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The Need of Agribusiness E-commerce to Support Staple Food Self-Sufficiency: The Experience from West Java

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Abstract

Agricultural sector plays an important role in national economic structure, because apparently the agricultural sector is more resistant to face an economic crisis than another sector. In addition, agricultural sector plays an important role to meet basic needs of the population, to increase farmer's income, to provide industrial raw materials, to develop business & employement opportunities, and to support national food security. Agricultural production has optimistically developed, but it still not satisfactory in marketing conditions. There are some aspects of the marketing system that still have to be addressed. By the case, the improvement of the IT field is strongly necessary. Therefore, the purpose of this research is to design an agribusiness e-commerce system for agricultural production. This system is usefull to introduce and to sell the products of the farmer, and to improve the performance of small and medium entreprise to minimize the risk of errors in the management of the company's sale transactions. This case study collected data by observation, in depth interviews, and literature study. The system was developed by Rapid Application Development (RAD) that is an object oriented with tools of Unified Modelling Language (UML). The result of the research is the creation of an e-commerce system that can help to market the products of rice, manage the data of the products, custumers, and orders.

Keyword: Agribusiness, system, *e-commerce*, custumer, and rice.

1. INTRODUCTION

Indonesia is a large country which has potential of abudant natural resources. Indonesia is an agricultural country mainly livelihood of its population is in agricultural field. Agricultural production is a kind of activity which is based on the growth of plants and animal. Agriculture in the narrow sense is mainly “agricultural people” which small area of land; while the so-called farm agriculture includes narrow area of agriculture, forestry, animal husbandry and fishery. Weather and climate in Indonesia is strongly supporting for the agricultural activities [1].

Agriculture is a very important sector in the Indonesian national economy. Development of the 21st century national economy will remain broadly-based on agricultural sector. In line with the stages of national economic development activities, the services and agriculture-based businesses will increase, in which the agribusiness activities will be one of the flagship events of national economic development in a wide variety of its aspects. Economic activities based on food crops and holticulture is a very important and strategic activity in Indonesia. Besides the largest labor involved in production processes, the agricultural products, especially the rice product, are also a basic foodstuffs in food consumption. In term of bussines, economic activities based on food crops and holticulture is the largest business activity, widespread throughout the Indonesian territory. The role of the farmer as a producer of staple food, causing everyone of 200 million Indonesian of population engaged in everyday food crops and holticulture economic activity [2].

Agricultural sector plays an important role in the structure of the national economy, because it is more resistant to face the economic crisis compared to the others sectors. In addition, the agriculture sector plays a role to meet a basic need of the population, increase the income of farmers, provide industrial raw materials, develop business as well as as employment opportunities, and to support national food security [3]

By the fact, there is a strong assumption, that the various groups of the nation widely realized that agricultural development has a very strategic position not only for developing countries, but the developed countries also seriously spend more attention to the agricultural development and protection. The discussion about agriculture sector is closely related to "survival" and sustainable of human being, nation, and finally the state. Agriculture is the provider of food, clothing and even housing material. As long as the people still need food to ensure its survival, the agricultural sector will remain as a very important role [4].

However, the agricultural development in Indonesia has been facing many issues needs the proper way to solve. The family farming system and land tenure in Indonesia should be addressed, in which it is attributed by small holding of land size and the lack of management, mainly in the post-harvest treatment. The classic study of Fujimoto [5] in four countries of South East Asia, mainly in West Java of Indonesia, strengthened the assumption that the rice agriculture in Indonesia is a family economy. The case of Ranca Ekek Village (West Java) indicated the average of land holder is 0.44 ha. The same trend was also found in Ranca Udik in which the farmer controlled the rice agricultural land averagely 0.66 per family in the same region of West Java. The next and the recent studies of Nabangchang and Srisawalak [6] in local areas of Java on the right of food agricultural land in Southeast Asia, with

a variety of viewpoints and diverse problems, affirmed the thesis that the agricultural food in Southeast Asia, especially in Indonesia, is a family farm with existence of various problem related to the lack of management, post-harvest treatment, marketing, and services for the customers.

The agricultural census of 2003 and 2013 data also illustrated the dominance of family farms as food producers in Indonesia. In 2003 there were at least 14 206 thousand family of rice farmers in Indonesia; and in 2013 it was reduced to 14 147 thousand farmers [7]. Referring to same source, the control of wetland size for each family in Indonesia is average of 0.69 ha. For more detail, the size of land tenure in the Sumatra area is about of 0.68 ha; in Java 0.61 ha; in Bali and Nusa Tenggara 0.72 ha; 0.78 ha in Kalimantan; in Sulawesi area of 1.32 ha; and in Maluku and Papua, an area is about 2.72 ha. The research conducted by Susilowati and Maulana [8] shows the average control of paddy fields in Java is about 0.36 ha.

