Online information system for data collection of cattle quality

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Abstract. Innovation and development of the science and technology which proclaimed by the government through Ristekdikti need to be supported. On the other hand, the Department of Animal Husbandry and Fisheries began introducing the Cattle Card system that contains the identity of each farm animal. Therefore, UNNES especially the Department of Computer Science of FMIPA UNNES, need to give positive contribution in the field of Science and Technology to support the manual system of Cattle Card, through the preparation of prototype of the online information system of data collection of cattle in Semarang regency. The main problem is how to monitor the data of cattle quality through online information system in Semarang regency? The purpose of this research is to produce the prototype of an online information system for data collection of cattle quality in Semarang regency. Main activities: (1) Prepare the flowchart of an online system for data collection of cattle quality. (2) Collecting data to obtain data on identity descriptions of each cattle, owners, mutation records, and health records of livestock cattle. (3) Creation of the prototype of an online information system for data collection of cattle quality in Semarang Regency. The results, (1) had been produced the prototype of an online information system for data collection of cattle in the region of Semarang regency. (2) Socialization of the online information system for cattle quality data collection and exploring input from various related stakeholders. (3) There had been a limited trial of prototypes of the system in Pabelan district in the working area of the Department of Animal Husbandry and Fisheries of Semarang regency and succeeded well.

1. Introduction

Innovation and development of science and technology which proclaimed by the government through Ristekdikti need to be supported. On the other hand, the Cattle and Fisheries Service began to introduce the cattle card system containing the identity of every farm animal, owner, mutation record, including livestock health records. Therefore, UNNES especially the Department of Computer Science FMIPA, Informatics Engineering Program, need to give positive contribution in the field of Science and Technology to support online cattle card system, through the preparation of prototype of the online information system of data collection of cattle in the region of Semarang regency.

The online information system can display all statistical data and stock of cows that can be utilized as a tool of decision making from related parties, for example, to know the stock of cattle in Semarang regency, selling price, health/quality, number of breeders, barn of livestock area, type of pre-eminent livestock, and others according to data available on cattle cards. Dairy cattle recording systems have become an essential part of intensive dairy farming today, recording varying amounts of production and health data, on both the individual and herd level [1]. A great advantage of such routine data is that they are cheap and usually uniformly gathered because most data are registered [2]. It has also been able to improve the level of trust [3]. For the long-term, this online information system can be disseminated nationally as a form of UNNES contribution to the nation and country.
Also, the enumeration system of cattle in the form of web-based application can also be accessed online with media web browser either through PC or smartphone. Based on the description of the background of the above problems, the applied product research is feasible to be implemented as a science and technology innovation.

From the description of the above background, then the problems to be solved through the research of applied products are as follows. (1) How to design an online information system to support the recording system of each conventional card of hardcopy recorded into a digital system (softcopy)? (2) How to make the prototype of an online information system for cattle quality data collection in Semarang regency? (3) How the test results of the prototype of an online information system for cattle data collection in the region of Semarang regency?

The purposes of the research are as follows. (1) To describe the identity of every cattle, owner, mutation note, and animal health/quality record in Semarang regency. (2) To obtain a way of designing an online information system to support the recording system of each conventional card of hardcopy recorded into the digital system (softcopy). (3) Produce the prototype of an online information system for data collection of cattle quality in Semarang regency. (4) To get the test result of the success rate of the prototype of an online information system for cattle quality data collection in Semarang regency.

The urgency of this research is as follows. (1) Availability of prototype of an online information system for ease of data collection of cattle quality. (2) Availability of complete cattle data documentation in Semarang Regency area. (3) Facilitate access to information about the identity of every livestock, owner, mutation notes, and health/quality cattle records that exist in Semarang regency.

2. Theoretical background
2.1. Database System Development Lifecycle
Associated with Lifecycle or Database System Development Lifecycle [4], wrote that Lifecycle is an important component in the database system because the application of the lifecycle database is related to existing information systems.

