

Geographic Information System : Information System Design and Development of Cow-Cattle Ownership Control in West Nusa Tenggara Province

Abdul Manan, Zainal Arifin Hasibuan, Husain, Ni Ketut Sri Winarti

Abstract— The magnitude of the potential of the central government set Nusa Tenggara Barat (NTB) province as one source of beef cattle and cows seedlings among 18 provinces in the country, so the pace is expected to accelerate the NTB national programs accelerate the achievement of self-sufficiency in beef (P2SDS). Therefore, the strategy pursued in developing the potential of dairy farms is to keep cows through collective cage system for the island of Lombok and the pattern of pasture or / so on Sumbawa Island.

As of mid-2010, there were approximately 880 units of collective cages cows on the island of Lombok from the target of 1,000 units of collective cages in 2013. Existence of the number of cattle each year has increased the required geographic information systems making research (GIS) and database identification of cattle ranchers. This study was conducted to produce cattle identification GIS database and cattle holdings in the province NTB. The research methodology used is the waterfall model (waterfall) is a method of information system development by means of planning, analysis, system design, coding and implementation, so that the product of the SIG is intended to generate a mapping population of cattle, cattle ownership identification database, the number of farmer groups, the number of cows owned by farmers, the number of cattle sold traditional market, the number of cows that are channeled out of the area and the number of population in the district in the province of NTB.

Index Terms—GIS, systems, cows, database and mapping

I. INTRODUCTION

The magnitude of the central government's commitment to meeting the needs of the national beef, Government of West Nusa Tenggara (NTB) launched a groundbreaking program "NTB the Earth of a Million Cows" (BSS). This breakthrough program is formulated to define a vision of forging local government from 2009 to 2013 to create NTB society that is faithful and competitive. Besides the potential of land and owned animal feed area of 1,690,156 acres of land and livestock capacity reaches 1,370,258 animal units, history and culture, NTB society has a high breeding civilization also contributed to the development of cattle. This is evident from the NTB cows contribution to support the significant development of beef needs nationally which

Manuscript received August 20, 2014

Abdul Manan, Lecturer of Informatics Department, STMIK Bumigora Mataram, NTB.

Zainal Arifin Hasibuan, Lecturer of Computer Science, Universitas Indonesia, Jakarta.

Husain, Lecturer of Informatics Department, STMIK Bumigora Mataram, NTB.

Ni Ketut Sri Winarti, Lecturer of Informatics Management Department, STMIK Bumigora Mataram, NTB.

annually NTB sends on average 16,500 *au*, seed 12 thousand *au*, with the purpose to various provinces in Indonesia

Central Government saw much potential NTB province, the province set as one source of beef cattle and cows seedlings among 18 provinces in the country, so the pace is expected to accelerate the NTB National Program to Accelerate Achievement of Self-Sufficiency Beef (P2SDS). However, the constraints faced by the majority of poor people in NTB are generally as a laborer or a peasant without land, especially on the island of Lombok and Sumbawa Island is a difficult access to capital and ability to support a limited government that made it all the landless could have cattle (Hendrawan, 2002).

Therefore, the strategy pursued in developing the potential of dairy farms is to keep cows through collective cage system for the island of Lombok and the pattern of pasture or lar / so on Sumbawa Island. As of mid-2010, there were approximately 880 units of collective cages cows on the island of Lombok from the target of 1,000 units of collective cages in 2013. Collective cages Each unit is able to accommodate up to 75 to 350 tail, involving about 18 thousand people who flat-livestock farmers average has 3-5 cows (Suwardji, 2004).

Entering the third year of the Earth of a million cows program, the local government as a form of revolving funds poured accelerating achievement of the earth a million cattle. The program is expected not only to accelerate the increase in cattle population, but also to alleviate poverty (Kedi Suradisastira, 2004). Community empowerment through NTB BSS in 2009 reached 252 farmers groups with a value of Rp.30, 308 billion of which comes from APBDP Rp.4, 545 billion and the state budget of Rp. 25.480 billion. The budget has been utilized for the procurement of livestock farmers as much as 4,351 head of cattle, stimulants cage group 27 units, graduate recruitment to build the village (smd) farm 50 people, as many as 10 LM3 boarding and development unit of the location of artificial insemination (ib) 8 units (Mashur, 2004).

The development of the cattle population since the program began NTB BSS ie an increase of 70 580 from 546 114 tail tail in January 2009 to 616 649 head in June 2010. Efforts to succeed in the BSS program NTB, NTB provincial government has issued a number of regulations, among other things: regulate trade system livestock between islands; productive cows cutting control and community-based breeding, where the regulation is issued in the form of regulations governor of West Nusa Tenggara (NTB Prov, 2013).

