can have an impact on village progress. Growing understanding for village innovations to get inspiration, shopping for ideas, and replicating good practices needed by information technology support. This study aims to design an android-based village innovation knowledge sharing application with the Knowledge Management Life Cycle method through secret knowledge channels from village managers. The process of capturing knowledge is oriented towards the entire process of exchanging knowledge and experiences between villages and between regions that are already running. Knowledge maps used for knowledge codification produce 719 explicit knowledge documented and stored and can be used by users. By the objectives, this study provides results in an Android-based mobile application design called InovasiDesa with a Knowledge Management Life Cycle approach fulfilled, and all functions are running well.**

Keywords*— *knowledge sharing, android application, innovation, village

I. INTRODUCTION

The village government is currently still having difficulty accessing valid knowledge about the use of village funds, which has resulted in the lack of village innovation programs. The lack of knowledge about the village innovation program results in the less rapid preparation of the Village Income and Expenditure Budget (APBDes) so that it affects the fast or slow absorption of village funds budgeted by the government. This has an impact on delays in the absorption of village funds from the central government to the village government because the village government is difficult to prepare village development programs. This shows the need for education or increased knowledge of innovation in utilizing village funds.

The government issued Presidential Regulation Number 131 of 2015 concerning the Determination of Underdeveloped Areas of 2014-2019. An area is called underdeveloped if the level of community economic development, human resources, facilities and infrastructure, regional financial capacity, accessibility, and regional characteristics is very low. As a consequence of the above regulations, programs for handling disadvantaged areas require a special and specific approach in order to be able to trigger the acceleration of development. Accelerated development is needed to reduce the level of gaps between underdeveloped regions and other regions.

For this reason, development activities in villages and disadvantaged areas must be able to produce creative and innovative traditions. The innovation tradition will grow if the cycle of transformation of knowledge and good practices from one village to another, one region to another - especially villages / regions that have similar conditions and problems, can run smoothly. In order for the process of exchanging knowledge and experiences between villages and between regions to run, we codify best practices in a structured, documented, and disseminated manner [1]. Village innovation can be divided into several types, namely scientific and technological innovation empowering agricultural modernization, institutional innovation management, network innovation and intermediary platforms to accelerate resource mobility [2].

In accordance with the problems formulated, the purpose of this study is to design an application that functions as a medium for sharing knowledge about the use of village funds through government innovation narratives. The application is expected to be able to become a reference for villages to carry out innovative practices by conducting replication studies and replicating good practices that have been done by other villages. This research contributes to science and technological innovation in the scope of Knowledge Management System (KMS), especially in knowledge sharing. KMS is an information system developed specifically to facilitate the process of creating, storing, retrieving, transferring, and applying organizational knowledge. The main objective of KMS is to improve the knowledge management behavior of the organization. Although KMS has various forms, there are three prominent features of KMS, namely knowledge repositories, knowledge maps, and collaborative tools, all of which support the knowledge sharing process [3]. Apart from that, this research also contributes to a problem that has not been explored much in the findings [4], which state that the sustainability and resilience of human society have not been studied and require the attention of the research community.

Several studies related to KMS have also been carried out using Knowledge Management Lifecycle (KMSLC) [5], namely the development of KMS applications for hydroponic cultivation [6], knowledge systems to facilitate sweet potato cultivation [7], a system that helps in selecting fertilizers [8] and systems knowledge related to child protection [9] using the five steps from KMSLC and built a web-based system. Therefore, in this research, a KMS was developed which focuses on knowledge sharing in the imitation study process and the replication of village innovations for village governments using the five step from KMSLC but the system is built based on android.

II. METHODOLOGY

One of the most important competitiveness factors that must be possessed by an organization in the current era is the ability to develop science and technology. Every individual in the organization must have qualified knowledge so that the organization can develop, compete, and survive. The increasingly close competition conditions necessitated a

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paradigm shift from resource base competitiveness to relying on knowledge base competitiveness. Resource base competitiveness rests on the advantages of natural resources and geographic location. Knowledge base competitiveness rests on science and technology as well as the development of organizational human resources. Romhardt stated that knowledge is an important competitive factor in winning the competition [10].

The knowledge possessed by an organization must be managed so that there is a knowledge relationship between the organization and the organization's strategy. An organization must develop its strategic objectives and identify every need for knowledge in order to implement the strategies that have been formulated. The strategy developed by the organization can be compared with the existing knowledge assets in the organization. The choice of strategy is based on the elements that directly affect the knowledge itself. Current technological developments make it possible for organizations to apply computer-based technology to manage knowledge.

