Forest Area Land Management Information Based on Website

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Abstract: Management of forest area land is a concern for community cultural values, aspirations, and involvement of local forest area communities in managing forest land with the existence of Community Based Forest Management(CBFM). In an effort to make it easier to collect data, currently, the management of forest land management data at *Perum Perhutani* KPH (KPH is the smallest unit of the forest management system at the site level) Tenggarong, especially in the Community Based Forest Management (CBFM) section, is still done manually by writing in a ledger. With the aim that *Perum Perhutani* KPH(is the smallest unit of the forest management system at the site level) Tenggarong, especially the Community Based Forest Management (CBFM) section, can use web-based application technology to be able to collect data more efficiently in terms of time and cost and print reports. The methodology of making this research uses the Waterfall methodology which consists of needs analysis, system design, program code writing, system testing, and application implementation and maintenance. The programming language used is PHP with a database using MySQL. This research develop a web-based forest area land management information system, that can facilitate and assist in recording and reporting "Pesanggem" (forest cultivator) data carried out by Community Based Forest Management(CBFM) expert staff at Perum Perhutani KPH (which is the smallest unit of the forest management system at the site level) Tenggarong.

Index Terms: Forest Cultivator (Pesanggem), Community Based Forest Management (CBFM).

1. Introduction

The development of increasingly advanced technology today greatly affects all aspects of human life to facilitate work or in obtaining information [1-3]. Information is processed properly to obtain accurate and precise data which can

then provide easy access to any data to users, one of which is in data processing in a company and agency to support a job. *Perum Perhutani* is a State-Owned Enterprise (SOE) that is engaged in forestry management [4], utilization [5,6], and conservation of natural forests [7] that has a Collaborative Forest Resource Management system [8-10]. The company does not only work for the benefit of the owners of capital [11,12] but is also needed to contribute to the welfare of the community through the Forest Village Community Institution (FVCI) [11,13].

Forest Cultivator (Pesanggem) is a term for farmers who work on forest land belonging to *Perhutani* [14]. Forest Cultivator (Pesanggem) farmers generally come from villages around the forest [14,15]. They manage land in forest areas that have been cleared by Perhutani, by planting various types of secondary crops, corn, pouring, and various other plants [2,16]. The data processing system for the "Pesanggem" in forest area land management currently running at Perum *Perhutani* KPH (is the smallest unit of the forest management system at the site level) Saradan is still done by manually writing the data of the Forest Cultivator (Pesanggem) in the archive ledger per year which then the data will be sent to the Perhutani head office as evidence of the report data for messages [17].

By analyzing these problems the author has the idea of being able to participate in solving these problems by creating an information system that can help to process the data of the Forest Cultivator (Pesanggem) in the management of forest area land. The new system is expected to replace the old system, so as to reduce the level of error and difficulty in the data collection process. Santoso, et al [18] entitled "Development of Information System for Data Collection of Farmers and Farmers Groups". The result of this research is the development of an information system with the aim of facilitating the process of collecting data on farmers and farmer groups where the information system is developed with a web display that is more efficient and easy to understand. In this paper research has similarities with the research above, namely development techniques that both aim to simplify data collection and make reports of all existing data.

Kristiawan [19] with the title "Analysis and Design of Farmer Group Data Management Information Systems at UPTD Department of Agriculture, Plantation, Fisheries and Livestock (Dintanbunnakikan), Jiken District". The results of this research are to make it easier to manage farmer group data and carry out bookkeeping by computerization at the UPTD (Regional Technical Implementation Unit) Dintanbunnakikan (Department of Agriculture, Plantation, Fisheries) Jiken and can improve performance by reducing the use of paper, pens, and books. Because with a computerized system the service process for farmer groups is faster and no longer focuses on storage when using books. In this research, it has similarities with the above research, where the data which was previously carried out manually with paper bookkeeping is expected to be more efficient if the process is carried out computerized.

