Using ISO 9241-11 To Identify How E-Commerce Companies Applied UX Guidelines

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Abstract— A lot of the company's business activities failed due to not adapting to user needs and technological developments. Previous studies show that there is no way to implement UX guidelines that explain the specific user needs for the UX of e-commerce systems. Therefore, we need a way of implementing UX for e-commerce websites. We used usability parameters in ISO 9241-11, namely effectiveness, efficiency, and satisfaction, to measure the system's usability and then conduct an interview to follow up the result. This research identifies how e-commerce companies implement UX best practices for their systems that can be used for other people who want to design their e-commerce applications.

Keywords— UX, UX Guideline, E-commerce, Usability Parameters, ISO 9241-11.

I. INTRODUCTION

UX (User Experience) is a user experience when interacting with applications that have gone through various design stages until they can be implemented in the broader community [1]. Find out the level of UX among users, and it can be seen based on the system's usability or application. According to ISO 9241-11, usability is the level of application usage by users to fulfill their needs, consisting of 3 parameters, namely effectiveness, efficiency, and satisfaction parameters [1]. E-commerce is buying and selling goods between two parties, namely buyers and companies, through internet-based electronic media [2]. This study collects quantitative data to find general UX problems for 23 students classified as beginner programmers. 53% of them expect a guideline on applying good UX guidelines.

UX is closely related to business activities. Companies that implement e-commerce to trade their products or services have challenges in providing a system that supports user activities and influences them to use the application. Several things that affect the level of user confidence in e-commerce applications are how simple, effective, and efficient the system that builds the application is. According to a study conducted by the Turnaround Society, 51.6 percent of a company's business activities fail due to the failure to adapt to changes in technology and user requirements. To prepare for this, it is vital to regularly adapt and update e-commerce applications to stay up with the changing lifestyle of the community and compete with other businesses to meet user needs and gain user confidence. To be able to implement e-commerce well, it is necessary to understand how to maintain customer satisfaction and build a good application infrastructure [3].

This research will study the Shopee application as a reference in making the concept of implementing UX guidelines. To get the usability value of this application, the researcher uses ISO 9241-11, where the standard contains the concept of usability. Usability is a user's system, product, or service based on effectiveness, efficiency, and satisfaction to achieve specific goals [1].

The effectiveness and efficiency parameters will be tested using performance measurement techniques to produce quantitative data about the respondent's performance when working on a task scenario. Task scenarios (task scenarios) are activities that the user must perform on the system to be tested. As for determining the user's satisfaction or satisfaction level, Quis (Questionnaire for User Interaction Satisfaction) 7.0. The version of QUIS currently in use is QUIS 7.0. QUIS 7.0 focuses on the user's response to the interface's usability by evaluating certain aspects of UX.

Based on the above, the authors conducted a study entitled "Identification of How Leading E-Commerce Companies Implement UX Guidelines for E-Commerce Systems". This explores the Shopee application and produces a good way to implement e-commerce UX guidelines for novice programmers or similar application developers.

II. LITERATURE REVIEW

A. UX (User Experience)

UX can be said as the experience gained by the user when interacting with the system [4]. The basis of UX development on a system is the level of user comfort. If the system does not pay attention to and adjust the system design to the user's needs, the UX assessment on the system gets a low score [5].

B. Identification of E-commerce Usability Parameters

Identification means the activity of collecting information, finding, collecting, recording data and information from the "needs" in the field. Identification of usability parameters of e-commerce systems helps gather information about the elements available in the Shopee application, grouped based on each parameter according to ISO 9241-11.

C. UX Implementation Guide

According to the Big Indonesian Dictionary (KBBI), the application is a process, method, manufacture, or installation. In comparison, the guide with the basic word scout means a guide, accompaniment, guide [6]. Implementation of a UX guide means a guide that explains how UX is applied to e-commerce.

