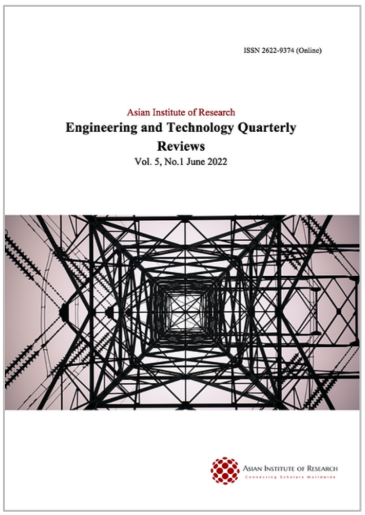

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Design of Land Selection Model for Sustainable Rice Field Direction Using SIG Technology in Kurik District of Merauke of Papua

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Abstract
Kurik District is a rice production center in Merauke Regency. The use of rice field agricultural land in Kurik District needs to be optimized for improving community welfare and the road to national food sovereignty. Until now Kurik District has not established the existence of sustainable rice fields in order to maintain food security. Determination of sustainable rice fields must be adjusted to the actual conditions of rice fields, such as water availability conditions, land intensity and rice productivity. In determining sustainable rice fields can be identified using the help of remote sensing imagery. This study aims to 1) review the ability of Landsat 8 image for interpretation of rice farming intensity based on the planting calendar 2) to find out the distribution of sustainable rice fields based on actual land criteria. Sustainable rice fields are determined by using matching methods against established criteria. The criteria that have been set consist of interrelated parameters, such as water availability, field intensity, and rice productivity. In determining the direction of sustainable rice fields first, a visual interpretation of the image of the sharpening image fussion to find out the condition of water availability, the intensity of the land with multitemporal imagery based on the planting calendar, and landform units. The results of this study have been made a model of sustainable rice field selection in Kurik District of Merauke Regency Papua.

Keywords: Sustainable Rice Fields, Rice Productivity, SIG, Kurik District

1. Introduction

Merauke Regency is the largest district in Papua Province and in Indonesia which is 46,791.63 km2 The vast natural potential (wet open land) supports Merauke Regency to be the development of one of the national rice production centers. The highest rice production centers in Merauke Regency are Tanah Miring, Kurik and Semangga districts. Kurik District has a population of 14,052 people consisting of indigenous tribes namely Malind, Muyu, Mandobo, Awuyu, Yagai and Asmat. The immigrant community in Merauke Regency is dominated by the Bugis, Javanese, Moluccas and Buton (Badan Pusat Statistik, 2018).

The sustainability of less considered land resources results in high-quality land being reduced and humans increasingly relying on marginal land resources. The causal factor of rice land to non rice land are lower productivity, low quality of land and higher economic values of land (Sumarno, 2006). This has implications for reduced food security, the level and intensity of heavy pollution and other environmental damage.

Indonesia's environmental sustainability in utilization results in community disobedience. Land use that is not in accordance with the potential of land due to lack of knowledge also causes problems. Land potential in Kurik, Merauke supports efforts to increase food sovereignty as one of the political agendas of President Jokowi and Vice President Jusuf Kalla. The author raised the research object related to sustainable Rice Field Productivity (Padi) in Dsitrik Kurik Merauke Regency.

1.1. Goals and External Targets

Based on the background and problems that arise, the purpose of this study is as follows:

1. Knowing the condition of the productivity value of kurik district rice rice as a criteria for sustainable rice field direction
2. Know the distribution of sustainable rice fields based on actual land criteria.

1.2. Benefits of Research

The benefits of the results of the research is a design of rice-specific agricultural land management in Harapan Makmur Village Kurik District Merauke District of Papua, expected to facilitate farmers in the management of agricultural land by using Geographical Information System technology.

2. Library Review

2.1. Farm Land

According to Indonesian Law No. 41/2009, agricultural land is a field of land used for agricultural cultivation. Agricultural land is used as a medium for planting certain commodities in order to meet human food needs (UU Republik Indonesia Nomor 41, 2009). Commodity crops replace the natural vegetation of the land thus generating economic value. Agricultural land consists of rice fields and non-rice fields (dry land). Rice fields are farmland that has a flat land surface and is limited by ripens so that it can be planted with food crops (rice) with a system of puddles / rain or intermittent irrigation.

2.2. Rice Plants

Rice goes through several phases of growth until it produces grain to then be ground and produce rice ready for consumption. There are three main phases of rice growth, namely (1) vegetative, (2) reproductive, and (3) maturation. The vegetative phase is the initial phase of growth of vegetative organs until the formation of malai. Reproductive phase is the primordia phase until flowering, in the tropics this phase generally takes 35 days. The last phase is the maturation phase which is the stage from flowering to mature grain. The length of this phase is generally 30 days. The time it takes for rice in each phase varies because it is influenced by physical factors as well as rice varieties.

