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## Designing an Android-Based E-Marketplace System as Pekalongan Batik Trade Facility

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Android  
Sub Sistem Penjualan  
Berbasis Android  
ICONIX Process***Abstrak**

Perkembangan online shop di era globalisasi sekarang ini memiliki kemajuan yang sangat pesat khususnya E-Marketplace. E-Marketplace merupakan tipe online shop yang paling populer dikarenakan keamanan yang terjamin dengan adanya perantara sehingga customer tidak perlu takut untuk bertransaksi tanpa harus bertatap muka secara langsung. International Batik Center (IBC) sebagai salah satu tempat perbelanjaan batik di Pekalongan menyediakan lahan untuk lebih dari 200 UKM memiliki konsep yang serupa dengan E-Marketplace. IBC sendiri saat ini belum menerapkan transaksi bisnis secara online sehingga membuat pemasaran produk-produk UKM di IBC hanya sebatas di daerah pekalongan saja. Untuk mengatasi permasalahan tersebut, dikembangkan suatu sistem E-Marketplace yang terdiri dari beberapa sub sistem. Penelitian ini berfokus pada sub sistem penjualan berbasis android. Metodologi perancangan yang digunakan dalam penelitian ini adalah ICONIX Process. Tujuan dari penelitian ini adalah membangun suatu sistem E-Marketplace berbasis android yang akan digunakan oleh customer sebagai media untuk melakukan transaksi secara online. Dengan adanya sistem E-Marketplace ini diharapkan seluruh pelaku di dalamnya baik IBC, UKM, dan customer akan memperoleh banyak manfaat dibandingkan dengan pasar konvensional. Secara khusus perancangan ini juga diharapkan dapat memberikan manfaat bagi customer untuk mempermudah dan mempercepat proses transaksi.

**Keywords***E-Marketplace  
Android  
Android-Based Sales  
Sub System  
ICONIX Process***Abstract**

The development of online shop in this globalization era has progressed very rapidly, especially E-Marketplace. E-Marketplace is the most popular kind of online shop because of the guaranteed security by providing the intermediatery so customers do not need to be afraid to make a transaction without having to meet in person. International Batik Center (IBC) as one of the batik shopping areas in Pekalongan which provides place for more than 200 SMEs has a similar concept with E-Marketplace. IBC itself is not applying online business transactions at this moment so the marketing of SMEs products at IBC is limited in Pekalongan. To overcome this problem, an E-Marketplace system comprised of several sub systems will be designed. This research focuses on android-based sales sub-system. Design method used in this research is ICONIX Process. The purpose of this research is to build an android-based E-Marketplace system that can be used by customers as a medium to conduct online transactions. The result of this research is with E-Marketplace system, it is expected that all party in it, which are IBC, SMEs, and customers, will get a lot of benefits compared to the conventional market. In particular, this design is also expected to provide benefits for customers to simplify and speed up the transaction process.

**1. INTRODUCTION****1.1 Background**

In this globalization era, online shop has become very popular in many countries. Without going to the store customers can order

products via internet and then the products can be delivered to the customers' address that have been registered on the online shop. There are two common types of online shop. First is an E-Commerce where sellers have their own websites as their own shop. The other one is an

online market (E-Marketplace) in which sellers can register their shop via an online service provider.

E-Marketplace is an online shop used for selling products via third-party website that bridge transaction between sellers and buyers. It gives the sellers some benefits, reducing cost of opening physical shop and delivering goods to customers. Furthermore, many products can be compared from many sellers via E-Marketplace so buyer can make a purchase decision via website (Naovarat and Panitharn, 2015:1). Examples of E-Marketplace in Indonesia are Tokopedia, Lazada, Zalora, BukaLapak, etc. Facilitating the exchange of information, goods, services, and payments is the role of E-Marketplace in the digital company. E-Marketplaces create economic value for buyers, sellers, market intermediaries, as well as for society at large in executing of the trading process. (Turban et al, 2015:55). Besides, E-Marketplace system gives security for both sellers and buyers effectively because of the third party who also participates in the transaction. Marketing the product in E-Marketplace is one alternative that can be used to compete in the business world, including Small Medium Enterprises (SMEs) that are in International Batik Center (IBC).