D. ISO 9241-11

ISO 9241-11 is one of the standards produced by ISO on the concept of usability. Usability is related to system performance and user satisfaction. Usability is the achievement of users when interacting with the system to meet their needs based on effectiveness, efficiency, and satisfaction [7]. Usability implementation aims to design or evaluate user interactions with systems, products, or services in order to be able to develop and implement systems, review or compare, as well as create marketing strategies and market research. Three parameters define usability, namely [7]:

1) Effectiveness: Effectiveness prioritizes accuracy and completeness of features so that it can make users achieve certain goals. The level of effectiveness of an application can be known through the analysis of the user's success rate when working on a predetermined task scenario. The task success rate is the percentage of the number of tasks completed successfully from the total tasks performed.

2) Efficiency: Efficiency includes the resources users spend in completing activities to achieve their goals. The success rate can be known based on the calculation of the user's time in completing a predetermined task and in seconds.

3) Satisfaction: Satisfaction prioritizes user experience and comfort when using the application. The level of satisfaction can be known based on user feedback or experience when using an application. To find out the value of satisfaction, it can be done through several methods, one of which is using QUIS 7.0.

The QUIS 7.0 questionnaire contains a demographic questionnaire used to determine user satisfaction when interacting with the system or service provider [8]. This questionnaire aims to assess user satisfaction based on five indicators, namely overall application responses, application interfaces, system terminology and feedback, learning, and system capabilities. The range of values given is 1-9.

E. Usability Testing

The implementation of usability testing is carried out to find out system problems carried out by users who represent certain groups [9]. Implementation of usability testing can use performance measurement techniques and RTA (Retrospective Think Aloud). Performance measurement is used to assess the user's success and duration of task execution. RTA provides an opportunity for users to explain their impressions, criticisms, and expectations of the system they are currently using. Through the two previously mentioned techniques, the implementation of usability testing can result in an assessment of the parameters of effectiveness, efficiency, and satisfaction [10]. Based on what has been described previously, the techniques that will be implemented in this research are performance measurement and RTA.

F. Task Scenario

Task scenario contains a set of tasks that need to be completed by respondents to test a system or application service provider [11]. Putting the task scenario into action results in a detailed explanation of how the user interacts with the system or service provider that has been selected [12].

In terms of preparing a task scenario, several things must be considered, namely [13]:

- Tasks are made realistically.
- Tasks are created to ask the user to perform an action.
- Tasks are created without containing instructions or work steps.

G. Persona

The goals and needs of the user can be identified based on the design of the user who represents several groups of users of a system [14]. Persona creation aims to classify user characteristics based on their goals, needs, background to a system [8].

Personas are used in this study to define the objectives of the research to be carried out. The output obtained from the persona is the user characteristics, and user needs when using an e-commerce application system.

H. Data analysis

1) Level of success: The criteria for measuring the success rate of task scenarios according to Nielsen are [13]:

- Success (S), means that the respondent successfully carried out the task scenario, and there were no errors in the process.
- Partly Successful (SB), means that the respondent successfully responded to the task scenario, but there were errors in the process.
- Failed (G), means that the respondent has not succeeded in carrying out the given task scenario.

2) Effectiveness: To see the level of effectiveness can be seen from the user's level of success when doing the task. The use of tasks to measure the success rate of usability testing is usually done [15]. The success rate is worth one if the task is completed, is worth 1/2 if the task is completed with difficulty, and is worth 0 if the respondent fails to perform the task that has been given. The average minimum task completion by calculating the completion rate is 78% [16]. If the average value of task completion is more than 78%, it can be concluded that the Shopee application is effective enough to use.

3) Efficiency: The efficiency parameter of the Shopee application will be measured based on the processing time of each task scenario by the respondent. The final result to be analyzed is to compare the length of time used by each respondent in completing each task. The book "Measuring The User Experience" explains that the right way to measure efficiency parameters is with overall relative efficiency [16].