In the light of the facts, the government policy to get food self-sufficiency brought out and forced the government to launch the empowering policy of the family farming. Agricultural development should be more serious to gain the status of Indonesia as the world rice barns by developing the small land holder farmer. This awareness--of course--should bring the politico-economic implications: all the energies and resources should be directed to development of this sector to increase the production of various kinds of food, and to increase the accessibility of all citizens by the affordable price. In addition, the goverment should have the political will to save the agricultural sector, not to let it marginalized by the current industrialization supported by large-scale capital owners.

The goverment failure to empower the family farming will get implication to born the serious problems of this nation, namely the decreasing the number of basic foodstuff, while the population will get increase significantly; and it is the potential of social anxiety. In this context, The Food and Agricultural Organization (FAO), International Fund for Agricultural Program (IFAD), and Food World Program (FWP) [9] delivered the special warning to Indonesian government by categorizing the country as food unsecure state based on the indicators of lack of food availability, stability, and facilities; although the three international institutions appreciated the Indonesian effort to get food self-sufficiency and food affordability.

Related to the above warning, The Economic Time [10] placed Indonesia at the 64 rank as a state of food unsecure. The top line of food secure states are USA, Denmark and France that hold the top three spots as the most food secure states; while the Sub-Saharan African countries which is Burundi, Chad, and the Congo take the three bottom spots as the ranking of 103, 104 and 105 of the most food unsecure countries. Indonesia gets less good position below Malaysia and Philippines.

The wide spreads of family farming also brought out the major issue of staple food distribution. The high dependent upon the rice lead several provinces in Indonesian territory still got a shortage of rice, such as NTT (minus 320 tons), Papua (minus 329 tons), Banten (minus 386 tons) and Riau (minus 380 tons). In addition, many other provinces are still lack of corn, soybeans and sugar. For corn, Riau was still lack of 254 tons, South Sumatra minus 245 tones, Jakarta minus 480 tons, Banten minus 521 tons, and West Java minus 1491 tones. For soybeans, Indonesia is still dependent on

import, with a total lack of 1,280,357 tons. For sugar, Indonesia still lacks of 1,059 tones [11]. The shortage of the rice could probably met by paddy production from the other provinces in Indonesia. This is based on the assumption about the existence of food surplus in many areas of rice or other food producers in Indonesia. But the lack of information made uneasy for the government to implement the proper policy of food distribution.

By the fact and condition, the information system support is very important to optimize the distribution of food, particularly rice. For the farming family, the system will assist to manage the product and production process, mainly in marketing process. For the government, the system will support to define the policy of rice distribution, and rice procurement. By the system, the government will easily and past to collect information from each area of rice production center in every harvest period in all areas of Indonesia.

The information system basically does not have to involve computer, but with the development of information and communication technology, the information system is often packaged based on computer. Development of the internet as a medium of information and communication is now strongly familiar. The information system using the internet network in the form of website simplifies data processing and expedite information delivery. In the light of this progress, the contruction of information system arouses the expectation to be able to help agricutural extension workers, training intructors, farmers, goverments, and businessman to manage and control agricultural production [12].

Internet usage around the world is continuesly increasing. The various companies – such as banking and airlines--use the internet as a vital need for everyday transaction. In addition, the development of advanced technology get increasing in line with the changing of times. A variety of advanced equipments like mobile phones, tablet PCs, computer, or laptop use an application that requires an internet connection. When you connect to the internet, as if you are accessing the largest post office, the biggest library, and the strongest data transmission network [13].

Discussion about internet, of course, can not be separated from a *website.* In the presence of a website, a company can do marketing easily using electronic commerce (e-commerce). Companies can use e-commerce as a medium to work as well to market. Companies do not need to set up a large office to run their business, but simply with a small office to transact and an e-commerce active system, then the business can be run.

If we review the farmer condition, there are various problems that make farmers lose money on the sale of their product. It is because they do not have market information. The lack of domestic distribution system causes high costs transportation. Accordingly, there are various issues related to weakness of agricultural information, agricultural production process (preparation, production, until post-production), provision of seeds, fertilizers, and drugs. Thus such matters becoming a major obstacles for Indonesian farmer which lead to weak competitive ability with other countries.

