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2 Strategies to Overcome the Selling Price Fluctuations of Palm Oil Fresh Fruit Bunches (FFB): The Farmers Efforts in Welcoming Industry 4.0

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Abstract

The purpose of this research is to build a system that can solve the problems faced by the palm oil farmers. The phenomenon is that the farmers did not get a concrete information about the market price of palm oil Fresh Fruit Bunches (FFB) when harvesting. This condition occurs due to the absence of a digital system that can be accessed by farmers in order to obtain information about the selling price of palm oil FFB. Information can only be obtained through cellular communication with loading ramps entrepreneurs. While the pricing of small-scale entrepreneurs at times occurs, the price fluctuates. This is because the information received by the small entrepreneurs from the palm oil FFB processing industry also uses the same method. On the other hand, the farmers and supply chains are susceptible to losses due to the price fluctuations and the decrease in the quality of TBS because they experience shrinkage, thereby reducing the yield. The sample of the study was farmers and entrepreneurs in the palm oil supply chain industry in Labuhanbatu District, North Sumatra Province, Indonesia. The data collection uses the research field by investigating and interviewing supply chain farmers and entrepreneurs. While the analysis was done by using a descriptive method. Then the system design uses the waterfall method which is tested by the Black Box and White Box Testing methods. The system built is an Android-based information system that involves two actors (administrator and user) to interact directly through the application embedded in a smartphone. This research is expected to contribute in helping the realization of Indonesian government program to face the 4.0 industrial eras, one of which focuses on empowering SMEs through strengthening the supply chains. This

information system can also be a benchmark for the farmers in managing the harvest time to accommodate the unstable price fluctuations.

Keywords: Palm Oil; Market Price; Information System; Android; Industries 4.0

Introduction

Industrial term 4.0 still have a diverse understanding. The German Chancellor, Merkel (2014) argues that Industry 4.0 is a comprehensive transformation of all aspects of production in industry through a combination of digital technology and the internet with conventional industries. Schlechte, Jahl, Keinert, Kretschmer, Lechler, & Verl (2014) emphasize more on the speed element of information availability, which is an industrial environment where all entities are always connected and able to share information between one another. A more technical definition was conveyed by Kagermann, Wahlster, & Helbig (2013) that Industry 4.0 is an integration of *Cyber-Physical System* (CPS) and The *Internet of Things and Services* (IoT and IoS) into industrial processes including manufacturing and logistics and other processes. This merger can be realized through the integration between physical and computational processes (*embedded computers* and network technology) in a *closed loop* Lee (2008).

Industry 4.0 has been pushing the technological innovations that impact the disruption or a fundamental change on people's lives. Changes in the era of disruption by Kasali (2017) is essentially not only on changes to a car or strategy but also on the fundamental aspects of the business. The domain of disruption era extends from the start of the cost structure, culture to the industrial ideology. The implication is that business management is no longer centered on individual ownership, but is a division of roles or collaboration or mutual cooperation. In the world of higher education, we can see this phenomenon of disruption from the development of collaborative researches between researchers from various disciplines and universities. Research is no longer associated with problem-solving, but is encouraged to find potential problems and potential economic value that can help people to anticipate various socioeconomic and political problems in the future.

In 2015, the President of the Republic of Indonesia launched the Revitalization of Agriculture, Fisheries, and Forestry (RAFF) program. The program aims to empower capabilities and improve agricultural performance in national development. The revitalization is also intended to change the paradigm of the community in seeing that agriculture is not only limited to farming but has multiple uses, namely as a source of life and nature conservation. Therefore, the agricultural business must be integrated with the development of its industry, both upstream and downstream industries. Most of the revitalization program is closely related to the development of the marketing subsystem of agricultural

products which includes promotion, sales and ending with distribution (Me, B, & Wahyono, 2008).

Marketing is one of the determinants of the success of agricultural business. Commodity prices in the market are one type of information that can be very useful, considering a large number of Indonesian people who are very dependent on their lives with the market. According to Toya (2014) basically, the most needed by both parties (buyers and sellers) is the existence of media or container that can collect and disseminate information of all parties about various matters concerning the object (Sinaga, Munir, & Daulay, 2017).

