E-commerce based on the Marketplace in efforts to sell agricultural products using Xtreme programming approach

S Rahayu, L Fitriani, R Kurniawati and Y Bustomi

1 Department of Informatics, Sekolah Tinggi Teknologi Garut, Jalan Mayor Syamsu 1, Garut 44151, Indonesia
2 Department of Industrial Engineering, Sekolah Tinggi Teknologi Garut, Jalan Mayor Syamsu 1, Garut 44151, Indonesia

*srirahayu@sttgarut.ac.id

Abstract. Along with the development of technology that enters all walks of life including agriculture provides an opportunity for farmers to be able to trade agriculture directly because of the problems that occur in the distribution of agricultural products for quite a long time so that they are directly in hand. Consumers sometimes make farmers quite disadvantaged because they get income that is not comparable if sold directly to consumers (end users). However, the limited space and lack of information make it a problem for farmers to sell it directly. E-commerce is one solution to this problem. E-Commerce is a forum that brings together sellers and buyers in buying and selling transactions directly using online electronic devices. The software development methodology that used in this study is the XP (Extreme Programming) method. This article aims to make e-commerce based on m-commerce to accommodate the needs of farmers in selling agricultural products directly and get greater profits, and customers get cheaper product prices. The results of this study are the form of e-commerce applications that can be used as a medium for promotion, communication, information, and provide direct benefits to farmers and consumers.

1. Introduction
The majority of the livelihoods of the Indonesian population are in agriculture, and therefore, Indonesia is also known as an agricultural country [1,2]. One of the agricultural commodities in Indonesia is the city of Garut [3,4]. A large number of demand for Indonesian agricultural products that are favoured by domestic and foreign countries makes the marketing of agricultural products increase every year. However, sometimes the distribution of agricultural products that are long enough to be directly in the hands of consumers makes the farmers quite disadvantaged because they get a comparable income if sold directly to consumers (end users) [5-7]. Limited space and lack of information make it a problem for farmers to sell it directly, the rise of brokers and the high cost of renting a place of sale such as the market become one of the factors that cause the price of products to be expensive. Then a direct and effective sales and marketing solution are needed to increase the income of farmers also benefit customers to get lower prices. E-commerce is one of the effective solutions to answer these problems [8,9]. E-Commerce is a container that brings together sellers and buyers in buying and selling transactions directly using electronic devices online [10,11].
Some determinants that e-commerce is an effective marketing system to use the First Market-Based E-Commerce to shorten the distribution of Sales of Agricultural Products [12]. Furthermore, Ontology-Oriented Software Effort Estimation System for E-commerce Applications Based on Xtreme Programming and Scrum Methodologies [13]. This article aims to make e-commerce based on m-commerce to accommodate the needs of farmers in selling agricultural products directly and get greater profits, and customers get cheaper product prices.

2. Methodology
Agile Methods presents a new methodology that is very flexible to changes that occur during software development so that software development can be successful and by the wishes of the client [14]. One of the Agile Methods is Extreme Programming or also called XP [15]. XP is a software development methodology that does not make formal documentation during development [16]. The stages of development use Extreme Programming, namely: the first stage of exploration is the stage where the client writes down the needs of the most basic system. Every need written by the client will be made in a simple module or also called User Stories. The results of the exploration stage know the documentation of the vision and scope of work. The two stages of planning oriented to the stages of exploration. This stage will estimate business needs, user needs, and system requirements. This stage will also produce a schedule that describes the time frame for implementing system development. Third System Development Iteration. At this stage, iterations will occur several times; each iteration consists of 3 stages, namely system analysis, system design, and system creation and testing. And the last stage of production is the end of the stage where the system is ready for release. This stage will do testing of the entire system that has made to the client.

3. Result and discussion
The XP methodology approach at the design stage using the XP methodology approach takes two initial steps. Namely, the Exploration Stage and Planning Phase.

3.1. Exploration stage
During the exploration phase, user requirements elaborated by using User Stories (US). The US is described based on the results of interviews with clients, as shown in Table 1.

| User   | System Requirements                                                                 |
|--------|-------------------------------------------------------------------------------------|
| Admin  | There is the manager of the e-Commerce marketplace application. Administrators can verify and manage data in the application |
| Farmer | Farmers who have accounts and can use the application to sell agricultural products |
| Buyer  | People who have accounts and can make purchase transactions                          |

3.2. Planning phase
At this planning stage, business needs and system requirements will be produced, concerning the previous stages, namely the exploration stage.

3.2.1. Business need. Business needs divided into two parts; one is hardware requirements such as PC / Laptop (provided by developers) and second is software requirements such as Microsoft Visual Studio 2010 XAMPP Control Panel and MySQL Connector.

3.2.2. System requirements. System requirements are analyses carried out on system functionality and data design.

3.2.3. Use case diagram. This use case diagram for e-commerce agriculture consists of three types of users.
3.3. Testing and analysis
The stages of testing and analysis take the final two stages. Namely, the Iteration Stage of System Development and the Final Production Stage.