2. Methodology

Waterfall method is the oldest software development method because it is natural. The Waterfall method is the earliest SDLC approach used for software development. [20,21]. The sequence in the Waterfall Method is serial, starting from the planning, analysis, design, and implementation processes on the system [22]. Information Fig. 1 :
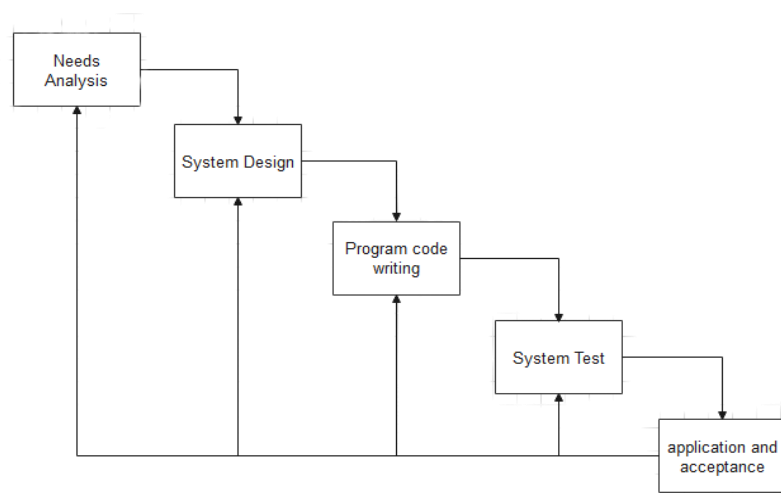

Fig.1. Waterfall Method

1. *Needs Analysis Stages*

Of the need for search process data to be collected for system creation.

2. *System Design*

This step is carried out by processing the data obtained from the first in design software to be made in the form of diagrams, flowcharts, architecture software, and display programs.

3.   Writing Program Code

The process of changing the shape of the design system into a programming language so that it can be read by the computer goes through the coding process by programmer.

4.   System Test

The trial stage on applications that has been made to know there is error in the system.

5.   Application Deployment and Maintenance

At this stage, the implementation and maintenance on applications that have already been made and successful at this stage trial so that the application can continue works fine.

System process design using UML model design (Unified Modeling Language) which consists of from use case diagrams, activity diagrams, and class diagrams.

2.1. Use Case Diagram

Fig. 2 is a use case diagram. Use diagram is one of many types of UML (Unified Modeling Language) diagrams that describe the interaction relationship between the system and the actors. [14]

1.   Farm admins may access user data and Forest cultivator data.
2.   Employees may only access Forest cultivator data.
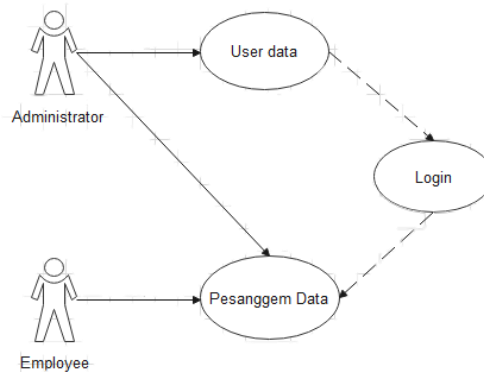3.   Farm admins and employees need a login to access.

Fig. 2.Use Case Diagram Admin and Employee.

2.2. Class Diagram

Fig. 3 is a class diagram. The class diagram describes the structure of the system in terms of defining the classes that will be created to build the system. Classes have what are called attributes and methods or operations.
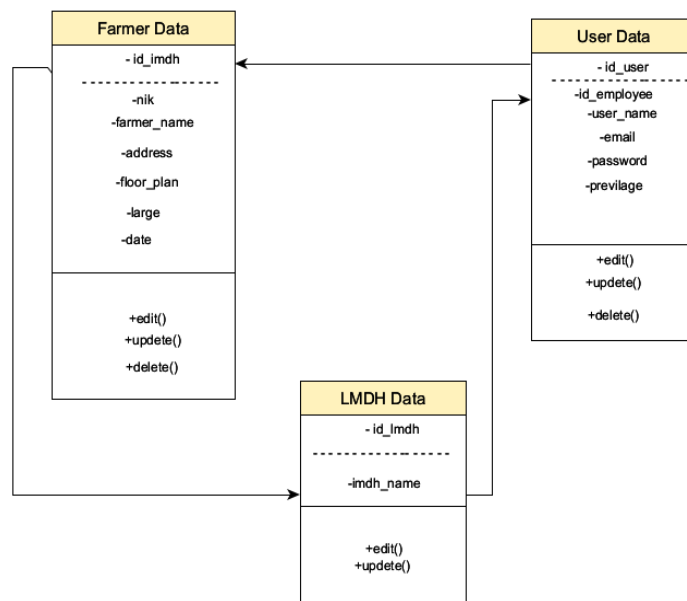

