The Design a System of Retention and Control on Broiler Farms Based on The Flow of Data

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Abstract— **In this study, we tried to design a system of retention and control on broiler farms in Prabumulih based on the data flow between processes, external entity and data storage. The purpose of this study was to find the best design that can be immediately implemented in the form of information systems. The design submitted is expected to accelerate the process that occurs between entities connected. Minimizing the possibility of error, which in turn can increase the production of broiler when the harvest is done.**

Keywords—Design; system; retention; control; broiler; flow

I. INTRODUCTION

In this study, we focused on designing a software system that is based on the data flow. This software serves as a recording and controlling the rotation process of data and information among entities that are connected in broiler farms. With the expected good software design, time needed to process the data and information have become fewer. The most common error can be minimized and given solutions to solve them. Recording and control system design proposed can be implemented in software or computer-based information systems. The discussion in this paper is primarily based on the definition of system design, system design methods, the use of system design methods based on the flow of data, discuss and conclusion.

II. LITERATURE STUDY

Software design is part of software engineering, software engineering has several definitions including application of scientific knowledge and experience, the use of methods and technologies to design, implement, evaluate, and documentation for software [1] or systematic, targeted, and measurable implementations for the creating, operation, and maintenance of software [2]. Other definitions submitted by Sommerville [3], software engineering is a discipline that encompasses all aspects of software development. The concept of software engineering can also be used in the development of computer-assisted instruction (CAI), which is usually used as a medium of learning between teachers and students so that learning process more interactive [4], while the system that we have designed to find the best concept of decision that can be immediately implemented in the form of information systems. A device can be called a decision support system when the device is able to provide solutions to the problems and accurately [5]. It can be concluded from the above definition

that the software design is a part of software engineering. As part of the software engineering, software design is usually used as a guide for engineers in developing the software they develop. In accordance with the definition of software design is the process by which developers create software specifications in the form of the initial plan used to achieve the goal by using various resources [6].

The focus of software design in this study is the retention and control system. The recording system is a term for an information storage system (usually a system running on a computer) that can be accessed at any time and is specific [7]. While the definition of control is a system manages, commands, or regulates the behavior of other systems or data [8]. Retention activities on broiler farms is a routine process of data collection and measurement of progress chicken every day. To determine the ideal weight or weight of broilers at the age of above 3 weeks, because in this period broiler show very rapid growth. Control in broiler chickens are observations of farming activities which aims to determine the chicken meat production results achieved at each harvest. Then displayed in graphical form to facilitate reading data every harvest period and do a comparison between the enclosure production. The object of this study is a broiler farm located in Prabumulih. Broiler farm site is considered quite strategic because it is near a river that is used to meet the daily water needs.

Another advantage is the ease of access of vehicles to the farm. The group has 3 pieces facility broiler breeding cage, the size of each 8 x 80 m square. The capacity of each enclosure can accommodate 6,000 broiler chickens. In the span of one year, the group in Prabumulih can do 7-8 times harvest. The need of water obtained from artesian wells and streams that are not far from the farm area. Transport for feed, transporting the harvest can be done easily and quickly because access to roads only takes about 5 minutes.

When viewed from the geographical location, the location of the farm is surrounded by trees, shrubs and rubber plantations. Natural fortress in the form of trees is needed to prevent erosion and reduce wind currents that can knock farm buildings. Another advantage is that these farms away from residential communities, so as to prevent the spread of the pest flies and the smell of manure. In conducting its business, the business is doing breeding farm in partnership. Broiler breeding with a system of partnership is raising broilers by means of cooperation between the farmer and the core company in Indonesia. With this partnership, the owner of the

farm was given the ease in obtaining broiler breeder, feed, and broiler market when harvested. But behind the convenience obtained, the farm owners also must meet its obligations to the company's core. Distribution of profits earned after the harvest is determined by the initial agreement between the owner of the ranch and the core enterprise.