2.3. Geographic Information Systems (GIS)

Sub systems of GIS from input data, data manipulation and analyst, data management, and output data processed by GIS to manipulate, analyze, visualize, and produce geographic information outputs equipped with their attributes. A digital cadastral map can be the basis for additional thematic layers, successively converting to a complex system for management of admininstrative units (Prahasta, Eddy, 2002).

2.4. Field Remote Sensing

Remote sensing is an important tools to upscale yield estimates from farm scales to regional level. Some researcher used remote sensing with rice model for reliable yield estimation. Several countries start to monitoring rice land that needed to synthesize current literature to identify knowledge gaps, to improve estimation accuracies (Sutanto, 2013).

3. Research Methods

3.1. Research Location

Kurik District was chosen as a research location, because it is the second largest rice producing district in Merauke Regency with the potential of vast rice fields to be developed into agricultural rice fields. Land in the research area is still much that has not been utilized optimally, therefore the location was chosen to realize food self-sufficiency in Indonesia through President Of Indonesia Jokowi's Nawacita program.

3.2. Research Stages

There are 3 stages in this research, namely the preparation stage, the implementation stage and the completion stage. Each stage of research has an interrelated process.

3.2.1. Preparatory Stages

Conducting activities to collect information related to research (library studies) as well as data preparation, both main data and supporting data. Research-related information collection activities, namely information related to remote sensing, geographic information systems, sustainable rice fields, criteria for determining sustainable food agricultural land, and other libraries. Information is obtained from a number of books, scientific journals, seminar results, and research-related articles obtained from libraries, internet access and related agencies.

3.2.2. Implementation Stages

The stage of research implementation starts from initial observation and survey, determination of coordinate points, sampling of data in the field, database design, spatial and non-spatial data design, each activity consists of related and sequential processes.

3.2.3. Completion Stage

The completion stage is the end of the research stage where the overall research reporting process is carried out.

4. Results of System Design

4.1. Proposed System

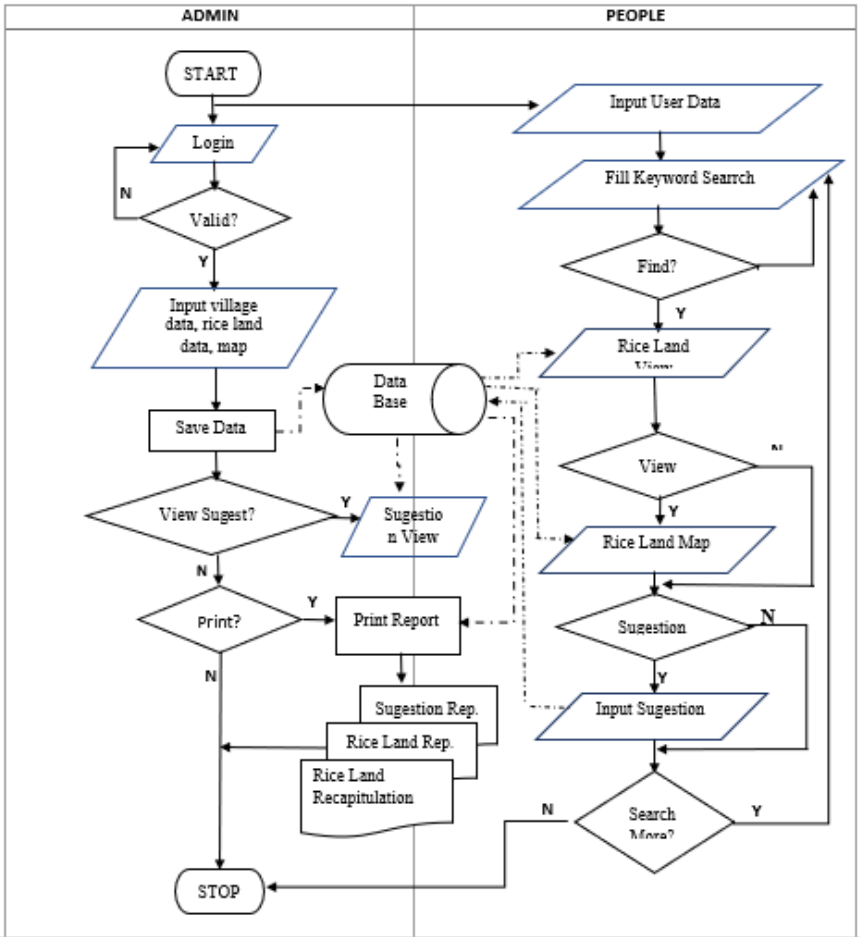


Figure 1 : Proposed System Flowchart

The proposed system has two groups of users, namely Admin and People. Admin is responsible for managing the system. Admins can set user access rights and update data. Admins can also print the required reports. The People can see the information and can provide advice if needed.