Fig.3. Class Diagram.

In the class diagram, the database is divided into 3 tables, namely:

1) Data Farmer (Forest cultivator)
   a. Contains id_imdh (automatically filled in), National Identification Number, name, address, slot, width and date.
   b. The data in the Farmer data table can be edited, updated, deleted, by the farm admin.
2) User Data
   a. Contains id_user (automatically filled in), Employee Identification Number, admin name, email, password and privileges.
   b. Data in the User table data can be edited, updated, deleted, by the farm admin.
3) LMDH data
   a. A contains id_lmdh (automatically filled in) and lmdh_name.
   b. The data in the LMDH table can only be edited and updated but cannot be deleted by the farm admin.

2.3. Activity Diagram (Data Recording and Printing Reports)

Fig. 4 is the activity diagram. An activity diagram is a diagram that can model the processes that occur in a system. The process sequence of a system is depicted vertically. Activity diagram is a development of Use Case which has activity flow.
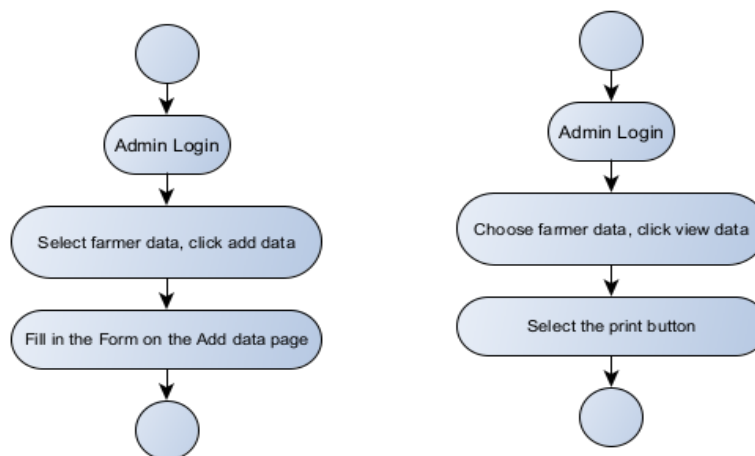
Fig.4. Activity Diagram.

2.4. DFD Level 0 (Data Flow Diagram Level 0)

Fig. 5 is DFD Level 0. DFD level 0 is a diagram or it could be a context diagram is the lowest level diagram that describes how the system interacts with external entities. The context diagram will be given a number for each running process, generally starting from 0 for the initial start.
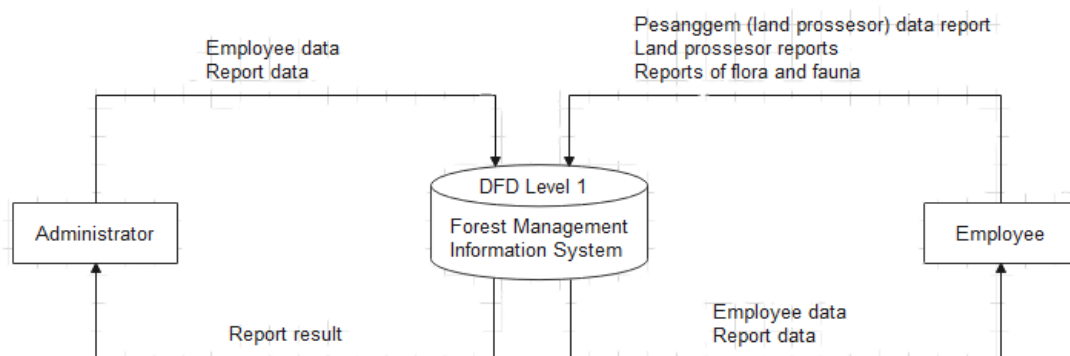
Fig. 5. DFD Level 0.