IBC is a shopping center of batik wholesale and retail located at Jl. A. Yani No. 573 Wiradesa, Pekalongan, Jawa Tengah. IBC was established in order to facilitate and provide access for batik producers in the country to gain equal opportunity in marketing and introducing their products to customers within one integrated trading area. International Batik Center facilitates batik trading and marketing activities of various transaction sizes on the local, regional, and international scales. IBC does not provide electronic trading facilities, therefore it makes IBC missed benefit of having an E-Marketplace system. Various benefits and opportunities of E-Marketplace needs to be considered. Therefore, as the party to facilitate trading batik in Pekalongan, it's necessary for IBC to have an appropriate and adequate system of E-Marketplace to facilitate the entire buyers and sellers in the IBC in transacting online.

In the E-Marketplace there are three participants. They are buyers, sellers, and market intermediaries. Each of them have their own function in the E-Marketplace and system requirement. They also cannot be separated. IBC role as market intermediaries in the E-Marketplace, meanwhile SMEs in IBC has a role as sellers, and anyone who buy the SMEs' product has a role as buyers. Sellers in E-Marketplace do not always sell their products online. Some transactions are conducted outside the E-Marketplace, such as an offline transaction which is commonly noted through the Point of

Sales (POS) application. Thus, IBC needs to design an E-Marketplace system which is divided by its participants and integrates with POS application. The system that will be built consists of android-based E-Marketplace application for customers, web-based E-Marketplace application for IBC, web-based E-Marketplace application for SMEs, and POS application for SMEs that is integrated with an E-Marketplace system.

The most important thing in designing an E-Marketplace system is the Front-End that will be used by the customer to make a purchase of goods or the desired product. Without Front-end, the function of the E-Marketplace will not run. Most of Front-End applications are using mobile based applications. The increasing use of smartphones and tablets in Indonesia has contributed to the community needs of mobile applications. In young people, the use of mobile applications started to be familiar than use of mobile browsers. Baidu study refers to Gesellschaft für Konsumforschung (Society for Consumer Research), GfK Indonesia research entitled Mobile Apps Market Study Indonesia on April 17th, 2016 show that during October until December 2015 the use of mobile applications is greater than mobile browser, it's 97 percent, compared to only 76 percent of the browser. According to the Head of Marketing Baidu Indonesia, Iwan Setiawan, the average user of mobile users in Indonesia spend 60 minutes per day interacting with mobile applications that have been downloaded to their smartphone or tablet.

Android is a mobile operating system most widely used. A report by mobile app analytics firm, App Annie, mobile content and commerce association MEF on October 28th, 2014 that have been published by Natasha Lamas in Tech Crunch site, said that Indonesia is one of the countries that is promising for the mobile application developer. Indonesia along with four other countries, Brazil, Mexico, Turkey, and India have a growing number of Android and iOS application downloads significantly in the third quarter of 2014. When comparing the data of Android and iOS app downloads between the third quarter of 2013 and 2014, growth in app downloads mobile in Indonesia increased 1.7-fold, or about 70%. Also The report notes that Google's Play store is currently 60% higher for app downloads than Apple's iOS App Store. The growth in Android app downloads are supported by a high number of low-cost Android smart phones are marketed. Based on the problems that occur at IBC and the data that show the growth of android mobile application user in Indonesia, this research will be designed an android-based E-Marketplace system which will be used by customers.

## 1.2 Literatur Review

E-Marketplace is an online location where buyers and sellers conduct commercial transaction such as selling products, services, or information. Any individual can also open a market for selling their products or services online (Turban et al, 2015:8).

There are eight major components and players in E-Marketplace namely customer, seller, products and services (physical or digital), infrastruktur, a front and back end, intermediaries, other business partners dan support service seperti security and payment (Turban et al, 2015:57).

E-Marketplace have four major functions, the following functions of E-Marketplace are as follows (Turban et al, 2015:55).

- Providing a meeting place for buyers and sellers, so transaction can be occurred.
- Flow of relevant information can be occurred.
- Associating with market transactions to provide services, such as payments and escrow.
- Auxiliary services such as legal, auditing, and security can be provided.

## 2. RESEARCH METHOD

Research method used in this research is ICONIX Process. Using ICONIX Process makes the time required for system design can be reduced and still produce a system that is expected. The use of UML in ICONIX Process was not excessive, as it only takes a few diagrams that are considered enough to perform object-oriented analysis and design. The common steps in ICONIX Process can be seen in Figure 1.

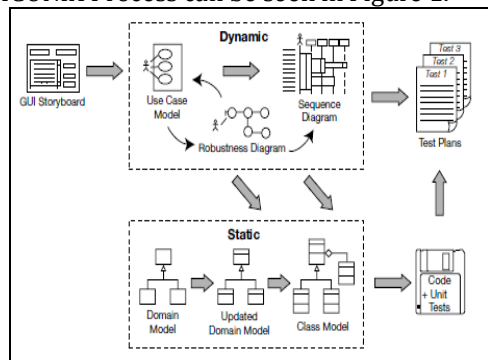


Figure 1. ICONIX PROCESS

Source: Rosenberg, D., & Stephens, M. (2007).