4) Satisfaction: While processing the data obtained from the QUIS questionnaire, based on research [17], researchers can sequence the steps in using the QUIS questionnaire to process quantitative data as follows:

- Using a score range of 1-9, calculate the average of each indicator contained in the QUIS questionnaire. The five indicators are an overall reaction to the system, application screen display, system terminology and information, learning, and system capabilities.
- Calculate the total average of each indicator to get the final result of the satisfaction value.
- Analyze the results of the questionnaire. Geltmeyer explains the median value of each QUIS 7.0 indicator is as follows: overall reaction to the system is 6.5, application screen is 7.0, terminology and system information is 7.0, learning is 6.5, and system capability is 6.0.

If the value of each indicator is greater than the median value, it can be concluded that the user is satisfied with the Shopee application and vice versa [18].

III. RESEARCH METHODOLOGY

Shopee is evaluated using usability parameters owned by ISO 9241-11, namely effectiveness, efficiency, and satisfaction. Task scenario is used to measure the efficacy and efficiency, while for satisfaction, we utilize QUIS 7.0.

A. Task Scenario Development

Task scenarios are designed for the implementation of usability testing, which are:

- Look for promos available today.
- Find a clothing store in your area.
- Find the item category: shoes.
- Find products based on the images available on your cellphone.

- Find products you've bought before.
- Check the availability of goods with the seller.
- Examine the thing that will be purchased.
- Validate delivery address.
- View order status.
- Add product reviews.

B. QUIS 7.0 Construction

As for QUIS 7.0, there are 36 questions in QUIS 7.0, consisting of 5 question indicators: overall reaction to the system, application screen display, system terminology and information, system learning, and system capabilities. All the questions in QUIS 7.0 can be seen in Table I.

TABLE I
QUIS 7.0 QUESTIONS

Question	Answer
a. Overall Reaction to the System	
1. This application is easy to use	difficult / easy
2. This application can help me in shopping online	not helpful/helpful
3. I feel comfortable shopping using the Shopee application	inconvenient / convenient
4. I will use this application often	rarely / often
b. Application Screenshot	
1. This system display makes it very easy for me to use the Shopee Application	complicates/makes it easier
2. I like to use the appearance of applications such as the Shopee application	dislike / like
3. Characters on the Shopee application display	not interesting/attractive
4. The shape of the character or font on the Shopee application display	unclear / clear
5. Images on the Shopee application display	not attractive / attractive
6. The layout of the information on the Shopee application is very clear	not clear / clear
7. The order of information on the Shopee application is very clear	unclear / clear
8. Shopee application page layout	messy/organized
9. Next page is predictable	unpredictable / predictable
10. Return to the previous page	complicated/simple
11. Easily find the information I need	difficult / easy
c. Terminology and System Information	
1. The use of terms or words in the Shopee application is easy to understand	difficult / easy
2. The use of terms on the Shopee Application	inconsistent / consistent
3. The information contained in the Shopee application is very clear	not clear / clear
4. Instructions / orders given	unclear / clear

Question	Answer
5. If an error occurs, the Shopee application displays an error message	none / exists
6. If an error occurs, the Shopee application provides suggestions for improvement	none / no
7. The error message displayed is understandable	agree / disagree
d. System Learning	
1. This application is very easy to learn	difficult / easy
2. When you explore a feature and an error occurs, it makes you feel like giving up	want to give up / not give up
3. When doing feature exploration, you find it	complicated / fun
4. I need a lot of time to learn the Shopee application	needed / unneeded
5. It Looks like I have to learn a lot before I can use the Shopee app	required / unneeded
6. I need help using the Shopee app	required / unneeded
7. I imagine that most people will find it easy to learn this application quickly	not easy/easy
e. System Capabilities	
1. The speed of the system in responding to each operation	slow / fast
2. System speed in displaying information	slow / fast
3. The system contained in the Shopee application	unreliable / reliable
4. If you make a mistake when using the Shopee application, this application provides recommendations for improvements/solutions	incorrect / correct
5. The Shopee application provides the functions and capabilities I need quickly	slow / fast.