Knowledge is defined as a mixture of experiences, values, contextual information, expert views, and fundamental intuition that provides an environment and framework to combine and integrate new experiences with information [11]. Routines, processes, practices, and company work norms become points of knowledge review and documentation in the company [12]. Knowledge is divided into two types, namely explicit knowledge and tacit knowledge. Explicit knowledge can be found physically, easily communicated, and quickly learned by others. Tacit knowledge can be in the form of a person's experience, conversations between individuals, dialogue, formal or informal discussions, individual intelligence, decision making, and thoughts. Tacit knowledge can also be defined as declarative knowledge, which tells the relationship or relationship between several variables.

Knowledge Management (KM) is the management of existing knowledge in an organization so that this knowledge can be utilized in increasing business value and organizational competitiveness [13]. KM is able to create, communicate, and apply knowledge as the ability to create and maintain increased value from the core business competencies of the organization. Therefore, a Knowledge Management System (KMS) is needed, which is a system created to facilitate the capture, storage, search, transfer and reuse of knowledge. The existence of this information technology is an enabler for KM implementation.

Knowledge in organizations needs to be managed and documented so that it can be a reference for other individuals to gain knowledge without having to depend on other individuals. If there is documentation of knowledge, it will be easier to trace and retrieve the knowledge even though the individual is no longer working in the organization.

Knowledge sharing is part of KMS which functions as a feature to help users share and use the knowledge that has been stored by the system [14]. Knowledge sharing can also be seen as a culture of social interaction which includes the exchange of a set of shared understandings so as to provide employees with access to information about relevant fields and to use knowledge networks within the organization. Knowledge sharing is not just about giving something to other people or getting something from them in return. However, knowledge sharing occurs when people are naturally attracted to helping one another to build new competencies and capacities for action. So knowledge sharing is not something that is forced or formally prepared, but flows naturally and there is an element of willingness to help others for progress or to achieve certain goals.

Knowledge sharing is also a process of creating learning. This means that through knowledge sharing activities, someone will gain understanding, new insights into something, and this increase is one form of learning. Knowledge sharing also has a cultural influence on an organization [16]. The main focus of knowledge sharing is a person's ability to make explicit and communicate knowledge to individuals, groups and organizations. Furthermore, in KMS, an individual is expected to be able to contribute his knowledge through the system that has been provided by the organization rather than being shared personally or in certain groups. KMS is the main key to the success of knowledge sharing activities in organizations.

The methodology in designing a knowledge sharing prototype application for village innovation, researchers used the five steps from KMSLC [5] as shown in Fig. 1.

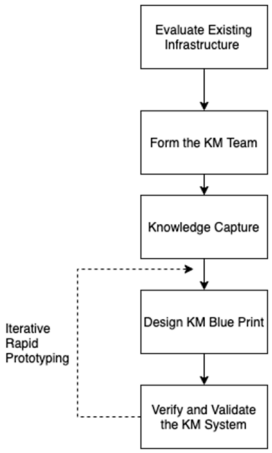


Fig. 1. Knowledge Management System Life Cycle

The last phase is the evaluation of the prototype design to measure the success of the design whether it is in accordance with the objectives and needs of the design, and so that continuous development can be carried out from the evaluation results.

III. Results and Discussion

The design of the village innovation knowledge sharing application prototype can support the knowledge sharing process more effectively, where users can do online learning in addition to face-to-face training. Users can be more independent in solving cases by using reference knowledge stored in the knowledge base, and the existence of discussion forums can facilitate users to participate in discussing certain topics. The following is the researcher's suggestion to socialize the use of knowledge sharing prototypes in order to form a better knowledge culture, namely that every case that occurs must be documented and included in the knowledge base and enforce a reward policy to users for participating in the development and use of knowledge sharing application prototypes.

A. Evaluate Existing Infrastructure

In this first phase, researchers identified human resources, identified technological infrastructure, and knowledge infrastructure by observing and interviewing the InovasiDesa team. Researchers divide the discussion into two main topics, namely regarding the analysis of running technology infrastructure and infrastructure analysis of the current knowledge culture. The results of software infrastructure analysis, there are several software commonly used by the community, namely the Village Innovation website, Community Based Development Information System (SIPBM), and Village Information System. The Village Innovation website compiles innovations and addresses innovators who aim to build a tradition of sharing ideas, experiences, and cooperation between villages [5]. The Community Based Development Information System (SIPBM) is an information system developed to help improve development performance based on community participation, both in planning, implementation, and in reporting [6]. The Village Information System is a tool for village officials in serving the community as part of the implementation of Permendesa PDTT No. 13/2020 article 11 and article 14. The results of the analysis of human resource infrastructure through interviews with program managers were selected by several program members who were appointed as sources of village innovation knowledge as in Table 1.

