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Innovating Information Management System for Cow's Milk Distributor

Yusuf Sutanto[1], Budi Al Amin[2], Heribertus Ary Setyadi[3]

[1]Economics and Business Departement, Dharma AUB Surakarta University, Surakarta, Indonesia
[2,3]Information System Departement, Bina Sarana Informatika University, Surakarta, Indonesia
Email: [1]yusuf.sutanto@stie-aub.ac.id, [2]budi.bdm@bsi.ac.id, [3]heribertus.hbs@bsi.ac.id

Abstract

This study explores the recent advancements in cattle farming, focusing on the significant role of dairy farming in bolstering the economy, particularly in rural communities. It highlights how dairy farming enhances the economic value for farmers, with an emphasis on Banyuanyar Boyolali, where residents predominantly engage in this practice. The research underscores the profitability of selling cow's milk, noting the local milk prices, and aims to develop a web-based milk data management system. This system seeks to bring transparency and accessibility to milk production data, benefiting both farmers and collectors. Utilizing the Rapid Application Development (RAD) method, which involves minimal personnel, the study demonstrates how this web-based system streamlines data entry and access, facilitating better record-keeping and decision-making in dairy farming.

Keywords: Cows, Milk, Management Information System, Collectors, Boyolali

1. INTRODUCTION

In Indonesia, animal husbandry, particularly cattle farming, is a significant business venture, with dairy farming playing a pivotal role in the nation's economic development and protein self-sufficiency goals. Cows, highly valued for their milk, meat, and labor, form the core of this sector [1]. The growth of the dairy cattle industry is supported by government regulations such as the Minister of Agriculture's Number 100 and the Technical Guidelines from 2015, aiming to enhance milk and meat production [2].

The advancement of dairy farming in rural communities has considerably improved the local economy, particularly benefiting breeders. This sector's progress necessitates government support for business scaling and milk price stabilization [3]. However, challenges such as limited outreach, farmers' lack of awareness about livestock registration benefits, and inadequate data collection facilities persist, hindering optimal development [4].

Record-keeping in dairy farming is essential, providing detailed livestock

information crucial for daily decision-making and long-term planning, thus aiding farm managers in evaluating their business's profitability and sustainability [5]. Profitability is a primary focus for farmers, often driving the choice of commodity cultivation [6]. This focus aligns with dairy farmers, where the economic and sustainability value acts as a key motivator [7].

In terms of production, regions like East Java, West Java, and Central Java are leading milk producers in Indonesia, with Boyolali Regency in Central Java being a top milk producer in 2019. The majority of Banyuanyar Boyolali residents engage in dairy farming, attracted by the promising profits and the potential to enhance income through cow milk productivity [8].

Previous studies have focused on various aspects of dairy farming management, including cow data, maintenance, and financial management, each employing different methodologies and functionalities [9,10]. Another study offered comprehensive mapping and information about farms in Kediri Regency, providing various management tools and user interaction features [11].

Contrasting with these studies, this research develops a web-based information system tailored to milk distributors, encompassing dairy farmers and milk factories. This system aims to streamline data management, produce essential reports, and offer real-time visibility of milk production for both breeders and collectors, leveraging the accessibility and convenience of web technology [12].

2. METHODS

2.1. Data Collection Methods

Data collection is a critical research technique that begins with acquiring data and knowledge pertinent to the research objectives. Without effective data collection methods, researchers may struggle to gather information that meets the predetermined data standards [12].

1) Observation: The research included visiting a milk collector, Mr. Maryadi, to understand the data requirements in the milk deposit process from farmers. Engagements with Mr. Maryadi provided insights into the daily operations and data flow from the dairy farmers. Simultaneously, interviews were conducted with the cattle breeders, focusing on the challenges they face and their aspirations for the future. The insights gained from these discussions were instrumental in shaping the development of the system, particularly in determining the necessary data and information to be included.
2) Literature Review: The research methodology also encompassed a comprehensive literature review. This involved consulting a variety of

sources, including academic journals and books from libraries, as well as conducting internet searches for materials relevant to the research topic. The literature review served to supplement the observational and interview data, ensuring a well-rounded understanding of the subject matter and aligning the research with existing knowledge in the field.