The broiler is the featured race types of crossbred chickens that have high productivity, especially in producing meat [9]. Broiler chickens are the result of cross-breeding of superior quality chicken that can be said good genetic quality. Genetic quality of good will come to the maximum when the chickens are given supportive environment factors, such as high-quality feed, the cage system, as well as health care to prevent illness.

The price of broiler meat in the country in recent years is relatively stable. This can be seen in the following chart:
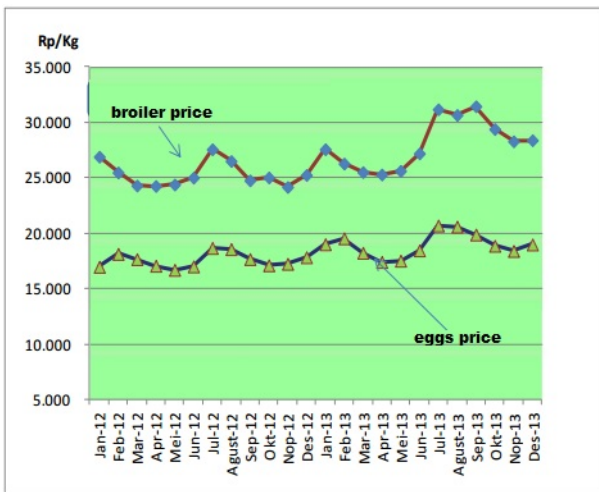
Fig. 1.   The price of eggs and broiler [10]

Broiler chickens are livestock most economical when compared to other livestock. Excess assets are the speed of increase of meat in a relatively short time is approximately 4-5 weeks, broiler meat can already market or consumed. The advantages include growing broiler chickens were very fast with high body weight in a relatively short period, small feed conversion, ready to be cut at a young age and to produce the fibrous quality of the meat is tender. The rapid growth of broiler is also an effort to offset the handling of public demand for chicken meat.

The data flow is the process of moving data from one place to another. In information systems, place or object that serves as the sender or recipient of the data is in the form of entity. The flow of data in information systems usually depicted in diagrammatic form, better known by the name of Data Flow Diagrams (DFD). Data flow diagram (DFD) is a representation of data in the form of graphics that are connected through the flow of data used for the initial modeling of an information system. DFD is usually created early in the development of information systems, without going into great detail, the which can later be elaborated [11].

III.   MATERIAL

Before doing the design, we defined several entities to be added to the data flow diagram. Information about data and entities used in the farm is obtained directly through interviews and field observations. Observations were made by looking at farm documents that were directly signed by the owner of the farm. We can guarantee the authenticity of the documents. There are many ways that can be done to prove the authenticity of the signature [12]. Back to the entity to be used, namely:

1. Owner

   The owner, may individually or in groups. Have full authority over everything that relates to the farms.

2. Employee

   People employed on farms. Usually, have specific job responsibilities in accordance with its expertise.

3. Ward

   Ward is a building created for storing all the logistics necessary for the need of farms.

As for the interests of entities to the recording process and control are as follows:

TABLE I.   THE INTERESTS OF ENTITIES

No	Flow of Data	Entities		
		Employee	Ward	Owner
1	Schedule of vaccination	$V_{(in)}$		
2	Data Retention	$V_{(out)}$		
3	Schedule of harvest	$V_{(in)}$		
4	Report: Number of dead chickens			$V_{(in)}$
5	Report: Number of chickens were harvested			$V_{(in)}$
6	Report: Feed Conversion Ratio			$V_{(in)}$
7	FCR Criterion		$V_{(out)}$	
8	Data of feed realization		$V_{(in)}$	

The data storage consists of three parts, namely:

1. Vaccine Supplies

   A place to store all the data associated with medicine and vaccines.

2. Retention

   A place to store all the data that has been used before, mainly related to the number of broilers during harvest.

3. Feed Suply

   A place to store all data relating to animal feed.