For the purpose of information system design, the research took the case of the company in Garut. West Java, whose name is *CV Beras 1001 Samarang Garut* as a

great sale agent company. The daily transaction conducted by the company is quite large but all sales processes are still done manually. The company often lose the evidence of daily transaction, resulting in having troubles to manage and calculate sales transactions quickly, accurately and efficiently. That is why the aims of this paper is to produce a design of agribusiness e-commerce system for agricultural production by case study of of *CV Beras 1001 Samarang Garut.* The system can assist this local company as well as other enterprices who sale the same commodities to introduce their sold product to all their custumers. The system can also improve the performace of the company to minimize the risk of errors in the management of entreprise data transaction. In general, by the system it will get proper policy to develop paddy wetland in Indonesia.

II. BASIC THEORY

A. Web-based Information System and Components

The system can be defined as an integrated group of elements with the same intention to achieve goal. Fitzgerald [14] defines a system as a network of procedures that are interconnected, gathered to perform an activity or completing a particular target. The information can also be defined as the data that has been processed, the data that has a meaning or the data that is processed into a form that is more useful and more meaningful for those who receive [14] While the information systems is an activity to organize the procedures which, when executed, will provide information to support decision making and control within the organization [14]. For more clearly, describes the information system within the organization in which is it brings the daily transaction processing needs, support operations, managerial, and strategic activities of an organization and provide certain outside parties with the necessary reports. Therefore, the information system can be defined as a system that leads to the use of computer technology in an organization that provides information to the user [14].

Web-Based Information System is a set of interrelated components that functions to collect, process, store, and distribute information to support decision-making and oversight within the organization. Web or WWW (World Wide Web) is a new method that runs in the Internet world, and it is rapidly expanding. This media may create tens or even hundreds of applications running under the site (under the web). PHP is one of the application programs commonly used in today's Internet media. MySQL database is the database server that can run in the online media database that is easily maintained by the user. [15].

MySQL is an RDBMS (Relational Data Base Management System). MySQL is distributed as open source and free from 1996, but has a history of development since 1979.

B. Basic Concept of E-commerce

E-commerce is process of electronic buying and selling goods or services or information [16] Broadly speaking, electronic commerce (e-commerce) is defined as a way to sell and buy goods (and services) over the Internet [15]. The advantages of Electronic Commerce (e-Commerce) for the company are:

1. Shorten the distance Companies can get closer to the consumer.
2. Market expansion.

The market distance of the company becomes unlimited by geographic area where the company is located.

4. Expansion of the network of business partners. Avoid the problem of lack information in the geographical position of a corporate partner.
5. Efficiency Reducing operational expenses such as papers for the transaction, advertising and recording.

Referring to the same source, the benefits for consumers are:

1. Effective

Consumers get the needed information more quickly.

2. Physically secure Consumers do not need to go to the store or the company with cash.
3. Flexible Consumers can make an offer wherever he is.

While, the benefits for the public are:

1. Reduce pollutants and environmental pollution. Consumers do not need to make a trip to the store or company that will probably reduce the pollution.
2. Opening of new employment opportunities. Electronic commerce will lead to new jobs as computer programmers, web designers, database specialists, networking specialists and so on.
3. Academic Advantage By the development of e-commerce, the academic world will go ferreting about e-commerce as an evolving science.
4. Improving the quality of human resources;
5. By the increasing number of electronic trading, everyone will learn computer technology for their own purposes.

However, beside the above various advantages, the electronic commerce has also emerged the probable disadvantages as following [16]

1. Increasing individualism In the electronic commerce, a person does not need to meet with traders to make transactions, in which buyers get easily to conduct transactions from wherever he is. It can lead a person's individualism which make the people lazy to move;
2. Sometimes it leads to disappointment At a certain condition, there is a possibility that the consumer gets the purchased product unsuitable with the displayed goods on the web. This of course leads the consumer to get disappointment.
3. Inhuman The electronic commerce transactions is conducted without direct meeting between the seller and the buyer. This probably makes the buyer and the seller not to feel the hospitality.

C. Systems Development Method

System development process is an activity, methods, best practices and automated equipment used by the stakeholders to develop a sustainable, improving information systems and software [17]. The system development methods that will be used in this study is the RAD method with Object Oriented.

D. PHP Programming in MySQL Database

To create a dynamic web application running, the web programming can be collaborated with PHP. PHP is a programming language that can make the web into a more dynamic program. By using the PHP program, it is not only to create web programs with a static display, but also be able to access databases such as MySQL. By such database, it can be used to store the news and to display on the browser page.