3.3.1. System development iteration. In the iteration stage of system development, three iterations carried out, in which more than one meeting is held in each iteration to discuss system development. Each iteration will go through three stages, namely (1) System analysis, (2) System design, and (3) System creation and testing.

a) First iteration. The first iteration is to build an e-Commerce application for Admin.
   - System analysis
     This stage analyses system requirements for admin users. Table 2 is a system requirement for admin users.

| Admin page   | Functions Provided                                      |
|--------------|--------------------------------------------------------|
| Home page    | • Admin name label (a sign that admin is logged in)    |
|              | • Tab menu: Items, Sold Items, Members, Inbox          |
|              | • Form for the input of new items                      |
|              | • Display the item table                               |
| Sold Item Page| • Admin name label (a sign that admin is logged in)    |
|              | • Tab menu: Items, Sold Items, Members, Inbox          |
|              | • Displays a sales data table                          |
| Buyer page   | • Admin name label (a sign that admin is logged in)    |
|              | • Tab menu: Items, Sold Items, Members, Inbox          |
|              | • Displays the buyer data table                         |

- System creation and testing of the admin have added to the Home Page by adding the opening sentence "Welcome to Our Website," which shows service for customers of employees.
b) Second iteration

- System analysis
  The second iteration is to build e-Commerce applications for Buyers. The process of designing and building a system for members is as follows:

| Table 3. Add home page requirements. |
|--------------------------------------|
| **Buyer page** | **Desired functions** |
| Home page | • The member name label that clicked towards the member profile edit page  
| | • Hyperlink Logout to exit the user member  
| | • Hyperlink My Cart that goes to the member's basket list  
| | • Hyperlink How to Order which goes to the page how to order  
| | • Menu tab consisting of Home, Categorize, New Arrival, Sale Items, About Us and Contact Us  
| | • Displays item data (item name, price) and Buy button  
| My Cart page | • Displays all data items that have been ordered by the member  
| | • Check Out Button to continue ordering  
| Check out page | • This page is a page for continuing member bookings. Data that filled is the Shipping Method and Payment Method  
| | • Submit button to complete member shopping  
| Categorize page | • Displays links for the Laptop, Accessory, Battery, Enterprise Storage, Peripheral, Component, Memory, External Hard Drive or Portable, and Speaker System categories. Each category link goes to the category based on the clicked link  
| | • Showing items based on the category clicked  

- System creation and testing
  Buyer Preparation and Testing by adding several requirements as in table 4

| Table 4. Add home page requirements. |
|--------------------------------------|
| **Buyer page** | **Desired functions** |
| New Arrival page | Add some images on the New Arrival page so that this page looks more colourful  
| Item Sale Page | The sale item page added a discount logo on each item so that the members know how much the discount for each item is.  


c) Third iteration. The third iteration is to build e-Commerce applications for buyers. The process of designing and building on e-Commerce applications for buyers is as follows.

- System analysis
  Three pages accessed by buyers, namely the Home page, Register, and How to Order. The following are details of the functions provided for each page.

| Table 5. Add home page requirements. |
|--------------------------------------|
| **Buyer page** | **Desired functions** |
| Register page | • Filled with a personal data form for buyers who want to register.  
| | • The information needed to fill out the form is UserID, First Name, Last Name, Email, Password, Address, Telephone, and Gender  
| | • Create Button Account if a buyer is willing to become a member  
| How to Order | • Add images to New Arrival page  


• System creation and testing
  Buyers produce requirements on page How to Order that has a function to produce Information provided to buyers to attract more attention.

3.3.2. Final production stage. The final production stage is the final stage in the construction of the entire system. After the developer has finished building the entire page, and according to the wishes of the client, the developer again meets with the client to show the client e-Commerce application that is ready to be implemented.

At the final production stage, developers still provide opportunities for clients to provide additional requirements in this e-Commerce application. Table 6 is the result of testing the functions that are already running on the system.

Table 6. Function testing.

| Function                  | Test Result |
|---------------------------|-------------|
| Manage Profile            | Succeeded   |
| Farmer Data Verification  | Succeeded   |
| Manage product            | Succeeded   |
| Manage order              | Succeeded   |
| Manage transaction        | Succeeded   |
| Registration              | Succeeded   |
| See product               | Succeeded   |
| Shopping                  | Succeeded   |
| Ordering Instruction      | Succeeded   |
| Comment                   | Succeeded   |

3.4. Analysis
From the test results, the analysis obtained, as explained in Table 7.

Table 7. Analysis of test results.

| Variable       | Analysis                                                                 |
|----------------|--------------------------------------------------------------------------|
| Communication  | • Communication makes it easy for developers to find out the client's wishes faster. Communication carried out every time a feature completed, and with feedback obtained from clients, developers can immediately know the changes desired by the client. Then the developer immediately repaired the system and carried out communication again after the system was changed.  
  • The obstacles that occur in this communication activity are adjusting the time of meeting with the client, and then the client's request is written in the form of a simple module so that the processing time does not become too late. |
| Feature Additions | • Added features provide an opportunity for clients to add several functions to the system. Addition of features is not limited, because XP always accepts changes that are desired by the client and also will not add to the cost of processing. |
| Change         | • The design made at the planning stage is not the same as the final result of this e-commerce application. As discussed in the Result and discussion before, is seen that the addition of features and changes desired by the client makes planning not complete into the system, because the client has changed or eliminated the planned functions.  
  • XP does not have formal documentation, because, during system development, developers focus on fulfilling client requests, and on resolving changes quickly, developers avoid activities that make the work process too late. |
Table 7. Cont.

| Variable      | Analysis                                                                 |
|---------------|--------------------------------------------------------------------------|
| Documentation | Developers do not recreate designs that have been carried out during the exploration and planning stages. Developers only write client changes in the form of simple modules and immediately change the system according to the wishes of the client. |

4. Conclusion

Based on the test results, it concluded that the system design documentation is only carried out in the early stages of development, namely the exploration stage and the planning stage. Then if there is a change when making an application, the system design will not be changed, only the system built will change. It said that XP does not have formal documentation that used as a measurement tool that the application completed, but the application is said to complete if the client does not need to add requirements to the application.

Then this e-Commerce application based on the marketplace can be used by farmers to market their agricultural products directly to consumers. So that the marketing distribution chain cut so that this will impact on profits for farmers. This e-Commerce application does not only involve buyers and sellers but also involves marketplace managers as supervisors of transactions by verifying purchase and sale transaction data so that that transaction security will be better.

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