4.2. Context Diagram

This Context Diagram illustrates the interrelationship of Admins and Communities using the system.

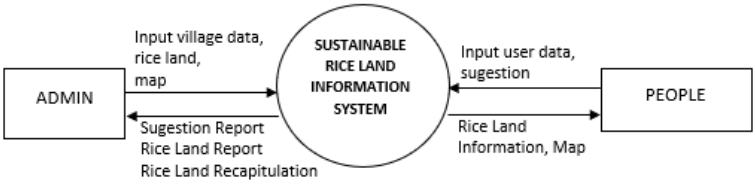


Figure 2 : Context Diagram

4.3. DFD Level 0

DFD Level 0 describes the process details on the system in Context Diagram. This diagram also illustrates the interrelationships between processes and table interrelationships.

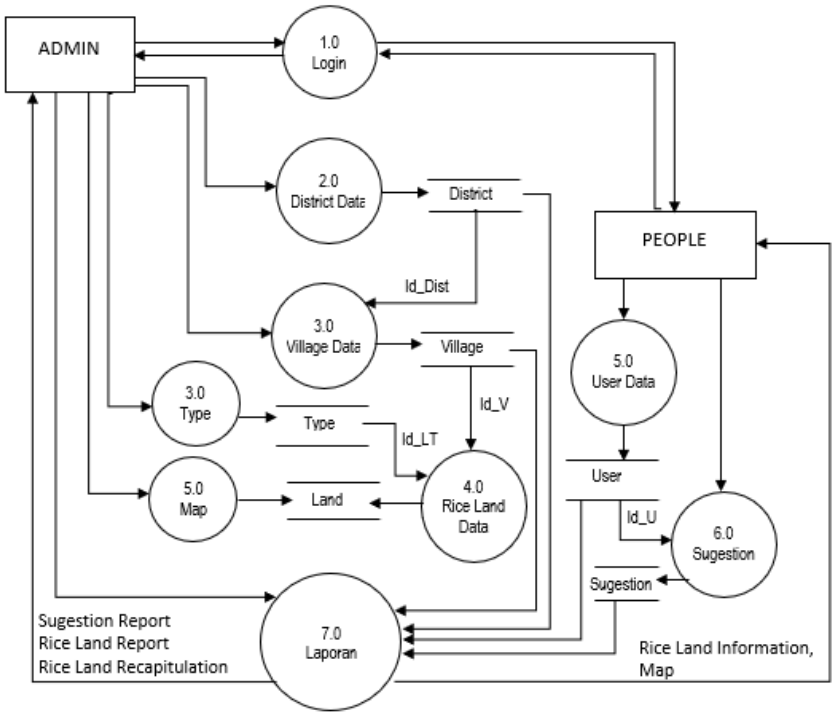


Figure 3 : Context Diagram

4.4. Entity Relationships

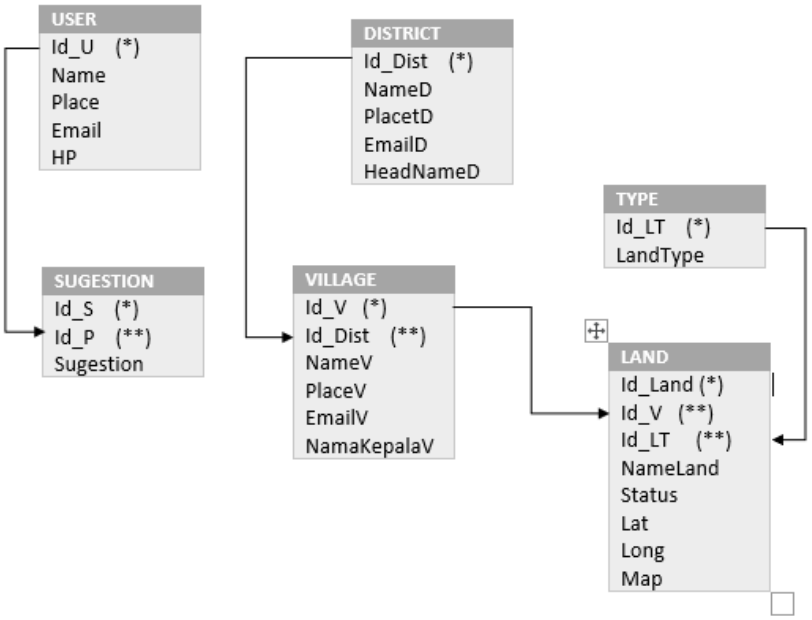


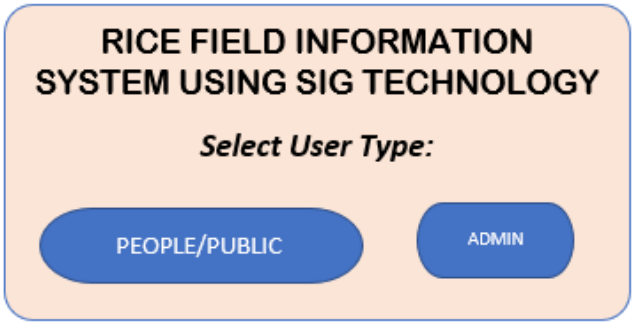
Figure 4 : Entity Relationships

This Entity Relationships describes the interrelationships of tables in the data base. User table is connected only with Sugestion tables. District Table is related to Village table, Villlage Table is related to Land table, and Land table is related to Type table.

4.5. Interface Form Design

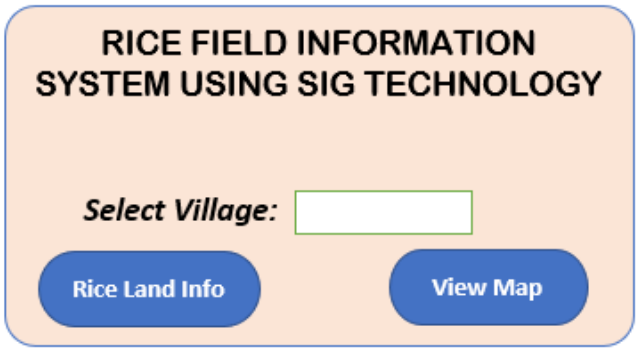
The interface design on the proposed system is useful for giving an idea of the menu display plan to be used for data input dialogs. The data input dialog design is as follows:

4.5.1. Login Dialog



If the user selects Public/General then the user will go to the user data input menu. If the user selects Admin then the user will go to the Admin login menu

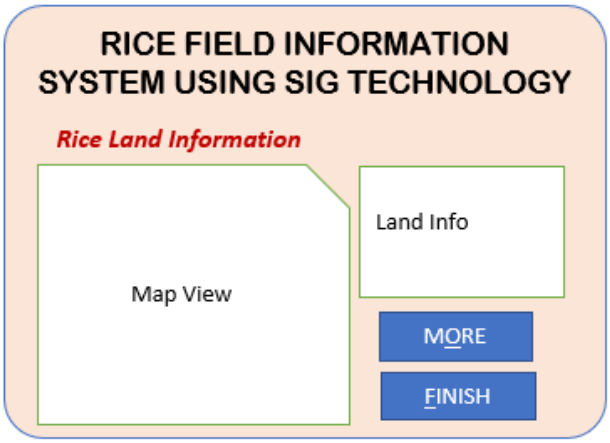