E. Unified Modelling Language

UML (Unified Modeling Language) is a language for visualizing, specifying, constructing and documenting the artifacts of a software system. UML is defined as a family of graphical notation supported by a single meta models, which help to describe and design a software systems, especially to build the systems using object-oriented programming. UML object-oriented does not depend on the development process, programming language and technology [18]. UML is a modeling language that should be used in conjunction with software development methodologies. Without methodology, UML diagrams are merely series of meaningless language. While software development methodology is a step by step guidance to develop and create a more efficient and well-planned application. The methodology used in this study is the Unified Software Development Process (USDP).

III. RESEARCH METHODS

The basic principle to adopt the methodology is to explore the problem faced by small and middle enterprises, especially for small business relating to the rice or the agricultural product in general; and to solve the problem by creating the information system. For this purpose, the methodology is divided into two stages. The first is to study the object where the system will be applied, which in this case is the rice company in Garut, West Java.

The second is to design an information system. For the first step, the research conducted qualitatively a case study operated by document content analysis, in depth interview, and direct observation [19] The document analyzed in this study is the archives, letters, chart of organization structure, and standard operating procedure (SOP) which led the researcher to catch the work process of rice selling includes the agents involved in the process.

The in depth interview was conducted to the official sides in selling process of the company included the director and middle employers. The gained data by this process was intended to affirm and confirm the written document, and to reveal the frame of thought consisted inside the written document, to lead the information system designed closed to the business process, and operationally useful to run the company.

The observation – as part of data collecting – was purposed to strengthen the acquired data by two previous methods. However, the research does not need a population and representative sample because it merely to get a complete and depth data in order to pave the way to implement the information system designed [20]
For the next second step to construct the information system, the research used the RAD model system, in which it is consisting of requirements planning, workshop, design, and implementation.

IV. RESULT AND DISCUSSION

The qualitative research conducted during March to October 2015 suggested the need of the agribusiness e-commerce to improve the lack of agricultural product management, especially for the rice farmer family. However, the suitable e-commerce system does not need a high technology, but merely a simple, easy to operate, and the lower standard of computer devices. By the fact, the research designed a simple e-commerce system, in which it included the use case, conceptual data modeling, mapping class diagram, and finally the system prototype to convince the suitable system.

A. Use Case Diagram

Based on the field study and actual business process, the system consisted of eight main use cases, included log-in and log out. The presentation of the use cases is to let the buyer easier to know the specific product, and easier to purchase if they need. The same principle is also designed for the company, to make them more efficient to store the order, archive, and make a report which is finally to deliver an excellence services to the customer. For the detail of use case, it is illustrated in Figure 1.

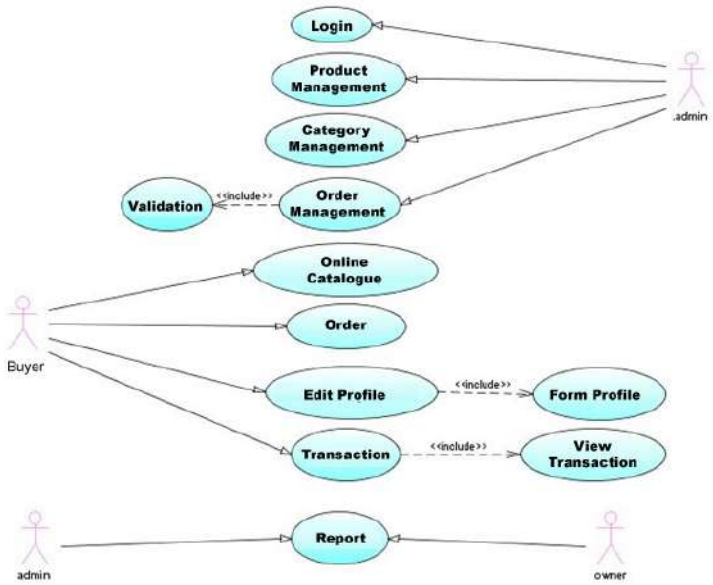

Figure 1: Use Case Diagram System

B. Class Diagram

1. Coseptual Data Modelling

The class diagram which describes the work process consists of conceptual data modeling and mapping class diagram. There are five items in work process of data modeling as presented in Figure 2. The modeling starts from the buyer, order, product, category of the buyer, which is controlled fully the admin.