In the era of information development that is supported by technological advances such as today, various facilities are provided by technology. People from cities to remote areas can access the information they want from anywhere and anytime. Currently, mobile devices are platforms that are widely used by the public, especially *the Android platform*. According to Gargenta (2011), devices that support this *platform* are relatively cheaper on the market compared to other smart device *platforms*. In addition, this *open-source platform* can do *multitasking* and *rooting*. With these advantages, the Android platform is a good platform for developing information systems. Seeing that currently more and more smartphone users, this information system is applied to *the android platform* so that it can be easily used.

Labuhanbatu Regency is one of the centers of oil palm plantations in North Sumatra, Indonesia. The Most of Labuhanbatu land in the district is used for mustard oil people plantation covering an area of 130, 264 hectare (51%) (Badan Pusat Statistik Kabupaten Labuhanbatu, 2010). “Data Luas Areal, Produksi dan Produktivitas Perkebunan Rakyat” (2017) showed that the total production of Fresh Fruit Bunches (FFB) in 2017 reached 540,856.59 tons . This shows that the main sector of the Labuhanbatu community’s income comes from oil palm plantations. The oil palm farmers are very dependent on their crops. So the higher the selling price of FFB, it will be more profitable for farmers.

This study aims to build a system that can solve the problems of oil palm farmers. The phenomenon that occurred that the farmers did not get information about the market price of Fresh Fruit Bunches (FFB) in a concrete manner when harvesting. This condition occurs due to the absence of a digital system that can be accessed by farmers to obtain information on the selling price of palm oil FFB. Information can only be obtained through cellular communication with loading ramps entrepreneurs, while the pricing of small-scale entrepreneurs at times fluctuations prices. This is because the information received by small entrepreneurs from the palm oil FFB processing industry also uses the same method. On the other hand, farmers and supply chains are susceptible to losses due to price fluctuations and decreases in the quality of FFB because they experience shrinkage, thereby reducing yield.

Method

The population respondents in this study were farmers and entrepreneurs as the supplier of the palm oil industry in Labuhan District, North Sumatra-Indonesia Province. Data Collection used *field research* by observing and interviewing farmers and entrepreneurs supply chain. While the analysis was done using a descriptive method. The system's design is using waterfall method. The system built is an Android-based information system that involves two actors (administrators and users) to interact directly through the application embedded in a smartphone. The sample used was farmers and traders of fresh fruit bunches of 30 people. At this stage, interviews and observations were carried out. The appropriation of quantity of samples is composed of: (1) palm oil farmers 20 people, (2) collector traders or small agents 5 people, (3) large traders or large agents as many 5 people, (4) palm oil processing factories 5 people.

The method used in application development refers to the concept *Software Development Life Cycle (SDLC)* by applying the Waterfall model: *First*, the Requirement Analysis stage is done to identify the functional and the non-functional needs in the program; *Second*, in the design stage, the requirements obtained from the previous stage are then translated into a system design that becomes the basis for application development; *Third*, the development stage in the manufacture of Oil Price Information System Applications in accordance with the right design which has been produced previously; Next in the *Fourth* stage, Tests carried out using the method of Black Box and White Box Testing; And the last stage is the maintenance of the system that is designed by periodic inspection of the data in the application.

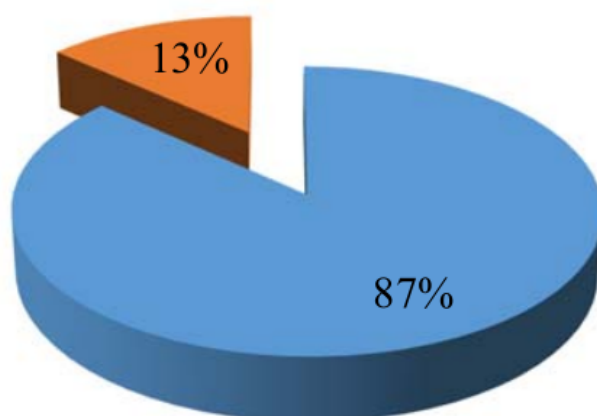
Findings and Discussion

The test results with the BlackBox method on the Admin and User show the suitability between the analysis of the system requirements and the results of the system creation. As for the white box method using the base path method, it is obtained a complex logic estimation so that the execution flow of the program can be defined.