3. Result and Discussion

The application of the forest area land management information system has an interface display and data processing processes that have been implemented in the following pictures and explanations:

3.1. Administrator View

1) Login View

Fig. 6 is the login page. This view is the display used by users or admins who previously had to login first. On the Perhutani admin login page, you can login to enter the dashboard.

Fig. 6. Login Page.

2) Add Data Page View

Fig. 7 adds a data page. On this page view, the admin can add message data by filling in the form provided. Add land data manager by agriculture admin :
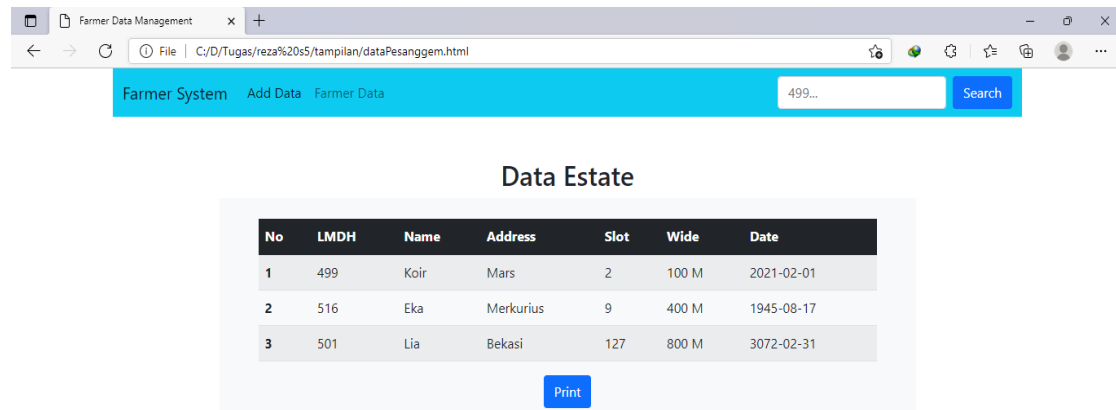
a. Column 1: Filled with LMDH data.
b. Column 2: National Identification Number is a resident identity number that is unique or distinctive, singular and attached to a person who is registered as a resident of Indonesia.
c. Column 3: The name of the "Pesanggem" is the person who has the right or is entitled to be responsible for the responsibility of the land through Perhutani..
d. Column 4: Address of land managed by forest cultivators.
e. Column 5: How many plots of land will the Cultivator manage?
f. Column 6: How much area is managed by the forest cultivator.
g. Column 7: Filled with the date of registration to become a forest cultivator.

Fig. 7. Add Data Page.

3.2. Employee View

Fig. 8 is forest cultivator (Pesanggem) page. On this page, employees can view, search, and print message data. The farm admin can view data and manage data from Forest cultivators.

a. Column 1: Contains serial numbers of data.
b. Column 2: Forest Village Community Institution.
c. Column 3: National Identification Number.
d. Column 4: Name of the land manager.
e. Column 5: Forest cultivator's address.
f. Column 6: Plot of land to be managed.
g. Column 7: Land area under management.
h. Column 8: Registration date.

Fig.8. Forest Cultivator (Pesanggem) Page.

On this page, the farm admin can print the existing data to share it with the government.

4. Conclusion

Based on the results of the research and discussion of the current study, the information system for land management in forest areas that were built was enough to make it easier for Community Forest Management. Staff to record and manage Forest Cultivator (Pesanggem) data, as well as make it easier to print reports from Forest Cultivator (Pesanggem) data. With this application, message data recording looks more up-to-date with modern and technological development.