2.2. System Development Method

The Rapid Application Development (RAD) method, employed in this research, is an incremental software development process model, particularly effective for short-term projects [13]. The RAD approach involves dividing the development team into multiple sub-teams, each responsible for different sections of the project. These sections can be developed concurrently, allowing for a more efficient workflow [14]. The choice of RAD was also influenced by the project's time constraints, with only about four months available for development. RAD is characterized by its ability to actively involve users throughout most of the development process [15]. The RAD method consists of four key stages, as illustrated in Figure 1.

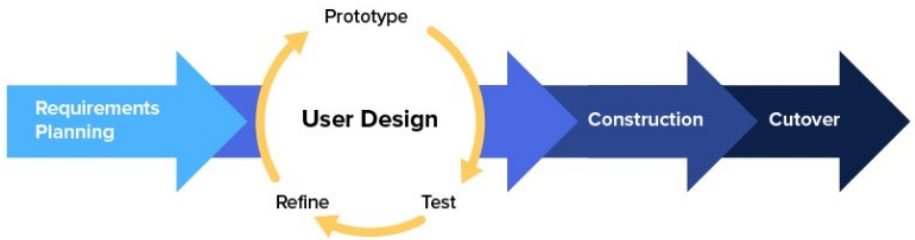

Figure 1. RAD Method Stages [16]

1) Requirements Planning:
In this phase, users and researchers collaborate to identify and address existing problems and determine the necessary components for the application system. Key considerations include data formats, necessary numbers or codes, report forms, and required hardware. This stage also involves the creation of use case diagrams, which are further interpreted into activity diagrams and technically represented through sequential and class diagrams.

2) System Design:
This phase includes several steps:

a) Prototyping: Here, a website design is initially developed on a local environment (localhost) to preview the website's design. This step results in the page display or forms that will be used.
b) Testing: This involves testing the designed website by accessing it from the created main menu.

c) Refinement: At this stage, the content and design are reviewed and adjusted if needed to ensure they meet user requirements.

3) System Development:

This stage involves actual system building based on the agreed design. It includes the creation of program code to convert the system design into a user-friendly application. Additionally, the database and table relationships are established. The programming languages used for web development include PHP, HTML, and JavaScript.

4) System Implementation:

This final stage is undertaken after the system has been developed. It involves setting up a system hierarchy, which includes the main menu, data management, service management, and reporting. System testing is conducted using the black box testing method before connecting to a server or hosting. Once the system is verified to function correctly, it is uploaded to a server and configured for broad network (Internet) use. The final step is user training on the web-based system, which is crucial for identifying any remaining issues or errors for immediate rectification.

3. RESULTS AND DISCUSSION

3.1. Use Case Diagram

The developed system features two primary roles: the admin and the breeder. The admin is responsible for managing farmer data, inputting milk deposits from farmers, and generating milk recaps for each farmer. Farmers, on the other hand, have the capability to view information related to their milk deposits and access the corresponding recaps.

Use case diagrams play a crucial role in this system, as they represent a set of use cases and actors, essential for regulating and modeling the system's behavior [17]. The system design encompasses various modules, including farmer data management, milk data input from farmers, milk quantity calculations, information on milk deposits, and reports on these deposits. The use case diagram for this system design, as illustrated in Figure 2, provides a clear visual representation of these functionalities.

For farmers to view information about their deposited milk and its recapitulation, the admin must first enter the relevant milk and farmer data. Once entered, the system automatically calculates and processes this data, ensuring efficient and accurate information flow for both admins and breeders.