TABLE I. INFRASTRUCTURE OF HUMAN RESOURCES

Human Resource	Expertise
Samsul Widodo (Dirjen PDT-Kementerian Desa PDTT)	Expert Council
Ivanovich Augusta (Kapusdatin-Kementerian Desa PDTT)	
Priyono (Widya Iswara Kementerian Desa PDTT)	
Yusra (Direktur PSDM-Ditjen PDT)	
Wahyudin AB	
Grace Palayukan (Dewan Pakar Gedhe Nusantara)	
Sutardjo Ps (Dewan Pakar Gedhe Nusantara)	
Joko Waluyo (Dewan Pakar Gedhe Nusantara)	
Idham Arsyad (Pokja Desa-Kemendesa PDTT)	
Muhammad Nurudin (Pokja Desa-Kemendesa PDTT)	
Suhandani (Kepala Subdit KKMD-Ditjen PPMD Kemendesa PDTT)	
Yossy Suparyo (Koordinator)	Coordinator of Editor
Sukarni	Editor
Neufil Fahlevi	
Abdul Malik	
Noor Azasi	Coordinator of Contributor
Sutardjo Ps	Contributor
Farida Hamra	
Agus Wahid Suyoto	
Didik Wahyudi	
Ratna Fatimah	
Khalid Barkah	
Narto	
Bayu Permana	
Hajar NS	
Arjuna SP	
Safwaturrahman	
Hirzuddin Hasan	
Syifa Khairunnisa	
Akhmad Fadli	
Arif BWI	
Rian	
Riza Allatif	
Akbar Bahaulloh (Puskomedia)	Technical Support

The results of the analysis of knowledge infrastructure in the program manager, there are 10 basic knowledge for beginners who are related to village innovation. Softcopy and hardcopy knowledge modules are obtained from the Gedhe Nusantara Foundation and expert experience. The results of the knowledge infrastructure analysis are shown in Table 2.

TABLE II. INFRASTRUCTURE OF KNOWLEDGE

No.	Knowledge
1	Village's Enterpreneurship
2	Village's Tourism
3	Village's Featured Comodity
4	Good Government
5	Appropriate Technology
6	Human Resources
7	Essential Social Service
8	Village's Infrastructure
9	Cooperation and partnership
10	Underdeveloped Regions

B. Form the Knowledge Management Team

This process involves forming a Knowledge Management (KM) team in order to identify the required resources or stakeholders. The KM team consists of researchers and program managers as shown in Table 3 which is divided into a board of experts, editorial coordinator, editor, contributor coordinator, contributor, technical support, knowledge management developer, and the general public.

TABLE III. KNOWLEDGE MANAGEMENT TEAM

Role	Information
Expert Council	Expertise as the source of village knowledge
Coordinator of Editor	Coordinating all editors
Editor	Selecting and improving the village innovation script to be published or displayed in the application
Coordinator of Contributor	Coordinating all contributors
Contributor	Obtaining knowledge about village innovations who have been registered as program management members outside experts
Technical Support	Performing the monitor, evaluation, and maintaining application
Knowledge Management Developer	Developing the system of KMS InovasiDesa
Common	Assisting the obtain of knowledge outside of developer

C. Knowledge Capture

Mapping of knowledge needs to support the village innovation stages can be seen in Table 4 which refers to the availability of knowledge infrastructure. In the stage of capturing knowledge, 719 sources of knowledge were obtained from online media and on-site observation techniques directly in the field.

TABLE IV. THE AVAILABILITY OF KNOWLEDGE BASED OF NEEDS

Categories	Knowledge Availability
Village's Enterpreneurship	147 catalogues

Categories	Knowledge Availability
Village's Tourism	103 catalogues
Village's Featured Comodity	83 catalogues
Good Government	34 catalogues
Appropriate Technology	32 catalogues
Human Resources	51 catalogues
Essential Social Service	40 catalogues
Village's Infrastructure	129 catalogues
Cooperation and partnership	50 catalogues
Underdeveloped Regions	50 catalogues

D. Design Knowledge Management System Blueprint

The knowledge codification design that is built uses a knowledge map to describe the knowledge map as in Fig. 3. The knowledge map is obtained from discussions with experts to complement the need for knowledge about village innovation.