The ICONIX process sits somewhere in between the very large Rational Unified Process (RUP) and the very small eXtreme programming approach (XP). The ICONIX process is use case driven, like the RUP, but without a lot of the overhead that the RUP brings to the table. It's also relatively small and tight, like XP, but it doesn't discard analysis and design like XP does. This process also makes streamlined use of the

Unified Modeling Language (UML) while keeping a sharp focus on the traceability of requirements (Rosenberg and Matt, 2007:1). Implementation of ICONIX Process consists of four stage which must be done in sequence as follow.

### 2.1 Requirement Analysis

This stage defines what the system should be capable of doing. Depending on how the project is organized, the main stage of requirement analysis are Functional Requirement Analysis, Domain Modelling, Story Board the User Interface, and Use Case Modelling.

### 2.2 Analysis and Preliminary Design

This stage is a process of analysis and preliminary design that are done simultaneously, the aims of it are to produce proper and reliable system design. The stage consist of robustness analysis, it helps us to bridge the gap in the description of the use case scenarios that were made to get better for the next stage.

### 2.3 Detailed Design

Detailed design consists of the stages of system design in specific and detail, the result of system design will be implemented in form of application. The stages are Technical Architecture, Sequence Diagramming, Updated Domain Model, Finalize the Class Model, and Designing Database. The result of this design will be the basic in the process of making the software that being designed.

### 2.4 Implementation

Design that has been completed with use case and its scenario until class diagram that have been equipped with some of attributes and operations obtained from robustness modeling and sequence diagram, then the design is implemented by start to arrange the design to source code to design an android-based E-Marketplace sales sub system that will be used by customer at IBC.

## 3. ANALYSIS AND DISCUSSION

### 3.1 Business Process Modeling of E-Marketplace

This research designed a business model with the concept of E-Marketplace where there are three main parties involved, namely the IBC, SMEs, and customers. Transactions are provided to the customers are purchasing products and ordering with special specifications. As for the transaction of business process model is described using BPMN (Business Process Modeling Notation) as follows.

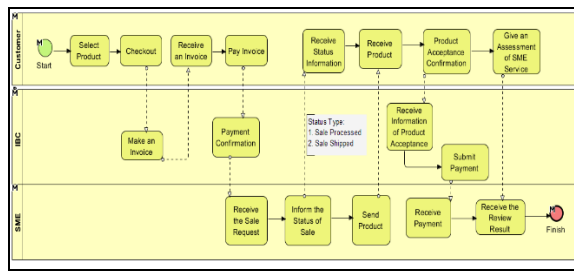


Figure 2. Business Process Modelling of Sale Transaction

Source: Processed Primary Data, 2016.

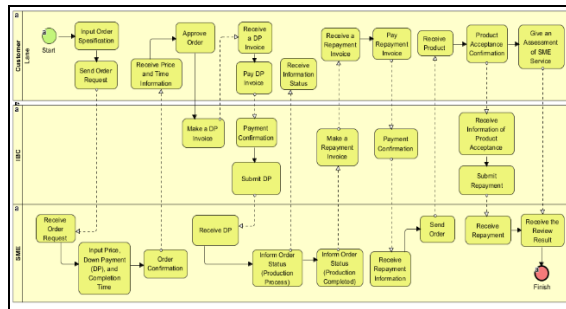


Figure 3. Business Process Modelling of Specific Order Transaction

Source: Processed Primary Data, 2016

### 3.2 System Design

System design method used in this research is ICONIX Process. It consists of four stages which must be done in sequence. Stages of ICONIX Process consist of Requirement Analysis, Analysis and Preliminary Design, Detailed Design, and Implementation. The following are the result of system design.

### 3.3 Requirement Analysis

This stage consists of Functional Requirement Analysis, Domain Modelling, Story Board the User Interface, and Use Case Modelling. The following are the results of Requirement Analysis.

### 3.4 Functional Requirement Analysis

This stage determines the functions that will be available in this application which will be used by the customer. The following is a description of Functional Requirement.