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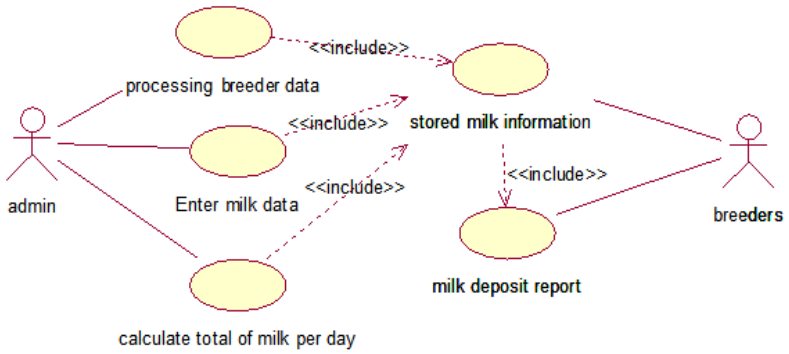

Figure 2. Use Case Diagram

3.2. Activity Diagram

Daily, dairy farmers deliver their milk to collectors. Upon receipt, the collector manually records these milk deposits in a logbook. This process involves calculating the daily total of milk received from each farmer and documenting it for record-keeping. In acknowledgment of the deposit, farmers are provided with a receipt by the collector. The operational workflow of this system, including these activities, is depicted in the activity diagram presented in Figure 3.

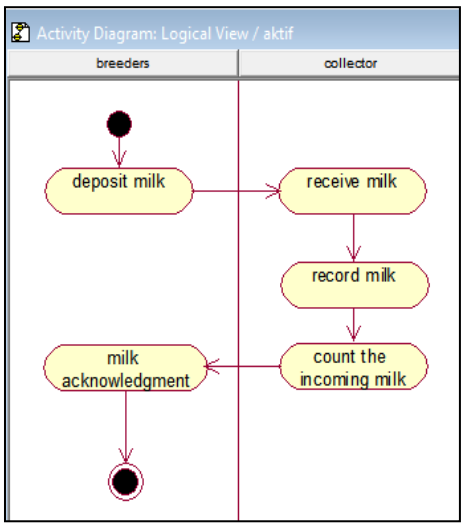

Figure 3. Running System Activity Diagram

A key function in the newly developed system is the documentation of milk transfers from breeders. When recording a transfer, the admin must first locate

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the breeder's profile in the system. Once the breeder is selected, the system displays their data along with a history of previous milk deposits. The admin then inputs the quantity of milk deposited by the farmer on that day. After entering this information, the admin saves the data by clicking the save button, ensuring that each milk transaction is accurately and efficiently recorded in the system.

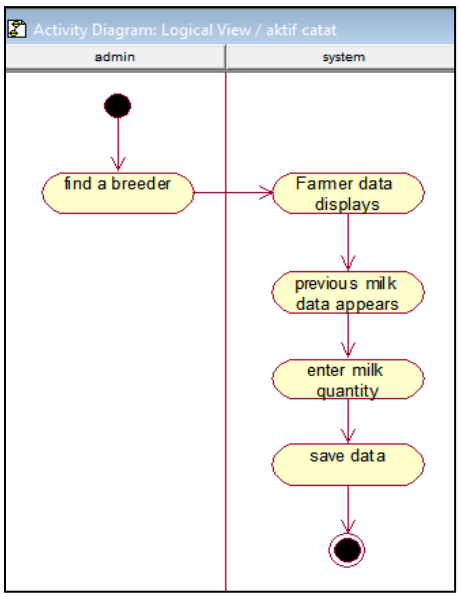

Figure 4. Records Milk Transfer from Breeders Activity Diagram

3.3. Implementation System

The initial step in leveraging the system is the entry of breeder data. To facilitate ease of use, the system automatically populates the farmer's identity, requiring the admin to simply input the breeder's name and contact information. This user-friendly feature significantly reduces the time and effort involved in data entry. The interface for managing farmer data, which is both intuitive and efficient, is depicted in Figure 5, showcasing the system's streamlined approach to data management.

To access a breeder's milk deposit history, the system offers a simple yet effective functionality where the admin can click on a breeder's name. For example, selecting 'Maryadi' retrieves his specific milk distribution history, a process that is both straightforward and time-efficient, as demonstrated in Figure 6.

The system is designed to be inclusive yet secure, permitting both members and other authorized individuals to view the selected breeder data. This inclusivity

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allows for transparency and collaboration among users, while the exclusive authority of the admin to add or delete data ensures data integrity and security. The detailed information available in Figure 6 includes daily milk deposits made by Maryadi, broken down into morning and evening sessions, providing a comprehensive view of each farmer's contributions.