Furthermore, data mapping is carried out from the process of capturing knowledge in the previous stage based on the knowledge map design. Obtained 719 catalogs of knowledge availability. The next step is to design the functional requirements of applications based on the actors involved in the system environment as in Fig. 2. Through the use case diagram there are four actors, namely admin, contributor, general, and editor.

Admin has features that can manage data dashboards, manage profiles of all users, and manage user personal profiles. Contributors who are generalizations of general users can manage knowledge, provide reviews, provide ratings, discuss, manage user profiles, and register. Editors can conduct discussions, manage user personal profiles, register, and manage village profiles.

Of all the functional requirements of the system that represent the standard features of KMS classification, there is a knowledge seeking feature as knowledge discovery, a feature that makes it easier for users to search for stored knowledge by applying a search algorithm based on description sentences. The comment management feature as knowledge sharing is a means of sharing experiences between users through comments on the knowledge read, and the knowledge management feature as knowledge capture provides a means of sharing knowledge through the process of adding new knowledge to be stored in the system. Furthermore, the menu structure design is carried out on the InovasiDesa application prototype shown in Fig. 4.

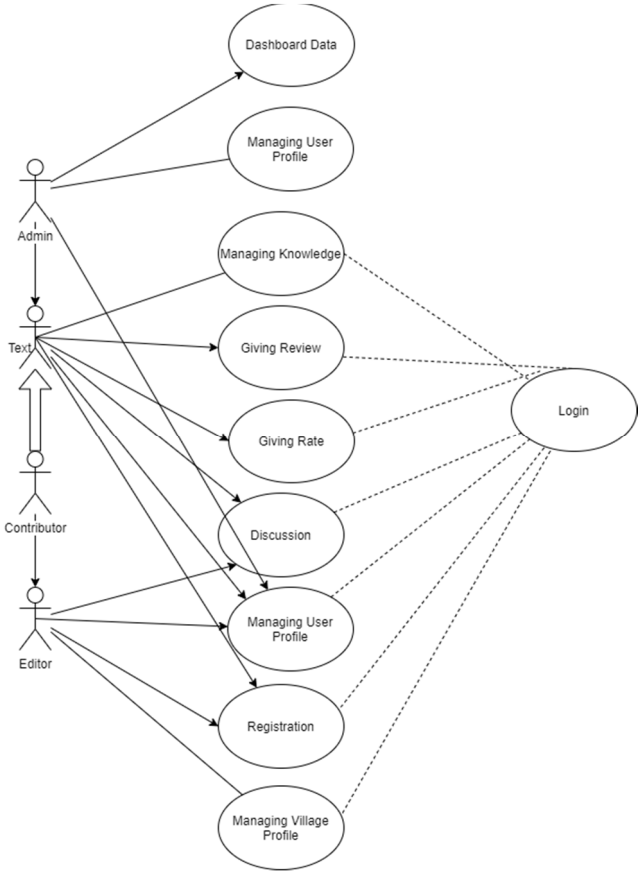


Fig. 2. Use Case Diagram

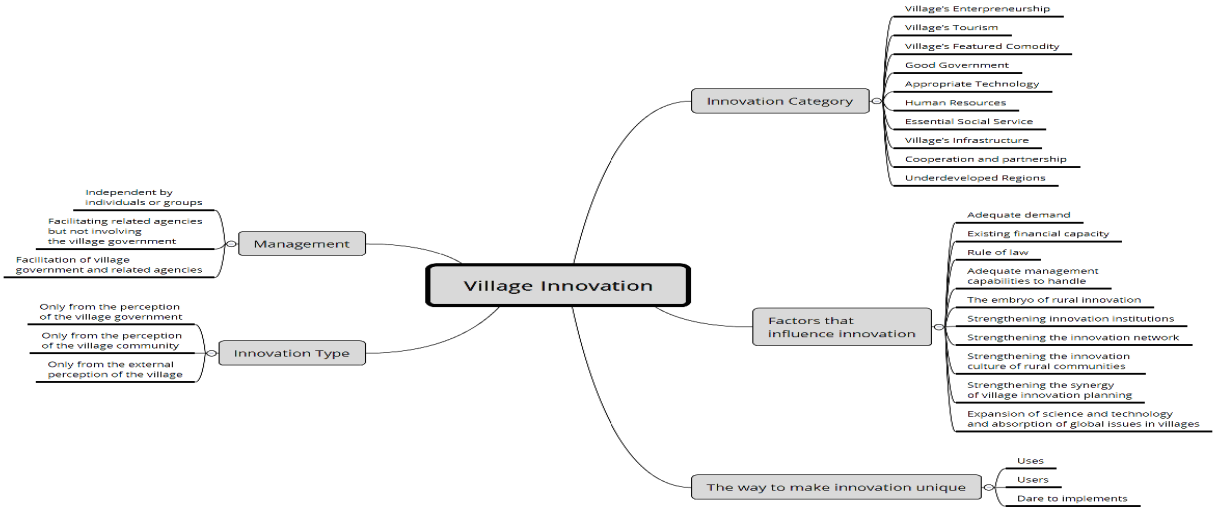


Fig. 3. Knowledge Mapping Result

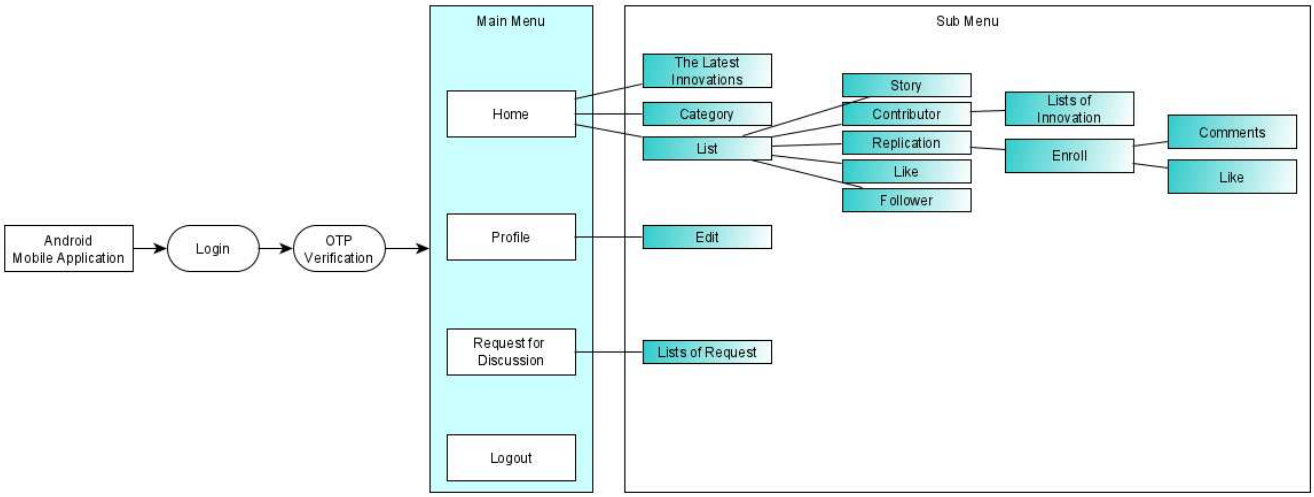
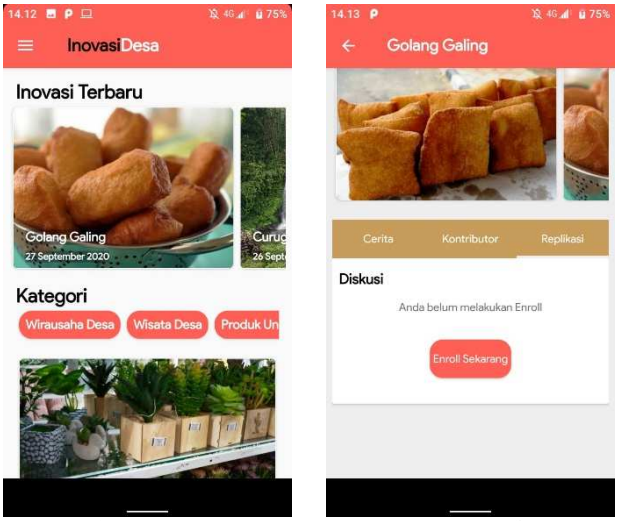


Fig. 4. Menu of InovasiDesa Apps

The KMS InovasiDesa application is divided into four main menus, including the main page (home), as shown in Fig. 4. The main menus are Home, Profile, Request for Discussion and Login-Logout. First, Home. Home consists of the latest innovations, category, and list. The sub menu of the list contains stories, contributors, replications, likes, and followers. Every ordinary user has access rights but cannot make changes to the village innovation data. The contributor's sub menu consists of lists of innovation. The sub menu from replication consists of enroll. The sub menu of enroll consists of comments and likes. Second, Profile. Profile consists of Edit. By using user data, users can view their personal data and make updates. Only register users can update or change data. And an admin can provide notes on village innovations. This record can only be seen by authorized admins. Third, Request for Discussion. Request for Discussion consists of Lists of Requests.