References

[1] Rammer, W., Schauflinger, C., Vacik, H., Palma, J. H., Garcia-Gonzalo, J., Borges, J. G., & Lexer, M. J. (2014). A web-based ToolBox approach to support adaptive forest management under climate change. *Scandinavian Journal of Forest Research*, *29*(sup1), 96-107.

[2] Pahlevi, A. (2018). Sistem Informasi Pengelolaan Lahan Kawasan Hutan Berbasis Web. *DoubleClick: Journal of Computer and Information Technology*, *2*(1), 16-21.

[3] Marto, M., Reynolds, K. M., Borges, J. G., Bushenkov, V. A., Marques, S., Marques, M., ... & Tomé, M. (2019). Web-based forest resources management decision support system. *Forests*, *10*(12), 1079.

[4] Vacik, H., Torresan, C., Hujala, T., Khadka, C., & Reynolds, K. (2013). The role of knowledge management tools in supporting sustainable forest management. *Forest Systems*, *22*(3), 442-455.

[5] Nowak, D. J., Maco, S., & Binkley, M. (2018). i-Tree: Global tools to assess tree benefits and risks to improve forest management. *Arboricultural Consultant. 51 (4): 10-13.*, *51*(4), 10-13.

[6] Packalen, T., Marques, A. F., Rasinmäki, J., Rosset, C., Ferreti, F., Mounir, F., ... & Nobre, S. R. (2013). A brief overview of forest management decision support systems (FMDSS) listed in the FORSYS wiki. *Forest systems*, *22*(2), 263-269.

[7] Kalabokidis, K., Athanasis, N., Gagliardi, F., Karayiannis, F., Palaiologou, P., Parastatidis, S., & Vasilakos, C. (2013). Virtual Fire: A web-based GIS platform for forest fire control. *Ecological Informatics*, *16*, 62-69.

[8] Ma, Z., Chen, M., Zhang, B., Wang, M., Shen, C., Yue, S., ... & Lü, G. (2019). A Web‑Based Integrated Modeling and Simulation Method for Forest Growth Research. *Earth and Space Science*, *6*(11), 2142-2159.

[9] Putra, R. R. (2019). Sistem Informasi Web Pariwisata Hutan Mangrove di Kelurahan Belawan Sicanang Kecamatan Medan Belawan Sebagai Media Promosi. *Jurnal Ilmiah Core IT: Community Research Information Technology*, *7*(2). Vacik, H., & Lexer, M. J. (2014).

[10] Past, current and future drivers for the development of decision support systems in forest management. *Scandinavian Journal of Forest Research*, *29*(sup1), 2-19.

[11] Pratihast, A. K., DeVries, B., Avitabile, V., De Bruin, S., Herold, M., & Bergsma, A. (2016). Design and implementation of an interactive web-based near-real-time forest monitoring system. *PloS one*, *11*(3), e0150935.

[12] Hamilton, S. L., Gleason, M. G., Godoy, N., Eddy, N., & Grorud-Colvert, K. (2022). Ecosystem-based management for kelp forest ecosystems. *Marine Policy*, *136*, 104919.

[13] Yan, G., Shi, Z., Cui, B., & Li, H. (2022). Developing a new thermal comfort prediction model and web-based application for heat stress assessment in dairy cows. Biosystems Engineering, 214, 72-89.

[14] R Kurniawan, T. A. (2018). Pemodelan use case (UML): evaluasi terhadap beberapa kesalahan dalam praktik. J. Teknol. Inf. dan Ilmu Komput, 5(1), 77.

[15] Sacher, P., Meyerhoff, J., & Mayer, M. (2022). Evidence of the association between deadwood and forest recreational site choices. Forest Policy and Economics, 135, 102638.

[16] Pahlevi, A. (2018). Sistem Informasi Pengelolaan Lahan Kawasan Hutan Berbasis Web. DoubleClick: Journal of Computer and Information Technology, 2(1), 16-21.