1. The designed system should provide the facility to enter the application as a user with the use of e-mail address and password registered by the customer.
2. The system must have account management functions including register, edit profile, and password reset function.
3. The system must be able to display the product data including the name of product, price, quantity, and description
4. The system should be able to display the data of SMEs including the name of SME,

address, telephone number, and descriptions

5. The system should provide the facility to sale products to customers that include sales data input and view the status of sales.
6. The system should provide the facility for customers to perform specific order transactions in which the customer can order products with their desired specifications to the SMEs directly.
7. The system should provide the facility to choose preferred courier to send the product to the customer.
8. The system should provide facility for payment of the transactions made by the customer to E-Marketplace administrator in the form of payment confirmation.
9. The system should provide facility for product acceptance confirmation and let customer to give a review and value of service from SMEs.
10. The system should provide balance management facility as another payment method that can be charged through a transfer to the account of IBC.
11. The system should provide a feature for customers to make contact with SMEs through the features of discussions, both general discussion and product discussion.

### 3.5 Domain Modelling

The results of the Functional Requirement Analysis will be used as a source in the making of Domain Model. After that, Domain Model that have been determined will become a Domain Object. The determination of relation between Domain Object are limited in relation is a generalization (is-a) or aggregation (has-a). The relations between Domain Object are as follows.

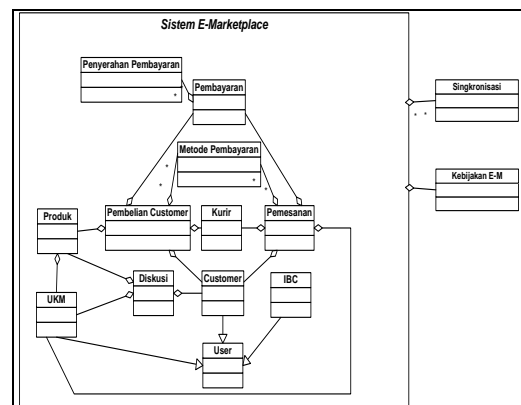


Figure 4. Domain Modelling of E-Marketplace System.

Source: Processed Primary Data, 2016.

### 3.6 Storyboard the User Interface

The next stage of ICONIX Process is Storyboard the User Interface. This stage is the stage of GUI Storyboard design which will be used as the basis for determining the use case in



E-Marketplace system especially in this sub system. The following is a display of GUI Storyboard of this sub system.

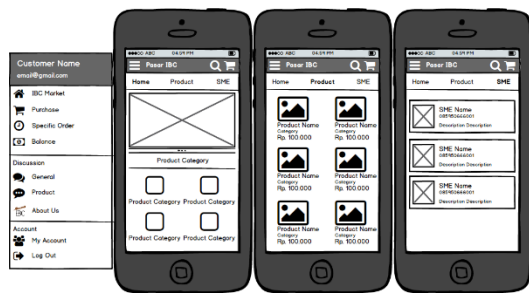


Figure 5. GUI of Main Page

Source: Processed Primary Data, 2016.



Figure 6. GUI of Cart and Purchasing Input Page

Source: Processed Primary Data, 2016.

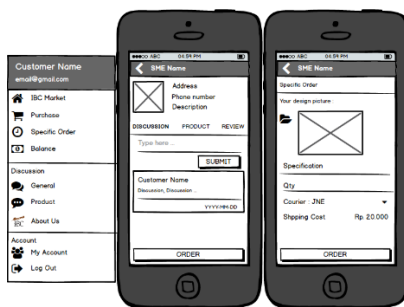


Figure 7. GUI of Specific Order Input Page

Source: Processed Primary Data, 2016.

### 3.7 Use Case Modelling

The next stage after Storyboard the User Interface is a Use Case Modelling. This stage determines functional requirement of user. The requirements describe in sentence and adding some number in each of requirement for each actor. Number or code in every requirement is marked with the code FR (Functional Requirement). The description of the use case modelling in this sub system are as follows.

Table 1 Description of Use Case Modelling

Code	Description
FR01	customers can log in to the E-Marketplace mobile application at the login page.
FR02	customers can manage accounts that include register, edit profile, and reset password.
FR03	customers can make purchase transaction starting from input

	purchase, view the details of purchasing data, confirm payment and confirm the product acceptance.
FR04	customers can make specific order transaction starting from input specific order, view the details of specific order data, confirm down payment and repayment also confirm the ordered product acceptance.
FR05	customers can manage balance that include fill and view the balance, view the balance usage and deposit balance data.
FR06	customers can make contact with SMEs through the features of discussions, both general discussion and product discussion.

Source: Processed Primary Data, 2016

Based on description of Use Case Modelling above, it can be formed Use Case Diagram as follow.