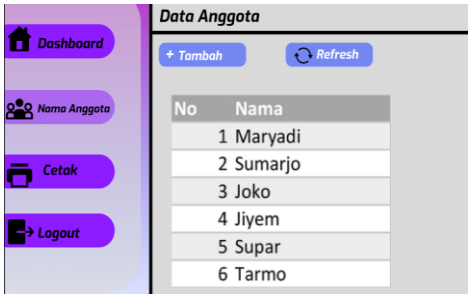

Figure 5. Farmer Data Management Display

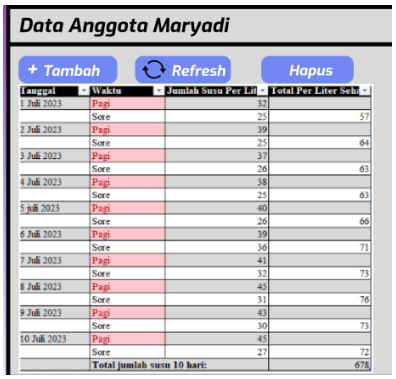

Figure 6. Milk Distribution History of Maryadi

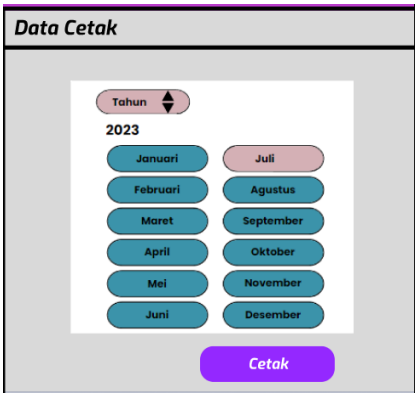

Figure 7. Select Year and Month Display

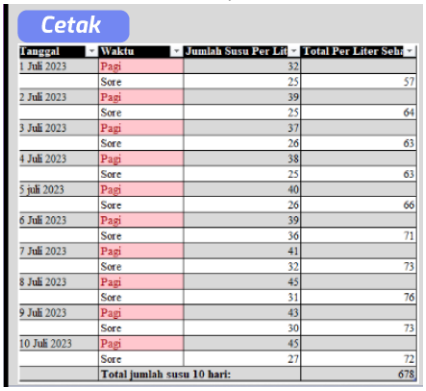

Figure 8. Milk Deposit Information

For a detailed analysis and record-keeping, the admin can print the recapitulation of a breeder's deposits by selecting a specific year and month, as illustrated in Figure 7. The user-friendly interface highlights the chosen month in a distinct color, enhancing the ease of navigating through different periods. This functionality aids in efficient data analysis and tracking over time. Upon selecting the print button, the system generates a detailed report of the breeder's deposits, as shown in Figure 8.

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This feature of the system is particularly beneficial for farmers and admins, offering them the ability to access and review detailed information on milk deposits and recaps, both collectively and individually. The data presented includes crucial details such as the farmer's name, the dates of milk deposits, and the quantity of milk deposited each day. The ability to print this information into a PDF file adds a layer of convenience and practicality, as users can easily press the print button and save the information directly to their internal storage media for future reference, record-keeping, or compliance purposes.

3.4. Discussion

The integration of the newly developed system into dairy farming practices marks a significant advancement in the sector. By automating and streamlining the process of data entry, particularly with the auto-population of farmer identities, the system effectively reduces administrative workload and potential for human error. This efficiency is crucial in the agricultural context where time is a valuable resource. The user-friendly interface, as shown in Figure 5, underscores the system's design philosophy: simplifying complex data management tasks while ensuring accuracy and reliability. This approach not only facilitates operational ease but also enables dairy farmers and admins to focus more on core farming activities.

The system's design prioritizes transparency and ease of access to milk deposit data. By allowing admins to quickly retrieve a breeder's milk distribution history with a simple click, as demonstrated with 'Maryadi' in Figure 6, the system ensures that crucial information is readily available. This feature is more than a convenience; it fosters transparency within the dairy farming community, allowing for an accurate and real-time overview of individual contributions. Such transparency is vital for building trust among community members and ensuring fair practices in the milk supply chain.