IV. RESULT AND DISCUSSION

A. Usability Testing

The statistical modelling and empirical data, Virzi [19], Nielsen [20] , and Lewis [21] claim that most problems in testing usability of software interfaces are discovered by the first four to five participants. We requested ten respondents to run task scenarios as well as to fill in QUIS 7.0. Respondents aged between 21-32 years. All of them have used the shopee market for more than six months.

1) Effectiveness: Based on the results of the task scenario, it is known that all respondents can carry out all the tasks given. However, 2 out of 10 respondents made a misstep (misstep) while working on a task. Missteps occur in the 2nd task scenario, which is looking for products based on the domicile area, and in the 5th task scenario, which is looking for products that have been purchased before.

When carrying out the second scenario task, respondents had difficulty finding the features used to limit the area according to the respondent's domicile. This was because the respondents did not recognize the feature when it was first displayed. According to the W3C [22], one of the principles in the Web Content Accessibility Guidelines (WCAG) 2.1,

which is perceivable (understandable), explains that the component information and the user interface should be displayed in various ways that the user recognizes. One of them is by using alternative texts such as the use of symbols, large print, or simpler language.

As for the 5th task scenario, respondents were confused about the order of content display. This happened because the respondents had scrolled on the screen page even though the features they were looking for were at the top of the application page. According to W3C [22], one of the principles of the Web Content Accessibility Guideline (WCAG) 2.0 is that it is perceivable with one of the indicators called meaningful sequence, which needs to pay attention to the order in which each content is displayed. Suppose the order in which the content is displayed affects the user in understanding the intent of the application display. In that case, a content display order is required to maintain the user's order to read the content. For users to understand the appearance of content, it is necessary to have alternative content that is displayed before other content.

Based on the results of the calculation of effectiveness using the completion rate on the Shopee application, a value of 90% is obtained. This is because there are two missteps (missteps) made by 2 out of 10 respondents, so it can be concluded that the Shopee application has implemented the effectiveness parameter on the system well, but some system improvements are needed.

The thing that can make the user complete the task is to focus on the activity to be achieved and find features in the application interface. Based on the results of the task scenario, respondents can easily find features that help them complete the task because of the simplicity and grouping of features so that respondents can easily use the required features.

2) Efficiency: From the results of working on the task scenario and using the overall relative efficiency calculation, the least time is needed to validate the delivery address and the longest time needed to carry out checkout activities. Validation of the delivery address can be done with 1-2 clicks at the order's checkout time. This activity is carried out by selecting the delivery address if several respondent addresses are stored. Address validation can be done simultaneously with checkout activities or on the user profile page. As for checkout, it takes 8-10 clicks with several things that need to be done, such as: validating the delivery address, selecting shipping options, creating a special message for the order, entering a promo voucher, and choosing a payment method.

In order to acquire a 100 percent efficiency rating from the implementation of usability testing, the results of the computation of the efficiency parameter using total relative efficiency are compared to one another. As a result, the Shopee program has developed an excellent e-commerce user experience (UX) in terms of efficiency factors. Respondents can complete tasks because of the capabilities of the existing system in the Shopee application, which include activities such as processing and displaying information that does not take a long time, activities that do not require repetition, and

error warnings and suggestions for improvement when incorrect input or problems occur. System and network constraints. In addition, respondents can easily find features on the main page and can predict each step that needs to be taken on the Shopee application.