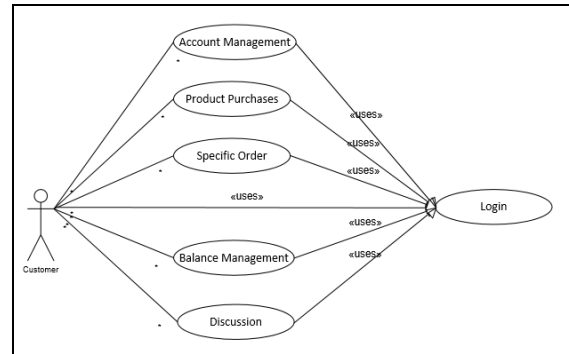


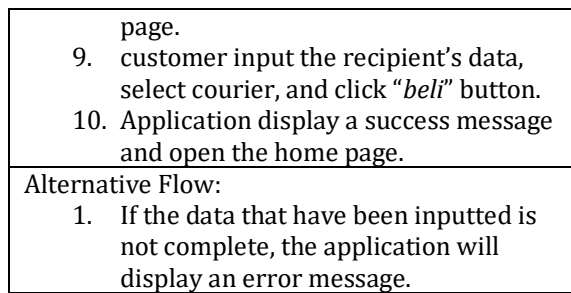
Figure 8. Use Case Diagram

Source: Processed Primary Data, 2016.

Each of use case will be equipped by description of scenario for explaining the action that can be done by actor. The following is an example of use case description of input purchase.

Tabel 2 Use Case Description of Input Purchase

Use Case Name	Use Case ID
Input Purchase	FR03A
<b>Primary Actor</b>	
Customer	
<b>Normal Flow:</b>	
<ol style="list-style-type: none"> <li>customer select product at product page.</li> <li>customer click “masukan keranjang” menu.</li> <li>Application save the product at cart page.</li> <li>customer click cart icon.</li> <li>Application display the cart page.</li> <li>customer can update his/her product detail at cart page.</li> <li>customer click “beli” button.</li> <li>Application display the input purchase</li> </ol>	



Source: Processed Primary Data, 2016.

### 3.8 Analysis and Preliminary Design

This stage is done with Robustness Analysis that describe the details of each sentence in Use Case either normal flow or alternative flow to determine which the most appropriate scenario. By using Robustness Analysis allows us to find a new Domain Object which are not previously identified. The result of this analysis in each Use Case begins with describing in detail along with their flow. The following is the example of analysis and preliminary design of this sub system.

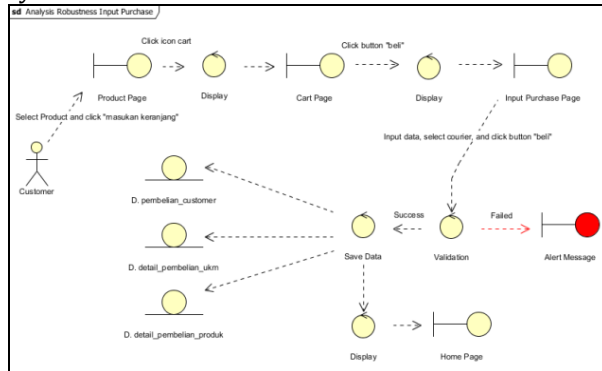


Figure 9. Robustness Diagram of Input Purchase  
Source: Processed Primary Data, 2016.

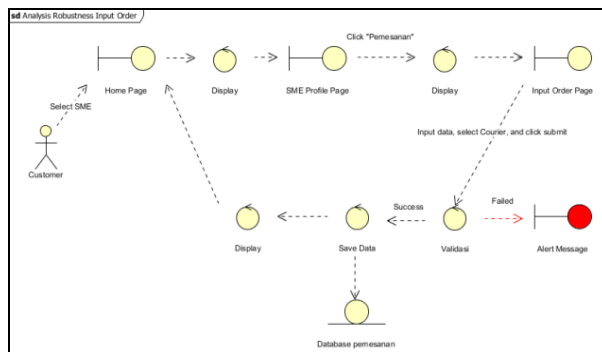


Figure 10. Robustness Diagram of Input Order  
Source: Processed Primary Data, 2016.

### 3.9 Detailed Design

This stage is a stage of system design in specific and detail, detailed design stage consists of determining Technical Architecture (using Deployment Diagram), Sequence Diagramming, Updated Domain Model, Finalize the Class Model, and Designing Database. The following is the result of Detailed Design.