Database planning is a management activity that allows the stages of the Database System Development Lifecycle to be realized as effectively and efficiently as possible. The definition of the system describes the scope and limitations of database applications and user views. This is very important to do in database design process to be more focused on database project that made. Requirement collection and analysis is the process of collecting and analyzing information about the organization part that will be supported by the database application and using that information to identify the needs of users of the new system. Database design is a process of making a design for a database that will support the operational and target of a system. The design of database is highly dependent on the type of stored data and the method of data collection [5]. Selection of appropriate DBMS to support database applications can be done at any time before logical design as long as there is enough information about system requirements. The design of the application is to design the user interface design and application program, which will then be integrated with the database in it. It is the creation of a working model of the database application. A prototype is an example model that does not have all the necessary features or provides all the functionality of the last system.

The main purposes of prototype development of a database application are: (1) To identify the features of the running system whether good or not. (2) To provide new features improvements or enhancements. (3) To clarify user needs. (3) To evaluate of feasibility (possibilities that will occur) of the design of special systems.

In implementation step, we create an external, conceptual, and defined internal database and application program. [6] wrote that database implementation is done by using Data Definition Language (DDL) from selected DBMS. Part of this program is database transactions that are implemented using Data Manipulation Language (DML). Data conversion and loading will be used if we will move data from the old system to the new system. This step is required only when the old
database system is replaced with a new database system. A DBMS has the utility of inserting a file into a new database and then automatically converting the data into the format required by the new database file. If applicable, the developer can change and use the application program from the old system to be used by the new system.

Testing is a process of an application program execution to find the error, using the planned test strategy and the real data. Operational Maintenance is a process of supervision and maintenance of the following database system installation. In the previous step, the database system has been fully implemented and tested.

2.2 Recording of Cattle Quality
The quality policy of cattle in Indonesia, especially for local cattle is still consistent with the target, which is directed to the development of breeding farms in rural areas [1]; Through the guidance of farmer groups and integrated service patterns.

The record of cattle quality is very useful in terms of (1) management of efficient management systems, disease control, breeding management and feed management; (2) selection of prospective males to be used in lieu of males; (3) selection in the framework of replacement of cattle; (4) poor removal of cattle; (5) evaluation of cattle in groups; (6) development of cattle production system.

The benefits of recording are to (1) facilitate breeding management of a cattle business, by providing information to users about the production performance and reproduction of cattle; (2) organize decisions on breeding at the central level through total information for production performance of all cattle records and their genetic superiority; (3) provide genetic improvement opportunities for the resulting production and reproduction traits [6,7].

As a comparison, in the company of beef cattle farms in Texas, currently has developed a system of recording and data collection electronically. In each cattle, 12-digit identification of cattle codes could be read electronically. The results of this reading can be sent directly to the data processing station to be analyzed using software that has been made. Sweden also has a national disease-recording system based on veterinary reporting. From this system, all cattle-disease records are transferred to the dairy industry cattle database where they are used for several purposes including research and dairy-health statistics. According to [6], this process does require a very expensive cost and a long enough time to design it. However, if this program has been running well, with once collected data then the next data processing will be very efficient.

2.3 Cattle Card
Since 2015 the central government in the field of livestock development has introduced the Manual Cattle Card system which contains the identity of every livestock, owner, mutation records, including cattle health/quality records. This program is based on Animal Husbandry and Health. The launching of Card Enforcement activities is temporarily applied to the selected districts. To support this program, on February 23, 2015, Directorate of Animal Breeding Directorate General of Cattle and Animal Health Ministry of Agriculture of the Republic of Indonesia has conducted a Working Meeting. The Working Meeting discusses the preparation of the Employment Guidance on the launching of this Cattle Card, particularly regarding the fostering and coordination of the application of cattle cards.

With the enactment of cattle cards, every cattle must be recorded in the cattle cards. In fact, data collection needs to be supported by the system to record every conventional card (hardcopy) recorded into a digital system (Web-based online system). UNNES especially Department of Computer Science FMIPA, need to give a positive contribution to science and technology field to support program of this Cattle Card by the arrangement of a prototype of an online information system for cattle quality data collection.

A sample of Cattle Cards (recorded hardcopy - front side). See Figure 1.
Figure 1. Manual Cattle Card to be made to online information system

3. Methods

The subjects of this study are cattle ranchers and cattle quality data in the region of Semarang Regency in cooperation with the Department of Animal Husbandry and Fisheries of Semarang Regency. The research location is centered on two places, namely at UNNES Campus of Computer Science Department for its programming and in Pabelan district of Semarang Regency for initial supporting data and test.