4.5.2. Land Information Search Dialog



4.6. Output Design (Output)

4.6.1. View of Rice Field Information

Kampung Data Input dialog can be opened by General Users / public



4.6.2. Design of Report

LOGO

RICE FIELD INFORMATION SYSTEM USING SIG TECHNOLOGY

PEOPLE'S SUGESTION REPORT

Date

No	Guest Name	Date	Sugestion
1			
2			

People Sugestion Reports can only be opened and printed by ADMIN Users.

4.6.3. Rice Field Report Plan

LOGO

RICE FIELD INFORMATION SYSTEM USING SIG TECHNOLOGY

RICE LAND REPORT

Date: dd/mm/yyy

No	Land's Name	Village	Land's Type	Width (Ha)	Status
1					
2					

The Rice Field Report can only be opened and printed by Admin users.

4.6.4. Land Area Recapitulation Plan

LOGO

RICE FIELD INFORMATION SYSTEM USING SIG TECHNOLOGY

RICE LAND RECAPITULATION

Date: dd/mm/yyyy

No	Village	Land's Type	Width (Ha)
1			
2			
		Total Land	**99999999**

Rice Land Recapitulation can only be opened and printed by ADMIN Users

5. Conclusions

1. All plans for the management of rice fields in the Harapan Makmur Village of Kurik District have been implemented as can be seen in Chapter V results and discussions.
2. This phase one internal research is devoted to the design of rice field management in Harapan Makmur Village of Kurik District.

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