### 3.10 Technical Architecture

Technical Architecture is a stage to determine the technical planning of system that will be designed by using Deployment Diagram. According to the technical architecture design, system that will be designed is an Android-based application. Data synchronization method is used to synchronize overall E-Marketplace system is web service by using REST concept. The working principle of the REST use the API for synchronizing data. The following is the Technical Architecture of the overall E-Marketplace system illustrated by Deployment Diagram.

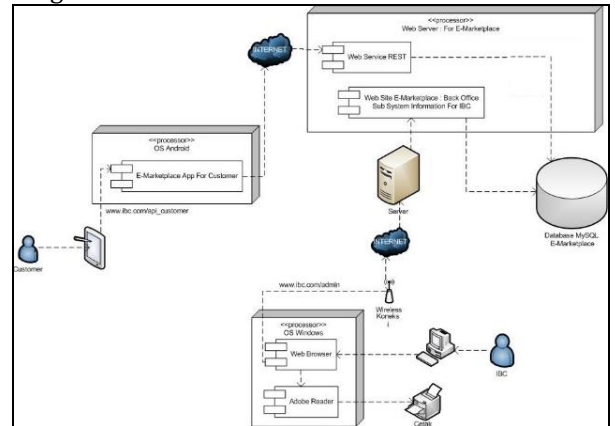
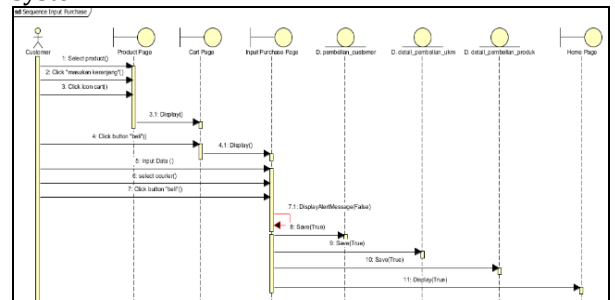


Figure 11. Deployment Diagram of E-Marketplace System  
Source: Processed Primary Data, 2016.

### 3.11 Sequence Diagramming

The next stage after Technical Architecture is Sequence Diagramming. It is used for designing in detail. Designing of Sequence Diagram is based on Robustness Diagram that have been formed before. The following is an example of Sequence Diagram of this sub system.



Gambar 12. Sequence Diagram of Input Purchase  
Source: Processed Primary Data, 2016.

### 3.12 Updated Domain Model

The next stage is to update the Domain Model by matching requirements of Domain Object based on analysis design that has been done. The discovery of a new Domain Model in the Updated Domain Model make the relationship between the new Domain Model can be described as follow.

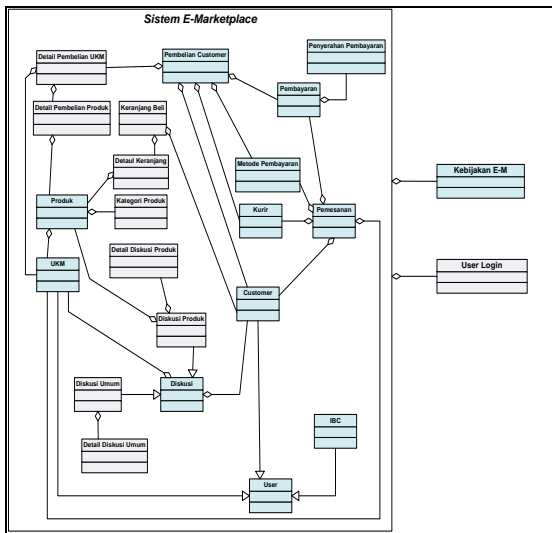


Figure 13. Updated Domain Model of E-Marketplace System  
Source: Processed Primary Data, 2016.

Updated Domain Model which has been arranged converted to Class Diagram by adding some attributes and operations are required. The addition of attributes is based on the design of the GUI were done. Meanwhile, the addition of operations is taken from each event contained in the Sequence Diagram. The relation between the class diagram is also developed to become more specific and descriptive.

### 3.13 Database Design

The last stage of Detailed Design is Designing Database where the result of Class Diagram become a basic for the design of Database. The following is the result of the relation between tables in database of E-Marketplace system.