Review of aspects of the use of information and communication technology, then to speed up the process of good service from the government intended for the

community to handling cattle farms needed research cooperation between universities in the manufacture geographic information system (GIS) database identification of cattle and cattle ownership. research conducted with the use of laboratory models and a GIS database applications lab partner in college (Lab of Faculty of Computer Science, University of Indonesia) with the aim of enriching science for faculty research team proposer (TPP) which will produce GIS databases of cattle identification and ownership in the region NTB.

This GIS is intended that: create a mapping population of cattle based on existing county region NTB, groups who raise cattle, cattle feed area mapping of land, cattle sales market mapping and mapping of cattle slaughterhouses that will be used for the needs of cattle sales transactions by society. While the ownership of cattle identification database used to identify the number of farmer groups in each district, the number of cows owned by farmers, the number of cattle sold in each of the traditional market, the number of cows that are channeled out of the area and the number of the population in each of districts in NTB.

II. LITERATURE REVIEW

2.1. GIS Definition

GIS by definition is a device for collection, store, display and spatial data corelation of geographical phenomena to be analyzed and the results communicated to the users of data for decision-making purposes. In general there are two types of data that can be used to represent or model the phenomena contained in the real world, namely:

1. The Spatial Data presented are the type of data that spatial aspects of the phenomenon in question. This type of data is often referred to as position data, coordinates, space.
2. Attribute data is the type of data presented descriptive aspects of the phenomena being modeled. Descriptive aspects include items or properties of the phenomenon in question until the time dimension.

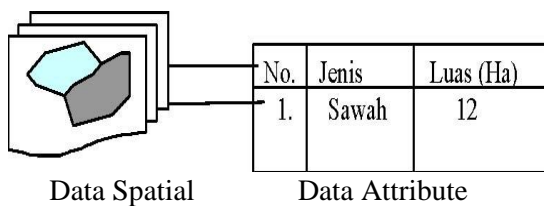


Figure 1. Spatial and attribute data model

2.1.1. GIS Spatial Data Analysis

Important aspects in design of GIS:

- a. How do we represent the earth's surface (the earth surface object) in the GIS database (TGA or object-oriented)
- b. How data analysis can be done effectively
- c. How to interpret the results of the analysis of an important aspect in determining the geographic characteristics of the object that this object determines how the data should be stored, searched / access, modeled, and represented in the presentation and measurement of objects, which include: (a) Introduction

- to characteristics / features of objects needed, (b) Are these characteristics will change in the temporal and
- (c) On a scale of how much we need to observe the object.

2.1.2. Digitized Map

How the presentation of digitized maps of geographic phenomena in the computer can be done in two forms (formats) are: raster (grid-cell) and a vector. Raster format is display object in the form of a series of cells or picture elements (pixels), while the vector format is in the form of a series of coordinates presented in the form of coordinates of both ends. A display format of raster and vector formats is as follows:

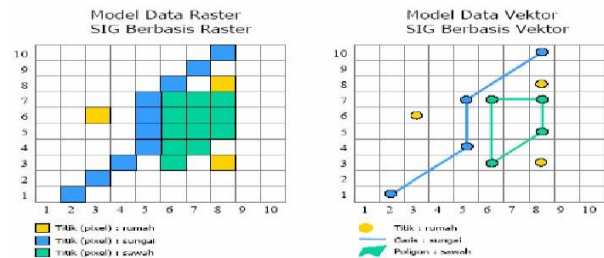


Figure 2. Raster and vector data model

Presentation of Geographical Information Systems map (GIS) can be done in two processes, namely through digitizing and sweeping (scanning).

2.2. Introduction to Database

Definition of database is “a collection of related data” (Elmazri & Navathe, 1994), “an organized collection of logically related data” (McFadden, Hoffer, and Presscot, 2002), and “a collection of data, typically describing the activities of one or more related organizations” (Ramakrishnan & Gerke, 2000).

Some other definitions of the database are as follows:

- a. A set of data store (can be in large amounts) are stored in the magnetic disk, optical disk, and other secondary storage media.
- b. A set of common application programs that are "batch" which executes and processes the data in general (delete, search, update, etc.)
- c. The database consists of data shared for multiple users and enables use of the same data at the same time by many users
- d. Unified collection of data from a enterprise. i.e interrelated base
- e. Hospital data will consist of data such as a patient, staffs, doctors, and nurses.