The flow of data to and from the storage are as follows:

TABLE II. DATA STORAGE

No	Flow of Data	Data Storage		
		Vaccine Supplies	Retention	Feed Suply
1	Load data vaccines	$V_{(out)}$		
2	Data of retention		$V_{(in)}$	
3	Data of feed conversion		$V_{(out)}$	
4	Data of chickens were harvested		$V_{(out)}$	
5	Data of dead chickens		$V_{(out)}$	
6	Load data of feed			$V_{(out)}$

After all the components are prepared, the next step is to connect all components into one complete diagram. Making a data flow diagram will be presented in the next section.

IV. DESIGN AND DISCUSS

The diagram that we submitted is still a draft, so need adjustment when it will serve as a guide in making the retention and control of information systems at a later stage. Can be seen in Fig. 2, entities, processes, and data storage are connected to each other. There is a flow of data coming from one component to another component.
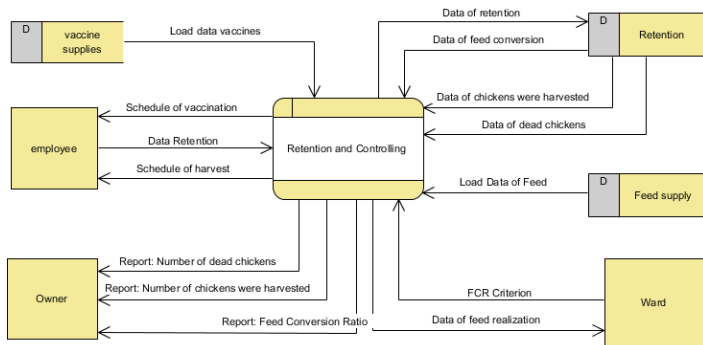
Fig. 2. Data Flow Diagram

Employee requires vaccination schedule and time of harvest schedule. On the other hand, the employee also always leave a note in the form of a daily log of the work he does every day. Owner requires a report on the process that has been done. That report related to the number of broiler harvest time, the number of rejects broiler and feed conversion ratio, to see the comparison between chicken feed to the overall weight.
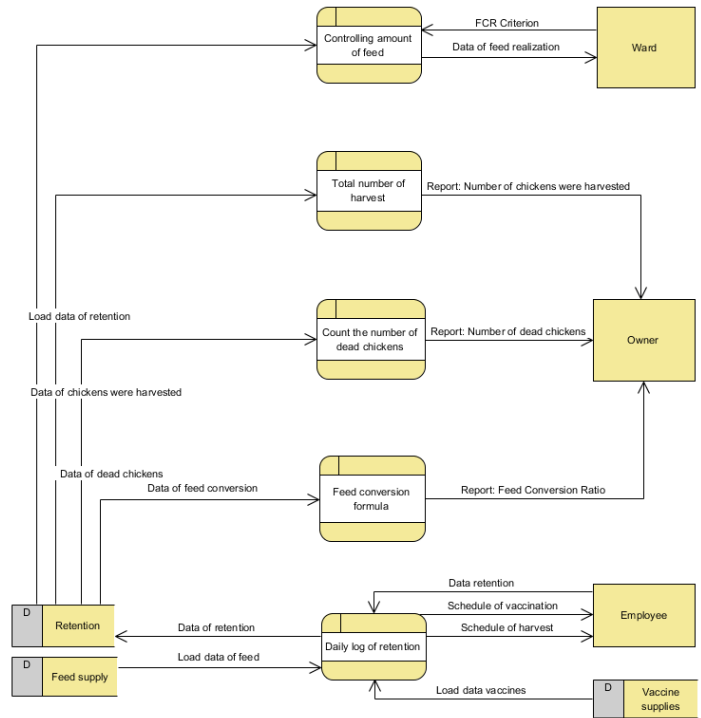
Fig. 3. Data flow diagram after process breakdown