A notable aspect of the system is its ability to balance inclusivity and data security. While offering members and other authorized personnel the ability to view breeder data, it reserves the power to add or delete data exclusively to admins. This design choice, as reflected in the information displayed in Figure 6, ensures that while the system is inclusive and transparent, it also maintains the integrity and security of the data. This is particularly important in agricultural settings where data accuracy directly impacts operational efficiency and profitability.

The system's capability to print detailed recapitulations of breeders' deposits, as shown in Figure 7 and 8, represents a significant step forward in reporting and record-keeping. By allowing admins to select specific years and months for reporting, the system provides a customizable and user-friendly approach to data

analysis. This functionality not only aids in efficient monitoring and management of milk deposits but also provides a tangible record for both admins and farmers. Such comprehensive and accessible records are essential for strategic planning, financial management, and meeting regulatory requirements in the dairy farming industry.

The introduction of this web-based system in dairy farming carries broader implications for the agricultural sector. It exemplifies how technology can be harnessed to enhance operational efficiency, ensure data accuracy, and foster a transparent and secure environment. Looking forward, the success of this system could inspire similar technological interventions in other areas of agriculture. Future enhancements could include mobile integration for greater accessibility, advanced analytics for predictive insights, and integration with other agricultural management tools. Such advancements have the potential to transform the agricultural sector, making it more efficient, sustainable, and profitable in the long run.

4. CONCLUSION

The Milk Distributor Information Management System, crafted through web programming, integrates several key features to optimize dairy farming operations. These include efficient data management for dairy farmers, streamlined handling of milk deposits, precise calculations of deposits, and the generation of essential reports. Designed to support both collectors and breeders, the system fosters daily transparency in milk supply management. A standout feature of this system is its capability to facilitate the easy entry and storage of cow's milk data on a website. This flexibility allows for hassle-free recording at any time and from any location. Both collectors and milk farmers have access to this data, enhancing collaborative efforts and making it simpler for farmers to track their deposited milk. One of the system's critical advantages is the minimization of data loss, achieved by securely storing or uploading data to the cloud. Looking ahead, the system's development roadmap includes the creation of an Android-based version. This enhancement will bring the added convenience of smartphone accessibility, further simplifying usage for users on the move.

REFERENCES

[1] G. B. Sulistyo and L. Saputri Dua, "Perancangan Sistem Informasi Manajemen Petenakan Sapi Berbasis Online," *Ijns.org Indones. J. Netw. Secur.*, vol. 9, no. 1, pp. 34–40, 2020, doi: http://dx.doi.org/10.55181/ijns.v8i5.1618.

[2] G. Desviani, A. Warnaen, and K. Utami, "Model Pencatatan Reproduksi Sapi Perah Menggunakan Rekording Sapi Elektronik (REKS-EL) Berbasis

Android Untuk Mengoptimalkan Reproduksi Sapi Perah Di Kecamatan Pujon Kabupaten Malang," *Agriekstensia*, vol. 21, no. 2, pp. 100–109, 2022, doi: 10.34145/agriekstensia.v21i2.2305.

[3] S. Rusdiana and S. Soeharsono, "Farmer Group Performance Bali Cattle In Luwu District East : The Economic Analysis," *Int. J. Trop. Vet. Biomed. Res.*, vol. 2, no. 1, pp. 18–29, 2018, doi: 10.21157/ijtvbr.v2i1.8634.

[4] A. Pari, Umbu Hina, "Pemanfaatan Recording untuk Meningkatkan Manajemen Ternak Kerbau di Kecamatan Matawai La Pawu Kabupaten Sumba Timur," *J. Sain Peternak. Indones.*, vol. 13, no. 1, pp. 36–42, 2018, doi: https://doi.org/10.31186/jspi.id.13.1.20-28.