2.3. Information systems

Many experts who reveal the definition of information systems, such as: "The information system is a man-made systems are generally comprises set of computer-based and manual components are made to collect, store, and manage data and provide information to the user" (Oram, Gelinas, & Wiggins, 1991). "An information system aims to collect, process, store, analyze, and disseminate information for a specific purpose" (Turban, Mclean, & Wetherbe, 1999). "Information System is a series of formal procedure where the data are classified, processed into information, and distributed to the user" (Hall, 2001).

With the approach of the system can be understood through the information system components which make it up, among other things:

1. Hardware, hardware such as computers and printers
2. Software, a set of instructions that allows the hardware to be able to process the data.
3. Procedures, rules that are used to realize the data processing and produces the expected output.
4. Personnel, all those responsible for the development of information systems, processing, and use of information systems output.
5. Database, a set of tables, interrelated tables, and in relation with data storage.

III. METHODS

3.1. Research Location

Location research done by districts in the province of West Nusa Tenggara. Site selection was based on consideration of the priority application database creation; manufacture mapping, inventory of cattle ownership and maintenance of land predominantly sought in the field of dairy farms that are part of the farm system.

3.2. Research Method

This activity is intended to understand and appreciate the purpose of improvement activities through information technology infrastructure management innovation, by extracting information to understand the dynamics of cattle ranchers as actors on a system of farming in the district on dry land / marginal districts in the province of West Nusa Tenggara.

Survey on the ground to see the natural resources of each country performed using instruments namely: Transect Map, on the basis of the existing village maps. The data collected are then analyzed descriptively. Followed by designing information system into two (2) models, namely the application of mapping application models and tables are produced from cattle database processing program.

3.3. Data Collection Techniques

In this study data collection is done by: Questionnaires, interviews, documentation and direct observation. Survey done as a material for the manufacture of database creation and mapping of information systems in NTB province by district / city. The survey was done with the activities of the association are:

a. Consultation on the card Cow Ownership with the head of the Lopok village, District of Sumbawa



Figure 3. Cow Ownership Card

b. Survey to cattle farms



Figure 4. Survey to farms in Lape Lopok

3.4. Data Analysis Techniques

The analysis will be performed on the database and mapping dairy farms in the region of NTB, which include the following: (a) model and the identification of the working procedures in utilizing the database and information systems technology mapping model, (b) Model and Procedures data processing dairy farms in the region of West Nusa Tenggara, (c) model and the procedure of data processing services information systems cattle and (e) Models and cattle farm management reporting procedures in the form of data and mapping models.

3.5. Research Design

In the development of problem solving and meeting the needs of the user is the main goal of this development. Compliance with these two key success or failure of systems development. To meet that development should pay attention to the principles of information systems development. The principle that should be applied are as follows: (a) Involving users who use the equipment and systems, (b) Through a number of phases of activity. This is done to simplify management and improve effectiveness, (c) Following a standard to maintain consistency and documentation development, (d) Development of planting system as a model, (e) Have a clear scope, (f) The division of the system into a number of subsystems, thus simplifying development system, and (g) Flexibility, so easily modified and developed further.

In addition to meeting these principles should also apply the system development of information systems development methodologies. One methodology that is very popular is the waterfall model (waterfall) by Pressman with structured techniques and prototyping techniques. The methods used are: information systems development methods ownership mapping and identification of cattle in the district as NTB through the System Life Cycle (SLC) or also known as "waterfall approach", consists of four stages, namely:

a. Phase Analysis (analysis) preceded the feasibility study;
Systems analysis phase include: background analysis, functional analysis and system requirements. Background analysis is a collection of facts as a basis for studying the existing systems such as: the nature of the organization, the history of the organization, organizational goals, organizational forms, legal aspects, resources (men, money, machines, materials and methods), product / service, experience, and problems encountered.

b. Stage Design (design);
System Design is based outcome or output-oriented, meaning that processes and inputs seen after a specified desired outcomes, so it can be seen the minimum requirements of an information network system. performed on the system design consists of a contex

Diagram, Data Flow Diagram, Data Dictionary, Database Structure and display programs.

c. Stage programming (code);

Perform programming for interaction between devices with the software through a computer programmer

d. Stages Test and Implementation (Testing) consist of:

- ✓ Designing trial phases
- ✓ Designing detailed implementation plan;
- ✓ Completing inadequate equipments;
- ✓ Preparing structure of *database, data entry, scan, reformat* , and so on
- ✓ Migrating to new system;
- ✓ Migrating parallely.