Furthermore, retention and control process can breakdown into several processes, namely controlling amount of feed, total number of harvest, count the number of dead chickens, feed conversion formula, and daily log of retention. Ward should provide feedback FCR standard that can be used as a benchmark in the effort to control the feed for broiler chickens. Excessive feeding may increase the cost incurred for a period of farm management. The employee must always pay attention to the weight of each broiler with age and the amount of feed that has been consumed. Always notify the ward through daily logs and reports to the owner. So that when there anomalies or mistakes can be immediately known. All the activities that take place during the harvest period are recorded in monthly logs. So it can be used as a reference for the next broiler harvest period.

The implementation of our retention system design is done by involving related entities. This needs to be done because the entity that will use this information system directly. Although not yet reached the stage of information system development, we are trying to convey the design concept that has been made to livestock voters. So although not yet in the form of information systems, the concept of retention and control system design that we developed can be implemented in the broiler farm environment.

We routinely conduct discussions with farm owners about the processes that occur between entities on the farm. The following is a simulation of the concept of retention and control that we developed:

TABLE III.   THE SIMULATION OF RETENTION SYSTEM CONCEPT

Periods	Atribut			
	Total Weight of chickens (kg)	Number of Dead Chickens	Chickens were Harvest	FCR
1	33.000	300	17.700	0.86
2	27.000	150	14.850	1.11
3	29.000	200	14.800	0.93
4	23.000	100	13.400	1.17
5	27.000	150	14.850	1.00
6	29.500	100	14.900	1.01
7	30.000	100	14.900	1.00
8	32.000	350	17.650	0.89
9	25.000	50	14.550	1.20
10	32.000	400	17.600	0.84

Table 1 above shows an increase in feed conversion ratio (FCR) compared to the previous year, as well as a decrease in the mortality rate of broilers that is inversely proportional to the total weight of broiler obtained (kg). The value of FCR shows the conversion ratio of fodder to the weight produced. The less feed used is the better. The heavier the weight of the broiler the better.

The following chart shows a simulated comparison of FCR values each period from the year before and after the implementation of the concept of retention system.
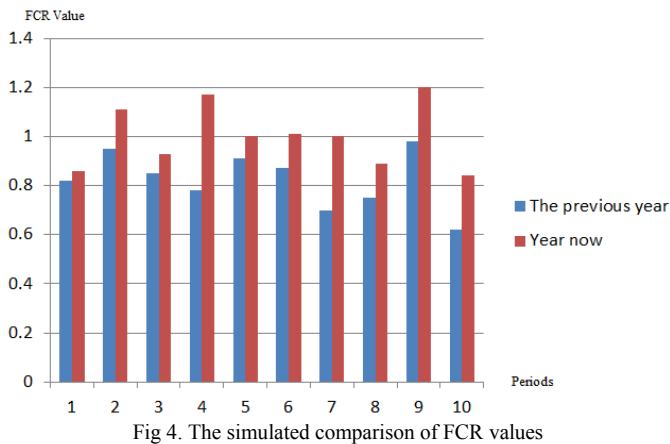

Fig 4. The simulated comparison of FCR values

Can be seen in the simulation, the comparison of FCR value has increased significantly. For example in the 4th period, the value of FCR = 1.17, whereas in the same period of the previous year only amounted to 0.78. With the same data and treatment, FCR value for the period after the implementation of the concept of retention system has increased and relatively stable. This means that the higher the value of FCR than the better the harvest quality, which in turn provides benefits to farmers.

V.   CONCLUSION

With the good design, expected when implemented in the form of an information system, the process of delivering data and information can be more quickly, so as to minimize the occurrence of errors. One example is the report of feed conversion ratio (FCR) which is needed by the owner. By looking at the value of FCR owner can instantly find out whether the harvest has failed, or vice versa. Another possibility, the calculation error has occurred. So the owner can take precautions or immediately provide the best solution to the error that has occurred.

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