Determining the feasibility of a system which has been built is done by giving questionnaires to farmers and entrepreneur's ramps. Questionnaires distributed (Table.1) consist of two types, namely *check list functionality* and application *usability check list*.

Table 1. Questionnaire results in functional check list Farmers and FFB Traders

No.	Question	Yes	No
1	Is this application running properly and functioning properly on your <i>smartphone</i> ?	10	0
2	Has the <i>Registration</i> function been running properly?	7	3
3	Is the <i>Log in</i> function running properly?	10	0
4	Has the <i>Price Info</i> function been running properly?	8	2
5	Has the <i>Change Password</i> function been running properly?	8	2
6	Has the <i>Logout</i> function been running properly?	9	1
Total		52	8



■ Yes
■ No

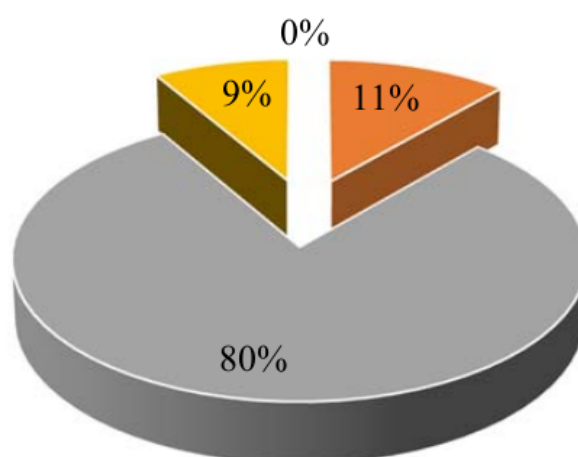
Figure 1. Questionnaire Results in Check List Functionality Farmers and FFB Entrepreneurs

In Figure 1. Explains that the results of the questionnaire on the *functional application checklist* for 10 farmer and businessmen respondents, 87% stated that the function of this application was running properly. While 13% of respondents said no. Furthermore, the results of the *usability checklist* questionnaire (Table 2) stated that the application (Figure 2) obtained 0% of the respondents of the farmers and the businessmen said that they did not agree, 11% of respondents stated that they did not agree, 80% of the respondents agreed, and 9% of the respondents agreed strongly.

Table 2. Questionnaire results in Check List Usability of Farmers and FFB Traders

No.	Question	DA	LA	A	SA
1	Overall, I am satisfied with the ease of using this application	0	0	9	1
2	The use of this application is very simple	0	0	8	2
3	I get info quickly on this application	0	0	7	3
4	I get accurate info with this application	0	2	8	0
5	This application is fun	0	3	7	0
6	This application has a function that meets according to my expectations	0	1	9	0
Total		0	8	56	6

- DA = Disagree
- LA = Less Agree
- A= Agree
- SA = Strongly Agree

**Figure 2. Questionnaire Results in Check List of Usability of Farmers and FFB Entrepreneurs**

The results of the questionnaire *check list functionality and usability checklist* application that is given to farmers and businessmen, the results show that the application that has been built is able to solve the problems of farmers and entrepreneurs in dealing with price fluctuations of palm oil FFB.

Conclusions

The application of the palm oil price information system from the results of this study can be used as a guideline for farmers and entrepreneurs in obtaining information about the price of palm oil fresh fruit bunches (FFB). The availability of fast information from this Android-based system can be a solution to overcome fluctuations in FFB prices and can provide benefits for palm oil farmers after harvesting.

Finally, we recommend that the results of this research are expected to contribute to helping to realize the Indonesian government program in the face of the 4.0 industrial era, one of which focuses on empowering SMEs through strengthening supply chains. Based on this research, we declare that this information system can also be a benchmark for farmers in managing harvest time to accommodate unstable price fluctuations. We also recommend for research on the development of this system can further be combined with added features, like price comparisons between the palm oil fruit collector (ramps) and the others.

In addition, it can also apply Geographical Information System (GIS) on applications so that it can help farmers to find out the location of palm oil fruit collectors (ramps).

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