[5] T. I. Purwantiningsih and K. W. Kia, "Identifikasi Dan Recording Sapi Perah Di Peternakan Biara Novisiat Claretian Benlutu, Timor Tengah Selatan," *J. Pengabdi. Masy. Peternak.*, vol. 3, no. 1, pp. 42–56, 2018, doi: 10.35726/jpmp.v3i1.251.

[6] M. Fauzan, "Profitability and Efficiency of Dairy Farming in Sleman Regency," *Agric*, vol. 32, no. 2, pp. 173–188, 2021, doi: 10.24246/agric.2020.v32.i2.p173-188.

[7] D. Yusuf, E. M. Rini, M. Fuad, and A. Haris, "Rancang Bangun Sistem E-Commerce dan Edukasi Pengelolaan Susu Sapi Berbasis Web," *Syst. Inf. Syst. Informatics J.*, vol. 04, no. 2, pp. 1–8, 2018, doi: 10.29080/systemic.v4i2.427.

[8] J. BPS, *Kabupaten Jember Dalam Angka Tahun 2021*, 1st ed. Jember: BPS Kabupaten Jember, 2020.

[9] M. H. Chaniago, F. Amalia, and A. W. Widodo, "Sistem Informasi Manajemen Ternak Sapi Perah di AKA Milk Jakarta," *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 3, no. 7, pp. 6920–6929, 2019.

[10] M. M. Primada, A. Arwan, and D. Pramono, "Sistem Informasi Manajemen Peternakan Sapi Perah. Studi Kasus Dinas Pertanian Kota Batu," *J. Pengemb. Teknol. Inf. dan Ilmu Komput.*, vol. 5, no. 3, pp. 984–991, 2021.

[11] F. S. Efendi, R. A. C. W. Aji, T. A. Cinderatama, and B. A. Nugroho, "Sistem Informasi Persebaran Peternakan Sapi Berbasis Website Studi Kasus Kab. Kediri," *J. Sains dan Inform.*, vol. 8, no. 2, pp. 150–159, 2023, doi: 10.34128/jsi.v8i2.352.

[12] A. Nurseptaji, "Implementasi Metode Waterfall Pada Perancangan Sistem Informasi Perpustakaan," *J. Dialekt. Inform.*, vol. 1, no. 2, pp. 49–57, 2021, doi: 10.24176/detika.v1i2.6101.

[13] A. Suryanto and I. Maliki, "Penerapan Model Rapid Application Development (RAD) Dalam Rancang Bangun Sistem Informasi Warga," *Infotek J. Inform. dan Teknol.*, vol. 5, no. 1, pp. 197–208, 2022, doi: https://dx.doi.org/10.29408/jit.v5i1.4887.

[14] H. A. Setyadi and D. S. Perbawa, "Sistem Informasi Manajemen Aliran Barang di Toko Anugerah Karanganyar Menggunakan Metode Rapid

Application Development (RAD)," *Bianglala Inform.*, vol. 10, no. 2, pp. 76–82, 2022, doi: 10.31294/bi.v10i2.12168.

[15] N. W. S. Saraswati, N. W. W. Wardani, K. L. Maswari, and I. D. M. K. Muku, "Rapid Application Development untuk Sistem Informasi Payroll Berbasis Web Rapid Application Development for Web-based Payroll Information System," *MATRIK J. Manajemen, Tek. Inform. dan Rekayasa Komput.*, vol. 20, no. 2, pp. 213–224, 2021, doi: 10.30812/matrik.

[16] A. Profita, A. N. Ifan, and A. E. Burhandenny, "Penerapan Metode Rapid Application Development (RAD) untuk Digitalisasi UKM Industri Busana Muslim," *JURTI*, vol. 6, no. 2, pp. 171–179, 2022, doi: http://dx.doi.org/10.30872/jurti.v6i2.8096.

[17] I. K. Siregar, "Implementasi Model Rapid Application Development Pada Sistem Informasi Persediaan Barang Dengan Metode FIFO," *JURTEKSI (Jurnal Teknol. dan Sist. Informasi)*, vol. 6, no. 2, pp. 187–192, 2020, doi: https://doi.org/10.33330/jurteksi.v6i2.593.