The research achievements were as follows (1) Retrieved descriptions of each animal, owner, mutation, and livestock health/quality record in Pabelan district of Semarang Regency. (2) Produced the design to support the recording system of each conventional card of hardcopy recorded into the digital system (softcopy). (3) Produced the prototype of an online information system for data collection of cattle quality in Semarang regency.

Online information system for data collection of cattle quality was developed based on software prototyping. The prototyping is the efficient method from many methodologies of software engineering approach [8]. It based on the idea of creating the entirety or part of the system in a pilot version called the prototype [9]. Prototyping consists of four stages: (1) the establishment of prototyping objectives, (2) function selection, (3) prototype construction, and (4) prototype evaluation.

Figure 2. Software prototyping

It is vitally important that both the developer and the customer know exactly what a prototype is aiming to achieve and the establishment of prototyping objectives is one of the first activities to be undertaken by the developer. The nature of a prototype, throw-it-away, evolutionary or incremental, determines factors such as the design method and the amount of resource to be allocated to the prototyping stage.

It is crucial that it be made clear to the developer exactly what parts of an intended system are to be prototyped. This is the purpose of function selection. Prototyping can be carried out in both a vertical or horizontal fashion. The former involves incorporating all the functions, albeit in a simplified way, in the prototype: the latter involves a selection of functions.

Prototype construction involves the actual development process required to produce a prototype. Construction is influenced by the nature of the prototype to be produced. If a throw-it-away prototype is required then fast, low-cost development is mandatory. If an evolutionary prototype is required then the use of ideas such as information hiding, coupling and modularity are advisable.
Prototype evaluation is probably the most important step in the prototyping process and one for which there is little knowledge. Users of a prototype system must have already been given proper training, and resources should be made available for evaluation sessions. Also, the evaluation process should be controlled through the use of meaningful measures. It is important that the prototype becomes a learning medium for both the developer and the customer and the latter should have confidence that the time-consuming activities involved are converging to a stable set of requirements. Normally the evaluation process takes some cycles until this happens and requires timely feedback for productive learning.

4. Result and Discussion

Online information system for data collection of cattle quality was developed based on software prototyping. According to [4], prototyping consists of four stages: (1) the establishment of prototyping objectives, (2) function selection, (3) prototype construction, (4) prototype evaluation.

In the stage of the establishment of prototyping, objectives have formulated the purpose of making this system which is to create an online information system that can be used for quality data collection of the cattle. In function selection stages decide the functions of Online information system in this research that were (1) To describe the identity of each cattle, owner, mutation note, and health record/quality of cattle in Semarang regency. (2) To design an online information system to support the recording system of each conventional card of hardcopy recorded to a digital system (softcopy). (3) To create the prototype of an online information system for data collection of cattle quality in Semarang regency. (4) To get the test result of the success rate of online information system prototype for cattle quality data collection in Semarang regency.

In the stage of prototype construction, it has been obtained online information system for data collection of cattle quality. Here is presented the results of research that is the initial view of online information systems for data collection of cattle quality in the region of Semarang regency. Consider Figure 3 and Figure 4 below.

![Figure 3. Initial Interface of Information System](image1)

For discussion, with the availability of online information system for ease of data collection of the quality of this cattle, then there is also complete documentation of cattle data in Semarang regency. Thus, it is easier to access information about the identity of each cattle, owners, records of mutations, and records of health/quality of cattle in the region of Semarang regency.

In the stage of prototype evaluation, we have been checked the performance evaluation, and the result is valid. The goal of performance evaluation is to measure the effectiveness of our platform, as compared to a traditional design environment [10]. The Effectiveness of our platform is as follows. (1) Availability of online information system for ease of data collection of cattle quality. (2) Availability of complete documentation of cattle data in Semarang regency. Make it easy to access information about the identity of every cattle, owner, mutation notes, and health/quality records in Semarang regency [10].

![Figure 4. Interface of Data Input](image2)
5. Conclusion
Based on the description in this article it can be concluded things as follows: (1) This online information system can be used for data collection of cattle quality. (2) Availability of complete documentation of cattle data in Semarang regency, make it easy to access information about the identity of every cattle, owner, mutation notes, and health/quality cattle records in Semarang regency.

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