User Interface Design of Mobile-based Commerce

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Abstract. Current research regarding user interface has shown that successful interaction between e-commerce component and the end-user is related to a readable, perceivable user interface (UI). The purpose of this paper analyzes the design principles of the user interface used in popular e-commerce by using guidelines derived from previous researches and field survey. By using the variables, this research evaluated mobile-based commerce user interface through a case study, and how it affected the end-user expectation and acceptance. The result shows that popular m-commerce is aware of effective user interface used in its mobile app and that it applies UI basic principles on designing the app.

1. Introduction
The advancement of technology in a mobile device has changed consumer’s preference in shopping activity. The consumer is given the ease to shop on various online retail through mobile device and computer without going to the physical store. This development creates a new marketing term that is e-commerce or electronic commerce. E-commerce can be generally described as any form of economic activity conducted via electronic connections [1]. Based on survey conducted in 2014 [2], the number of online transaction through mobile device continues to increase. The result shows that 78% of consumer purchase products via online shopping through their mobile gadgets, thus making mobile device to be the most used medium in e-commerce activities.

Mobile e-commerce or m-commerce is defined as all activities regarding e-commerce in mobile device conducted through communications networks [3]. However, mobile device poses a challenge regarding usability [4] and perceivable user interface to ensure consumer’s experience. Good user interface is essential to satisfy the user’s sensory and functional needs [8], and it will also influence the user to return in using the app, brand, or product. The user interface is part of computing system used to interact with users; it also functions as representation of the product or business [6]. Every detail in user interface design is essential and plays a significant role, especially in effectivity level of an information system. Unlike web-based user interface, the one used in mobile device owns several constraints such as bandwidth limitation and display size [4]. It is still unclear whether the existing principles of user interface design can be applied to another device (from web to mobile) or not, although some previous researches proposed a basic guideline to evaluate ’good’ user interface for mobile device. Gong and Tarasewich [7] proposed a guideline for user interface elements in mobile device, which is a development of Shneiderman’s golden rules [5]. One of the principles is ensuring the consistency of elements to keep the brand image the same across the device. It is also essential to make the design appropriate to mobile device’s width, which can be done by limiting vertical scroll as mentioned in a concept [4] by Chan, et al. User interface design needs to accommodate both new user with little to no experience, and ’expert user’ who seeks for efficiency in using the interface [9].
The researcher aims to develop further the guideline that has been previously discussed by other studies to make it more appropriate to a growing m-commerce application today. This study also evaluates user interface and design principles used in popular m-commerce, through a case study, and present its evaluation based on a set of criteria. The methods used are by reviewing previous researches to make a guideline regarding good user interface, and also conducting a survey among customers to know their experience in using the mobile-commerce app.

2. Methods
2.1. Research method
The method used in this paper was combining field research and principles review. The results collected from field research thus would be used to evaluate the user interface of a case study, along with descriptive analysis regarding whether or not the case study had used basic principles of good user interface. The criteria of good user interface were derived from previous researches and papers in the same matter.

2.2. Field research
This research uses a survey method that is distributed online to approximately 300 respondents. The question listed in the online form asks respondents about their online shopping preference and their favored e-commerce. Respondents are also asked to judge and write their opinion regarding readability of Shopee’s mobile app user interface, that this paper used as a case study, to find out whether the application has fulfilled customer’s expectancy or not. The survey was conducted online using Google form and could be accessed for two days, starting from February 22, 2019 to February 24, 2019. The forms were distributed among online respondents, and in the end, there were a total of 323 responses collected. The participants were open to all ages and genders, as long as they have experience in using e-commerce at least once. All the user interface-related questions are variables taken from previous study [7] and Shneiderman’s golden rule, adjusted accordingly for this research. Some indicator of user interface principles used in the questionnaire are as follow (See Table 1):

| Table 1. User interface principles and questions sample in the questionnaire |
|-----------------------------------------------|
| UI Principles                  | Questions used in survey form |
|-----------------------------------------------|
| Consistency                     | Is the style of this particular element maintained or consistently present across different platform? (i.e in web and app) |
| Shortcut for frequent users     | Are shortcut icons in the app homepage easy-to-understand for both experienced and new users? |
| Design dialogue to yield closure | Is the page clear and obvious, does it need any guessing at all? |
| Informative feedback           | Does the user know what this action lead them to? |