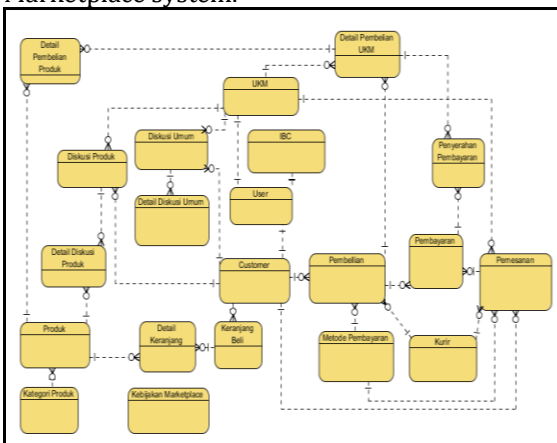


Figure 14. The Design and Relation of Database  
Source: Processed Primary Data, 2016

### 3.14 Implementation

The implementation stage is a stage to implement the design into source code. This stage is expected to build an android E-Marketplace system for inputting purchases and ordering products transaction. This stage will

explain how the application that has been built run. The following are the few examples of the result of implementation.

To access this application, the customers need to login first by using e-mail and password at the login page followed by clicking the "login" button. The following is the view of login page.

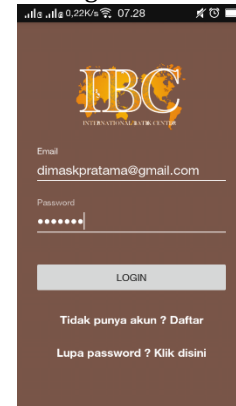


Figure 15. Login Page  
Source: Processed Primary Data, 2016.

After the customer logged in successfully, the application will display the main page. It consists of three tabs: home, latest products, SMEs list. The following is a view of the main page.

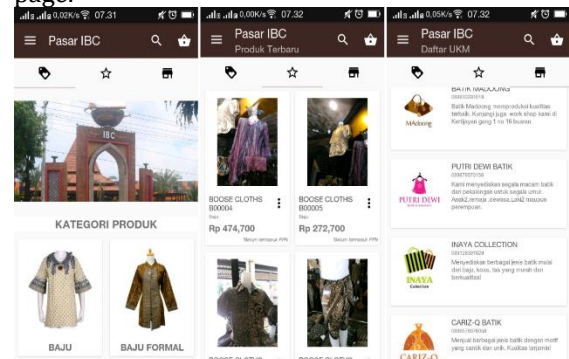


Figure 16. Main Page  
Source: Processed Primary Data, 2016.

The home tab contains IBC image slider and its business activities as well as product categories sold in PasarIBC. The newest products tab contains the products sold by all SMEs in PasarIBC. While the SMEs list tab contains SMEs enrolled in this application. In addition, there are icons of search, cart, and menu which holds all important activities in PasarIBC.

If the customer clicks a certain product, the product detail page will be shown. Product detail pages contains details of product data, discussions related to the product concerned, review of the product satisfaction, and the number of the products sold, as well as the cart icon to insert the product into the basket. The following is a view from the product detail page.

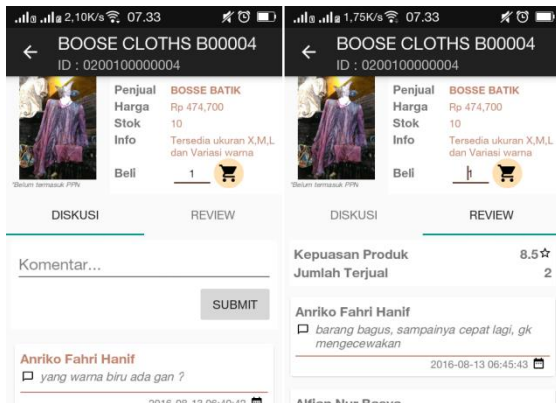


Figure 17. Product Detail Page  
Source: Processed Primary Data, 2016.

Meanwhile, if customers click one of the SMEs, the SME profile page will appear. SME profile page contains details of SMEs, discussion related to the SME concerned, the value of service, number of transactions and successful transaction, as well as the list of products sold by that certain SME. The following is a view from the SME profile page.

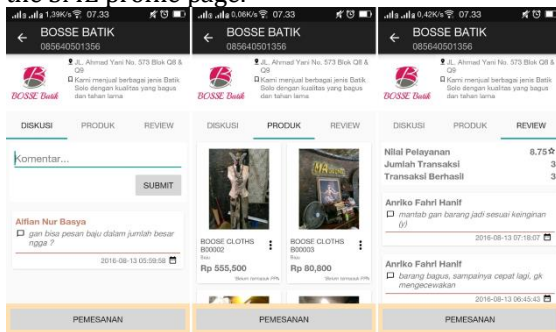


Figure 18. SME Profile Page  
Source: Processed Primary Data, 2016.