[17] Vicky, M. R., & Septiana, L. (2021). Perancangan Sistem Informasi Koperasi Simpan Pinjam Berbasis Web Pada Koperasi Hutan Lestari Jakarta. Jurnal Manajemen Informatika Jayakarta, 1(3), 208-219.

[18] Santoso, H. B., Malvin, C., & Delima, R. (2017). Pengembangan Sistem Informasi Pendataan Petani dan Kelompok Tani. SESINDO 9, 2017.

[19] Kurnawan, H. (2014). Analisis Dan Perancangan Sistem Informasi Pengolahan Data Kelompok Tani Pada Uptd Dintanbunnakikan Kecamatan Jiken. Thesis Sekolah Tinggi Majajemen Informatika Dan Komputer Amikom Yogyakarta.

[20] Sihombing, V., & Yanris, G. J. (2020). Penerapan Aplikasi Dalam Mengolah Aset Desa (Studi Kasus: Kepenghuluan Sri Kayangan). Jurnal Mantik Penusa, 24(1), 12-15.

[21] Muttaqin, T. (2014). Evaluasi Kekritisan Lahan di Kawasan Lindung Kecamatan Pujon Kabupaten Malang Jawa Timur tudengan Teknologi Sistem Informasi Geografis. Jurnal Gamma, 10(1).

[22] Utomo, B., Budiastuti, S., & Muryani, C. (2017). Strategi Pengelolaan Hutan Mangrove di Desa Tanggul Tlare Kecamatan Kedung Kabupaten Jepara. Jurnal Ilmu Lingkungan, 15(2), 117-123.

Authors' Profiles

Asep Nurhuda, S.Kom, M.Kom, was born in Samarinda on February 8, 1989. He is a lecture of Software Engineering Technology, Polytechnic of Agricultural, Samarinda since 2021. He is also a teacher of Network Engineering in Senior High School Muhammadiyah 1 Samarinda until now. He obtained Master Degree from Business Engineering in STMIK Eresha Jakarta (2014). He also obtained Cisco Certified Network Associate (CCNA) & Foresec Certified in Networking Security (FCNS) in 2013.

Koir Herianto was born in Loa Duri, April 5th, 2001. He was graduate from Bhakti Loa Janan vocational high school. Now, he studying in 5th semester majoring Software Engineering Technology in Polytechnic of Agricultural in Samarinda. When I was a teenager I had an Android cellphone, but unfortunately the cellphone is outdated, it's a shame compatible games, that's why I changed my habit to read articles about startup companies, the habit continues to this day.

Eka Fitriani was born in Tabalong on December 24th, 2000. She was graduate from Senior High School 6 in Samarinda. Now, she studying in 5th semester majoring Software Engineering Technology in Polytechnic of Agricultural in Samarinda. My hobbies are reading, listening to music, and dancing. I also listen to K-pop music a lot, like everyday food haha. My fandom name is NCTzen. My dream is to be part of Google, part of the design. I have a motivational handle for me to be more enthusiastic about living life, namely: "In life, there are sweet and bitter tastes. Sometimes we have to taste bitterness to really enjoy sweetness when it comes to us." And one more motivation, I think this really hits me so I don't keep complaining, "If it's wrong, fix it. If it fails, try again. But if you give up, it's all over."

Lia Pera Wati was born on October 28th, 2001. Now, she studying in 5th semester majoring Software Engineering Technology in Polytechnic of Agricultural in Samarinda was born on the day of commemorating the youth oath, has a hobby of watching K-Pop music videos, having a Korean husband is a pleasant hallucination, besides that she like to sing, the first time she wandered in college, she had to be smart in managing her own life.

Reza Andrea earned his Bachelor's degree from Computer Science, Mulawarman University in 2012. In 2013 he was involved in a game development project as a leader of Bibir Design Studio and he was awarded the best 2D game developers of Indonesia Game Show (IGS). In 2014, Reza Andrea earned his Master's Degree in Business Engineering from Department of Computer Engineering, STMIK Eresha, Jakarta. Now, he is a lecturer in Software Engineering Department in Polytechnic Agriculture of Samarinda and Expert Staff of Research Department in STMIK Widya Cipta Dharma.