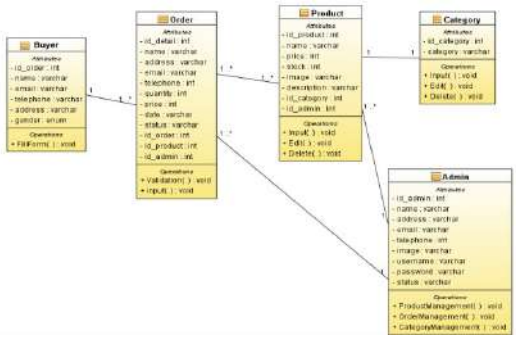

Figure 2: Conceptual Data Modelling

2. Mapping Class Diagram

The mapping class diagram which means a Logical Record Structure (LRS) is used to describe and design the database. This diagram is shown in the primary key table and becomes a forgein key in another table. The detail of mapping class diagram is showed in Figure 3.

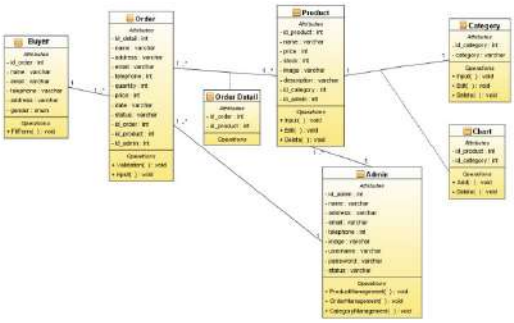

Figure 3: Mapping Class Diagram

C. Protoype of System

By the case of a company in Garut which produces the rice, sells, and distributes, the prototype of the system consisted of main page, order form, chart page, log in page, and admin dashboard page. The system could be developed for every family farmer which gathers in farmer group, and the government by internet network can easily watch the progress of each farmer group. By the prototype, it is easy to evaluate the suitable system to real field of the farmer group, cooperative, and small and medium size of local enterprises.

1. The main page

The information presented in the main page is menus needed by the company to market their product, included the company profile, the brief of rice product specification, the rice photos, the price, the way to log in, to order the product, and other menus relevant with selling methods and improve the management and services.

Figure 4: The Main Page.

2. The Order Form

From the main menu, the customer can enter to the order form, which is one of the essential content of the information system. The customer can order the rice directly. The technology is very simple, and may be left behind compared to the developed tool and device. But the matter that should be considered is not the highest and the advanced technology, but the common devices and tool that easily operated to help and to empower the small farmer.

Figure 5: The Order Form

3. Chart Page

The system should have to give a dialogue box to the customer, as illustrated in Figure 6. The question and answer is very important, especially the chart is related to the information about the growth of product needed by the consumers; and their satisfaction of the product. In case of rural society, the dissemination of innovation related to the agricultural technology is very important. The all rural institution, commercially as well as non-profit social services should have to be functionally as an extension services to develop the farmer.

Picture 6: Cart Page

4. Login Page

The log in process in a system is very important and essential. But, generally, it is not easy to enter the system by the log in way. The user name, the password, the email, and the process to enter sometime make the customs disappointed because of the difficulty and long process. The log in process in this system is simple and easy, just specialized to the lower education level.

Figure 7: Login Page

5. Admin Dashboard Page

The admin dashboard is this system is the page specialized for the admin to control, manage, and giving a response to the customer. In addition, the admin stores, makes the archives, and deliver a report of the information traffic of the system. By the admin database, the order by sequencing of the time and distance should be managed properly. The admin, of course, has a close cooperation with the whole parts of the company.

Figure 8: Admin Dashboard Page

6. Validation Page

The system for a business purposes is not proper and complete without validation page and payment system. But, based on fact that the costumer is lower education level and also unfamiliar with the computer system, the system is designed in a very simple way and short process. The payment could be done by ATM process and direct payment to the teller of the bank, without any requirement to use the credit card. The illustration of the validation and payment is presented in Figure 9.

Figure 9: Payement Validation Page

V. CONCLUSIONS AND IMPLICATION

A. Conclusion

1) The agribusiness e-commerce system is actually needed to develop agricultural product in rural society, to improve management system in the post-harvest treatment, to introduce the product to all customers, and also to manage the data of the customer, order, and variety of the product;
2) The system is also useful for the government to solve the problem of rice distribution, to determine the need of rice import, to get the proper information about the number of paddy harvesting in each center of paddy wetland in all areas of Indonesia.
3) The system directly or indirectly will get support the government policy to get staple food self-sufficiency by proper distribution, complete information, and suitable number of rice procurement.

B. Recommendation

By the conclusion, it is strongly recommended to perform the following action:

1) The government should be conduct a special project to provide the information system which specially designed for the farmer and small & medium enterprises;
2) The researcher should probably continue the project to create the information system which properly suitable for the low level of economic life and education, and also the system which is more high security level.

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