(a) (b)

Fig. 5. (a) Page of Search Knowledge (b) Page of Discussion

The implementation of the functional design uses an Android-based mobile application with the Java programming language. The results of the system implementation for the knowledge seeking feature that represent knowledge discovery can be seen in Fig. 5(a).

Users can sort on the category button then the system will process based on the selected category. The results of the implementation of the discussion feature that represents knowledge sharing can be seen in Fig. 5(b). Users can share experiences through discussion by responding to comments on the knowledge they read.

The knowledge management feature that represents knowledge capture is shown in Fig. 6. Contributors can view knowledge, change already stored knowledge or add new knowledge.

Fig. 6. Page of Knowledge Management

E. Verification and Validation of Knowledge Management System

Logical testing includes testing the results of codification of knowledge through experts for the knowledge validation process as in Table 5.

TABLE V. KNOWLEDGE VALIDATION

Categories	Knowledge Availability	Status
Village's Enterpreneurship	147 catalogues	Valid
Village's Tourism	103 catalogues	Valid
Village's Featured Comodity	83 catalogues	Valid
Good Government	34 catalogues	Valid
Appropriate Technology	32 catalogues	Valid
Human Resources	51 catalogues	Valid
Essential Social Service	40 catalogues	Valid
Village's Infrastructure	129 catalogues	Valid
Cooperation and partnership	50 catalogues	Valid
Underdeveloped Regions	50 catalogues	Valid

Furthermore, user acceptance testing is carried out by using blackbox testing, which can be seen in Table 6. The test is based on the main features of the KMS classification which consists of several functions resulting from the features of seeking knowledge, managing knowledge, and managing comments. The results of the blackbox testing show that the main features of the KMS classification have worked well.

TABLE VI. BLACKBOX TESTING

Description	Condition	Testing	Result	Status
Search Knowledge	Choose Search knowledge menu based on category	Choose category of village innovation	Show searched knowledge	Valid
Add Knowledge	Choose knowledge menu	Add knowledge	Show new knowledge	Valid
Edit Knowledge	Choose knowledge menu	Change knowledge	Showing Notification that Knowledge is Edited	Valid
Delete Knowledge	Choose Knowledge	Delete Knowledge	Showing Notification that Knowledge is Deleted	Valid
Add Comments	Choose Comments	Filling Comments	Showing Comments	Valid
Edit Comments	Choosing Comments Menu	Editing specific Comments	Showing New Comments	Valid
Delete Comments	Choose Comments Menu	Delete Comments	Comments deleted from comments menu	Valid

The steps of the KMSLC method determined according to the objectives in part II have been carried out. Study [16] discusses the purpose of the application of village innovation. The study has not been inlined with a suitable knowledge capture process using KMSLC. The KMSLC method starts with evaluating existing infrastructure and ends with an evaluation. The evaluation stage for existing infrastructure includes human resource infrastructure and knowledge infrastructure. There are six experts in human resource infrastructure: expert council, coordinator of editors, editors, coordinator of contributors, contributors, and technical support—knowledge infrastructure as listed in Table II. The knowledge management team form stage contains the determination of the Knowledge Management team. The knowledge capture stage resulted in 179 sources of knowledge originating from online media and field observations. The design stage of the blueprint knowledge management system mapped out village innovation knowledge and system design in the form of an android application. The verification and validation stage of the knowledge management system validates knowledge based on village innovation expert resource persons.

IV. CONCLUSIONS

Designing an android-based village innovation knowledge sharing application to share knowledge that the community can use. This application, called InovasiDesa, has been successfully created using the knowledge management system life cycle method. Knowledge capture on the design of the InovasiDesa application has also received evaluation and validation from expert resource persons in the village field.

In this study, InovasiDesa was successfully designed with standard classification features. Its namely knowledge capture on the knowledge management menu, knowledge sharing on the comments menu, and knowledge discovery on the knowledge search menu. It can support the digital learning process in a digital village community. The test results show that the standard function of the knowledge management system classification has been fulfilled and is functioning correctly.

Implementing the KM System has not been conveyed in this study. It is part of our future work. It must also consider managing change and rewards structures to encourage knowledge sharing between villages. Post-system evaluation is also essential for evaluating the current knowledge management system.

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