2.3. User interface principles evaluation methods
The methods used to evaluate user-interface principles in m-commerce application is through reviewing guideline that has been done in the previous research and study. The target research is limited to paper that discusses mobile device only. Guidelines that will be used to evaluate are those formulated by Gong and Tarasewich [7], Chan, et al. [4], Shneiderman [5], and also some that mentioned in [9]. Combining the guidelines presented by the previous researches, some principles that will be used as an evaluation variable in this paper are as follow (See Table 2).
Table 2. UI Evaluation Variables

| No | UI Principles                          | Details                                                                 |
|----|----------------------------------------|-------------------------------------------------------------------------|
| 1  | Minimalize horizontal scrolling        | To fit mobile dimension width                                           |
| 2  | Design consistency                     | Consistent with the design used in other platforms, both in term of brand-aesthetics and design in general |
| 3  | Providing a history list               | Allowing user to access the history list                                 |
| 4  | User-customization                     | Allowing preference, both technically and for personalization-purpose   |
| 5  | Design for smaller devices             | Allowing word selection to make it easier for the smaller device to input searches |
| 6  | Providing back button                  | Providing a button to get back to the previous page or state in the application |
| 7  | Explanatory elements                   | Making the user interface easy-to-learn for new users by using familiar icons |

2.4. Case study
The case study is a method, which allows the researcher to analyze the data within a specific context [10]. The method offers an in-depth study of a certain subject. Although it is hard to make a general conclusion, using case study can help to examine the existing variables within a single case; the case chosen for this research is Shopee e-commerce. Shopee is the most popular mobile shopping app based on AppStore and Play Store ranking. This becomes the consideration to pick Shopee as the appropriate case study for this research. The survey conducted in this paper also shows that from a total of 300 respondents, 89% of them have used Shopee before and have Shopee installed on their mobile device.

3. Result and Discussion
This paper used the questionnaire results and the combined guideline of user interface design principles to evaluate Shopee application. The aspects and evaluations are as follows (See Figure 1).

3.1. Minimization of horizontal scrolling.
The sample used to evaluate this variable is Shopee’s front homepage. Due to the handheld device’s nature of having small screen and limited bandwidth, it is not likely to present an excessive amount of information in one screen [4]. However, this issue can be less severe by applying one-directional scrolling in the app. It is shown in figure 1 that Shopee only provides vertical scrolling in its homepage. All user interface elements are designed downward and fixed to screen width, allowing user to do one-directional scroll to see all the contents. The first element placed on homepage is the search bar, along with cart and chat feature in the same column. Right below that is a section for Shopee’s exclusive content (for example; Shopee Mart, Men Sale). Further scrolling will lead users to items category list, popular search, and recommended items section in a two-columns grid format (See Figure 2).

![Shopee's brand color](image)

**Figure 2.** Shopee’s brand color

Shopee is consistent with its brand design. Shopee is using the same brand color across device and platform. The main color for this brand is orange, as seen in figure 1. The color is also used in some visual elements presented in the mobile app version, such as banner and buttons. Figure 3 shows two examples of applied brand color on visual elements in Shopee mobile app (See Figure 3).

![Color scheme used in Shopee app](image)

**Figure 3.** Color scheme used in Shopee app

On the survey conducted beforehand, respondents are given three choices to associate Shopee with various colors, which are orange, blue, and other colors. Nearly 98% of respondents claimed they associated Shopee mobile app with the color orange. The rest are either white or other colors (See Figure 4).