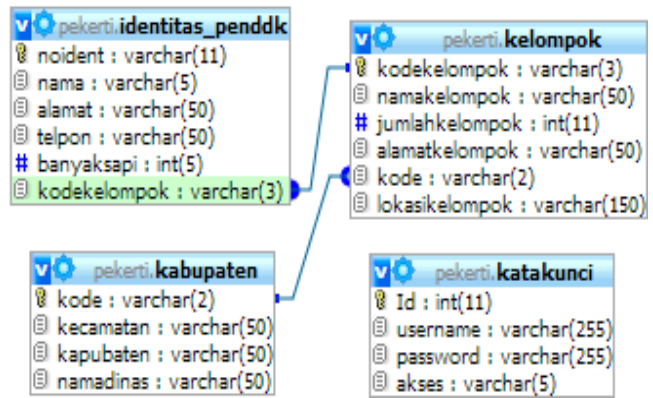


Figure 6. Database Structure Relational Model

IV. RESULTS AND DISCUSSION

After a study of the obtained results in the form of products consisting of cattle ownership database, mapping territories cows per farmer groups and software applications related to mapping cows and cattle ownership.

4.1. Cattle Ownership Structure Database

Cattle ownership structure of the database with the database name: character consisting of 4 table is the table keyword, county, ownership groups and identity.

- ✓ Keyword: table used to save user data that populate the database
- ✓ Region: to save data of subdistricts and regions related with cattle ownership data
- ✓ Group: table used to save data of cattle farmers groups
- ✓ Identitas_penddk : table used to save data of cow cattle farmers.

4.2. Regional Mapping Application

This application will generate data in the form of cattle ownership system in the show by way of mapping tables.

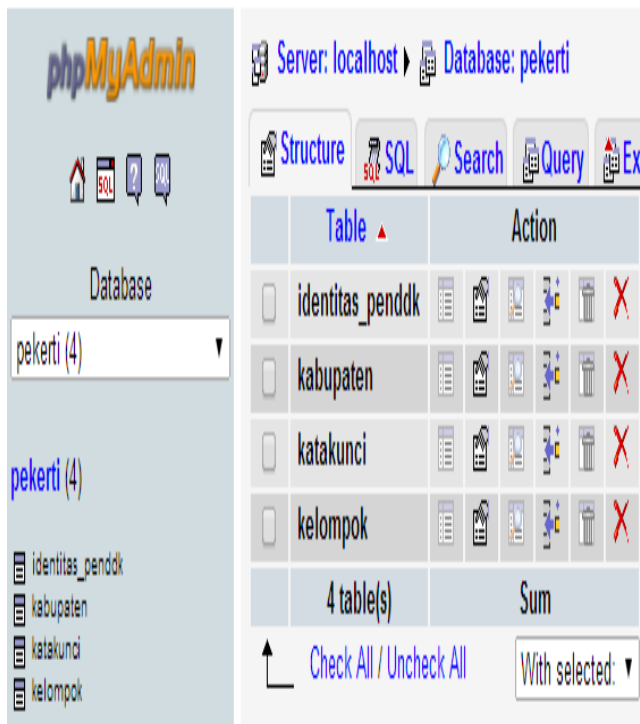
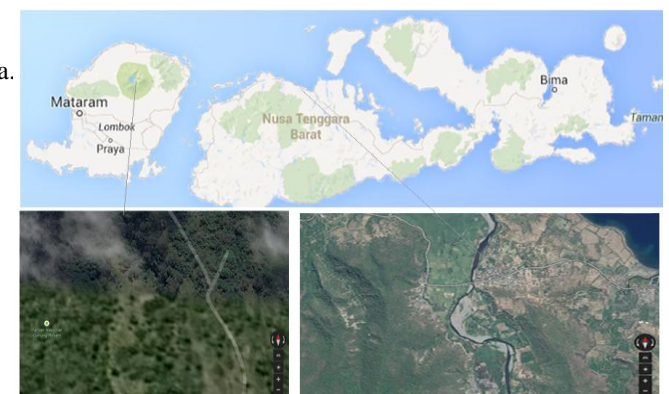


Figure 5. Database Structure

From the 4 tables above, there 3 tables have relational connection, those are; region table, group table, and identitas_penddk table.

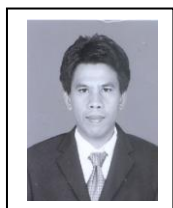
V. CONCLUSION

- ✓ Application Mapping using a system that can determine the spread of cattle in the region of NTB
- ✓ Can know the population of which is the number of cattle farmers in each district and sub-district
- ✓ Can know the number of cattle owned by the province
- ✓ Regional mapping of livestock feed and land can be precisely known.
- ✓ Can be easier for leaders in each region to provide assistance to a group of cattle farmers in the district.