3) Satisfaction: Overall, the results of QUIS 7.0 based on each indicator are greater than the median that has been determined (Figure 1), so it can be said that respondents are satisfied with the Shopee application system. But it is necessary to improve the system based on each indicator. To get detailed indicators that affect respondents' satisfaction when using the Shopee application, researchers conducted interviews with respondents.
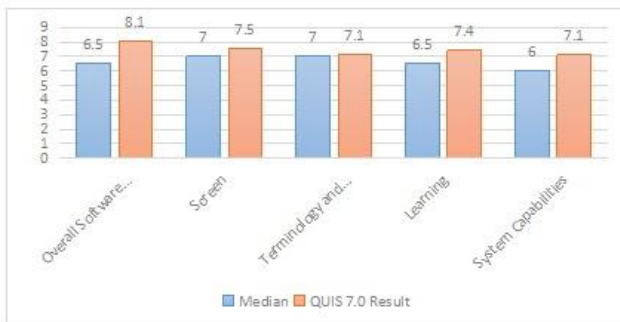

Figure 1: Result of QUIS 7.0 compare to Median

Based on the results of interviews conducted to find out what attracts the attention of respondents when using the Shopee application and get recommendations for improvement to increase the satisfaction value of e-commerce applications, the following facts are obtained:

a)   Screen Display: The thing that makes respondents comforTable and interested in using the Shopee application is the appearance of each page on the user-friendly application that can be accessed easily, and the combination of various elements such as colors, icons, and attractive images that make respondents comforTable when using the Shopee application. However, there are several things that respondents consider to improve the screen display, namely:

- Similar feature positions need to be placed close together or in the same element group.
- Setting the distance between elements so that the grouping of each feature is clearly visible.
- On the main page, frequently used features such as product categories are placed in places that are easy for the user to find when opening the application for the first time. In addition, the use of the slide bar on the main page of the application does not make it easy for the user because it contains features that are not often used.

b) Terminology and System Feedback: Based on the results of interviews, all respondents said that the use of words and

terms as well as the information contained in the Shopee application was clear and understandable. However, several things need to be improved when using terminology in the system, which is as follows:

c) Terminology and System Feedback: Based on the results of interviews, all respondents said that the use of words and terms as well as the information contained in the Shopee application was clear and understandable. However, several things need to be improved when using terminology in the system, which is as follows:

- Error warnings and suggestions for improvement when a user makes a mistake are consistently displayed. So that users understand the state of the application they are using.
- Error warnings and suggestions for improvement made more attractive.

d) System Learning: Based on the results of interviews, all respondents said that they did not take long to recognize the Shopee application and be able to use it. This happens because the use of words or terms, images, and icons already represent every feature contained in this application, and users can recognize new features with "new" signs and the use of striking colors on these features.

e) System Capabilities: Based on the results of interviews, respondents said that the ability of the system applied to the Shopee application was good because the system's performance when processing and displaying information did not take long. However, if there is a massive national online shopping day event, it will take a long time to check out the product. In addition, this application requires a large memory capacity, so the operating speed that occurs on the system depends on the memory capacity of the user's smartphone.

B. Making How to Implement UX Guidelines

1) Effectiveness: There are several things that the Shopee application applies to e-commerce system UX based on these parameters:

a) Simple screen display: Users can shop easily because they understand each element on the screen display of e-commerce applications.

b) Features: The availability of complete features in e-commerce applications helps users achieve their goals when using e-commerce applications. Based on the features contained in the Shopee application, the features that support online shopping activities are promos, item searches, product reviews, chat, baskets, product categories, checkouts, order statuses, and notifications.

c) Easy to understand information
d) Content display order
e) Consistent

2) Efficiency: Efficiency focuses on the resources the user uses when using the application. The value of system efficiency gets better if the user spends less time, effort, and so on to run e-commerce applications. Based on the system performance in the application, several things can increase the efficiency value of e-commerce applications, namely:

a) Build a simple system: Based on the results of usability testing on the Shopee application, users can achieve their goals without experiencing difficulties. It relates to how the system should be built for e-commerce applications, namely, helping users achieve their goals when using the application. To provide the user with the system contained in the application, it should reduce the difficulty of working steps without repetition of activities or reprocessing.

b) Clear and easy to understand information: Based on the results of usability testing on the Shopee application, one of the factors that makes it easy for users to use the e-commerce application is clear and easy-to-understand information. Information and use of the application interface must be understandable to the user. The things that make it easy for users to understand information are: the use of words and terms that are familiar, easy to understand, and consistent, the use of clear commands/labels when giving instructions to the user, and, provide repairs or corrections automatically if an input error occurs, such as an incorrect product input in a search.