![Survey regarding Shopee brand color on users](image)

**Figure 4.** Survey regarding Shopee brand color on users
3.2. Provide a history list
Shopee provides a history feature to let users see what products they have searched for. The history list is essential for the users to track their record on application. The history list in Shopee app is presented in a different way than a regular web browser. It is listed in the form of product thumbnails, not as a list of hyperlinks. History list can be accessed through the profile menu in Figure 5 and is shown with a clock icon (See Figure 5).

![Figure 5. Shopee’s history list](image)

3.3. User-customization
Users need customization to run the application on their favor, as they like. Shopee provides in-app customization for its users. Users can turn the product notification on and off, block other users on chat, and also set a privacy setting. Account-related customization can be accessed through the user’s profile page located in the most right bottom bar in Figure 6. As for user-based customization, Shopee allows users to change their profile and banner picture to be shown at the profile page (as shown in fig 6 left picture) for identification and user’s experience purpose (See Figure 6).

![Figure 6. Shopee’s user profile page](image)
3.4. Design for the smaller device
The smaller device sometimes faces trouble to do manual text input. Shopee gives auto-input feature on search bar to make product browsing easier for users. Shopee also allows the user to pick a certain category in search bar to minimalize the user’s effort in looking for the desired product as shown in Figure 7. Users only need click a button to browse product lists without actually typing it. (See Figure 7).

![Figure 7. Auto input to search product in a certain category](image1)

There is also an auto input feature in the search bar. Users need to type some words, then Shopee will predict the product based on the inputted name as shown in Figure 8. It is a lot faster and easier than having to type the complete product name in some cases (See Figure 8).

![Figure 8. Auto input in the search bar](image2)

3.5. Provide back button
Shopee provides a back button to allow the user to get back to the previous page and to undo the action users are about to do. The back button is shown as a left pointer in red color and is available on the most page in the app (see Figure 9).

![Figure 9. Back buttons in Shopee app](image3)
3.6. Explanatory elements
Shopee’s user interface is easy to understand for both new users and experienced users. One of the essential pages in the app is the product detail page, which is showing everything users need to know about the product, and what should be done to purchase the product. There are three buttons on the bottom menu of the product detail page, as shown in Figure 10. The bottom menu consists of chat shortcut, add to cart, and ‘buy now’ option. The options are making it easier for users to proceed with their interest in products, whether they want to buy it or sending inquiry to the seller (See Figure 10).

![Shopee product detail page](image1)

**Figure 10.** Shopee product detail page
Shopee is using a lot of self-explanatory elements in its pictogram and icon designs. The survey also shows that 71% users did not face any trouble when first using Shopee application, while only 28% others have some issues in running Shopee because of the unfamiliar menu and icons, too many placements in one page, and excessive use of icons. Shopee m-commerce is aware of a good and effective user interface for its mobile app. There are some findings from the evaluation conducted (See Figure 11).

![Shopee application survey](image2)

**Figure 11.** Shopee application survey
Shopee is using the same brand color across platform and device, making it easy to be recognized for users.

Shopee allows vertical scrolls, which is the most effective way to browse content through a mobile device, rather than doing a horizontal scroll.

Shopee provides a history list and a back button on every page to let users record what they have done and to go back to the previous page to undo actions.

Although it does not apply to all users, Shopee has explanatory elements and universal pictogram that can be easily understood by both new and regular users.

4. Conclusion

This research combines several studies from previous researches to make a guideline to evaluate a proper user interface in an e-commerce application. The design principles include the minimalization of horizontal scrolling, design consistency, designing for a smaller device, providing a history list, user customization, back button, and having explanatory elements. Shopee e-commerce is used as case study for this research for its popularity among mobile-based commerce. After evaluating user-interface principles used in Shopee application, it is concluded that Shopee m-commerce is aware of effective user interface and is applying it in its mobile app design.

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