REFERENCES

[1] Sutanto. 2002. Resource Utilization Optimization Strategies and Appropriate Technology to Improve Revenue Farming Beef Cattle Breeders. Proceedings of the National Seminar. Institute for Agricultural Technology of NTB. AARD. Department of Agriculture.

- [2] Kedi Suradisastra. 2004. Context Cultural Ecology of eastern Indonesia in Dryland Optimization. Proceedings of the National Seminar. Empowerment of Poor Farmers in Marginal Land Through Appropriate Technology. BPTP NTB. Puslitbangsosek. Badan Litbang Pertanian.
- [3] Mashur and A. Muzani. 2004. Prospects of Development of Cattle Breeding Centers of Bali Cow in Marginal Land Cattle Going to Support Provision in West Nusa Tenggara. Proceedings of the National Seminar. Empowerment of Poor Farmers in Marginal Land Through Appropriate Technology. BPTP NTB. Puslitbangsosek. Badan Litbang Pertanian.
- [4] Puspadi, Ketut., Yohanes G.B., Sri Hastuti, I Made Wisnu W., Prisdiminggo, Kuku Wahyu W., Sasongko WR. Mashur, 2004. Report of Understanding In Participatory Rural Poor Farmer in the region of East Lombok. Institute for Agricultural Technology NTB.
- [5] Puspadi, Kt., Yohanes G. B., A. Muzani, Mashur. 2004. The Book of Economic Social and Institutional Animal Plant PRA Draft Chapter II: Local Wisdom of Bali Cow Cattle Penning Patterns in Crop-Livestock Farming Systems (Case in NTB). Presented on the Workshop of Crop Livestock System in Bogor 25 May 2005. Not yet published.
- [6] Puspadi, Kt., Yohanes G. B., A. Muzani, Mashur. 2004. In a paper entitled: Institutional Opportunities In Base Cages Collective Agribusiness Development Cattle Breeding of Bali Cow in West Nusa Tenggara. Presented at the workshop Institutional Animal Plant Farming Systems (CLS). Denpasar, 30 December 2004 – 2 January 2005.
- [7] Message from the Governor NTB. 2004. Proceedings of the National Seminar. Empowerment of Poor Farmers in Marginal Land Through Appropriate Technology. BPTP NTB. Puslitbangsosek. Badan Litbang Pertanian.
- [8] Subandi and Zubachtirodin. 2004. Prospect of Planting Corn in Feed Forage Biomass Production. Proceedings of the National Seminar. Empowerment of Poor Farmers in Marginal Land Through Appropriate Technology. BPTP NTB. Puslitbangsosek. Badan Litbang Pertanian.
- [9] Suwardji. 2004. Finding Scenario Development Sustainable Dryland Agriculture in the Province of NTB. Proceedings of the National Seminar. Empowerment of Poor Farmers in Marginal Land Through Appropriate Technology. BPTP NTB. Puslitbangsosek. Badan Litbang Pertanian.
- [10] Yohanes G. Bulu, Sasongko WR., Tanda S Panjaitan and Sudarto. 2004. Perceptions of Farmers Against Animal Feed Supplies in Different Physiological Status of Bali Cow Cattle. Proceedings of the National Seminar. Empowerment of Poor Farmers in Marginal Land Through Appropriate Technology. BPTP NTB. Puslitbangsosek. Badan Litbang Pertanian.
- [11] Yumichad Yusdja and Nyak Ilham. 2004. Agribusiness Development Policy Review of Beef Cattle. Agricultural Policy Analysis Bulletin. Puslitbangsosek. Badan Litbang Pertanian. Bogor.



Abdul Manan was born in Utan, Sumbawa, West Nusa Tenggara, Indonesia at August 15, 1971. Graduated from Master of Information Technology, Technique Faculty, Gadjah Mada University, Indonesia, in 2008. Beside as a civil employee in Mayor Office of Mataram, he is a lecturer in STMIK Bumigora of Mataram, teaches *Web Programming, Computer Networks, Simulation and Modelling*, and so on. Some of his research experiences are *Integrated*

System of Private Tertiary Education in West Nusa Tenggara (2013), *Biometric: Health Service Model for Poor People of Mataram* (2012), *Mapping the Komodo Island as Tour Destination Using GIS* (2012), *Master Plan of West Nusa Tenggara Province* (2010).