c) Reduce the waiting time for each operation performed by the user: The results of the usability testing of the Shopee application explain the reason why users choose to use this application because they do not need a long time to do online shopping activities. System-supported performance in an application that does not require a long period to process and show information is achieved through the use of caching. Shorter lead times reduce problems and increase sales capacity and customer loyalty.

d) Feature placement: User experience testing has revealed that users find it simple to use this application since the arrangement of the features is easy to recognize, and as a result, they do not require a long period to recognize the features that are available in the program simply. Setting frequently used features on a one-page view allows better integration of various features so that users can immediately find the features they need in e-commerce applications.

3) Satisfaction: Satisfaction focuses on user satisfaction when using e-commerce applications. Based on QUIS 7.0, five indicators affect user satisfaction, which are as follows.

a) System-wide response: Based on the results of the Shopee application usability testing, it was concluded that the Shopee application is easy to use and has an attractive appearance so that users do not hesitate to return to using this application and suggest to others. The thing to note from this indicator is the user's response after using e-commerce applications. The application's design aims to make the user want to reuse the e-commerce application.

b) Application interface: Based on the Shopee application usability testing results, the thing that makes users comfortable using the application even for a long time is the attractive appearance and color combination used. For that, several things need to be applied to the appearance of e-commerce applications to provide convenience to the user, namely: color, use of the distance between elements, icons/characters, and images.

c) Terminology and system feedback: According to the KBBI, the terminology is a term or can be said to be the science of terms and their use. In contrast, terms are words and combinations of words used in certain contexts. The results of the usability testing of the Shopee application explained that users did not find it difficult to understand the information available on the application because the words used were familiar and easy to understand, as well as the consistent use of words and terms. What needs to be considered in developing terminology in e-commerce applications is the use of consistent terms and error warnings or warning suggestions when the user makes a mistake.

d) System Learning: System upgrades must be performed regularly to keep up with technical advancements and user requirements. It is vital to have a display capable of notifying the user of various new things that have appeared on the system to notify the user effectively. Based on the results of the usability testing of the Shopee application, users can recognize the various features that are newly available in the application through different colors to attract the user's attention to these features, and the use of icons, characters, and fonts that explain the function of these features. Thus, it is concluded that a combination of icons, images, content titles, and usage help users understand new features and assist users who are using e-commerce applications for the first time in understanding the context of using the various features available on the e-commerce application interface. The word that is used to describe each element that appears on the application interface. The combination of icons, images, and titles that match each other helps users understand the meaning of each feature available in the e-commerce application interface.

e) System Capabilities: Based on the results of the usability testing of the Shopee application, the user does not experience significant problems, but there is one thing that must be considered, namely the relationship between the speed of the system in displaying information and the user's storage memory capacity. System performance, such as the speed of running operations and displaying information, affects user satisfaction when using e-commerce applications. Several things must be considered to provide service satisfaction to users as follows.

- The system responds to every operation performed quickly.
- The system can display information quickly.
- The system provides solutions or recommendations for improvement when errors or errors occur in e-commerce applications.

Users who are not familiar with e-commerce can benefit from the application of this technology.

V. CONCLUSION

ISO 9241-11 states three parameters that build UX usability for e-commerce systems: effectiveness, efficiency, and satisfaction. The Shopee application has implemented the e-commerce system's UX based on the ISO 9241-11 UX guide based on each parameter. First, the effectiveness parameter is a simple screen display, completeness of features, easy-to-understand information, order of content display, and consistency. Second, for the efficiency parameter, the following things are applied: building a simple system, clear and easy-to-understand information, reducing the waiting time for each operation performed by the user, and placing features. Third, the satisfaction parameter consists of 5 indicators; system-wide responses, application interfaces, system terminology and feedback, system learning, and system capabilities.

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