For doing a purchase transaction, customer must enter a product into the basket, then customer should click the cart icon on the home page to do checkout by clicking “beli” button at a cart page. After that, the next step is entering recipient information data and choosing the courier on purchasing input page. The application then will display the data from the customer by default which can be replaced with other data if the customer wants to send the product to another address. The following is a view of the purchasing input page.

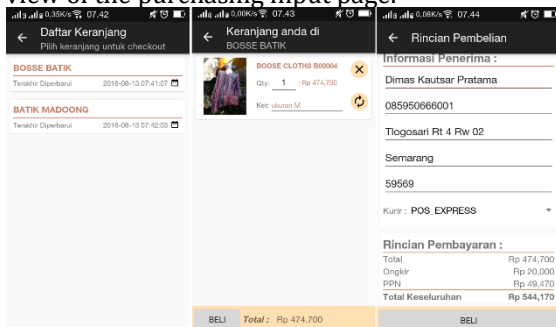


Figure 19. Cart and Input Purchase Page  
Source: Processed Primary Data, 2016.

In order to perform specific order transactions, the customer can access it by clicking the “pemesanan” button in the SME wished, the application will display the input specific order page and the customer will be expected to fill in the required data and click the submit button to enter the order. The following is the picture of input specific order page.

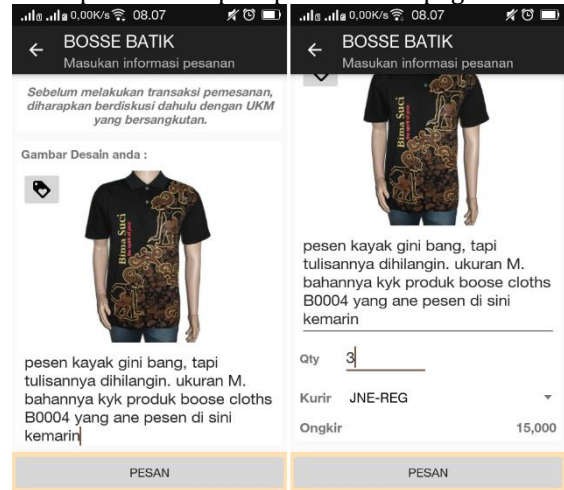


Figure 20. Cart and Input Purchase Page  
Source: Processed Primary Data, 2016.

#### 4. CONCLUSION AND SUGGESTION

International Batik Center (IBC) as one of the batik shopping areas at Pekalongan which facilitate and provide access for batik producers in the country is not applying online business transactions yet at this moment. Meanwhile, the development of online shop in this globalization era has progressed very rapidly. Therefore, to take advantage of existing opportunities, IBC need to provides an online shop to facilitate batik trading transaction.

E-Marketplace is the most suitable type of online shop to be applied at IBC. The safety of transaction which is guaranteed by the service of third party makes E-Marketplace a choice in conducting online shopping so the customer does not need to be afraid to make a transaction without having to meet in person. It also makes customer can easily do the transaction in anytime and anywhere.

Design method used in this research is ICONIX Process that consist of 4 main stage. They are requirement analysis, analysis and preliminary design, detailed design, and implementation. This system design create an E-Marketplace sub system which is used to fulfill the customers' need. This sub system has some main functions, which are to make purchasing input process, whether it is purchasing or ordering, to input receipt, whether it is used to confirm a transaction payment or cash deposit to IBC, to see the list of product, SMEs, and transaction status, and as a media to discuss with SMEs.



This sub system was tested by using black box testing method as well as white box testing method. This testing gave a result that the system has run in accordance with the functional requirement at the early designing stage and has a correct processing procedure.

The design of this sub-system is still far from perfect in the design process as well as the output of the system. Therefore, here are some recommendations for further research so the system design can be developed.

1. The application designed is an android-based application system that is limited only for the android users. Therefore, it is expected that a similar system based on iOS and web for non-android users can be developed in the future.
2. The application designed cannot accommodate multiple processes within a single page at this time. It would be better if further research can overcome this problem so the product filter function by price and time can be added as well as the push notification feature for the changing of status transaction so when current transaction status changed, the customer can be informed in real time.
3. The payment method can only be done by bank transfer and not direct payment so IBC must confirm the customer's payment data that have been inputted. It is expected that direct payment methods may be added to this application in the future research.
4. Shipment rates used in this application is still using flat rate tariff and not the original shipment rates using the courier tariff plugin. It is expected in the next research that the shipment rate uses the JNE, POS, and TIKI plugin may be added to this application.

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