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Formulation of E-Commerce Website Development Plan Using Multidimensional Approach for Web Evaluation

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Abstract

The rapid growth of the Internet in Indonesia is creating rapid growth in e-commerce industry. In 2011, internet users are 68,5 million or around 25% of Indonesian population. In general, the average transaction per online users in Indonesia has reached US\$ 68,3/year or US\$ 5,69/month. Based on average transaction per user, Indonesian e-commerce industry is predicted to continue to grow in line with growth of Indonesian internet users.

Significant growth of the Internet makes e-commerce business is becoming increasingly competitive and requires areas of innovation that can be developed into competitive value. Using multidimensional approach for website evaluation, areas of innovation can be identified and developed into website development plan.

Evaluation is conducted using questionnaire survey with young people, who regularly access internet, target respondent. Result from survey is analyzed using multidimensional approach that consists of usability testing and user feedback. Main goal from analysis is to identify innovation areas of opportunity to increase user satisfaction and create competitive values of company.

Final result of this study is set of recommendations that should be implemented by E-commerce website to improve company performance. Recommendations consist of web concept formulation and web features formulation that are needed to modify web system.

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Keywords: E-commerce; Web user satisfaction; Multidimensional approach; Usability testing; User feedback

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1. Introduction

Web has rapidly evolved in a past decade. Today, web can be used for transactional activities such as shopping. Revolution named web 2.0 become massive trend and increase user demand for improvement of web usability.

Based on Lang(2001), one of key issues in web development is lack of conceptual modelling techniques and tools. Brooks (1987) as saying that “No single technique is by itself sufficient to describe all the various aspects of an information system; rather, a complete model invariably comprises a series of interconnected, superimposed diagrams”.

On the other hand, transactional activities such as shopping online, has become a fluent activities for internet users. Satisfaction of visitors accessing the website is increasingly becoming a priority in order to increase sales transactions.

One of the common method conceptualizing web development is website evaluation in a multidimensional approach. Multidimensional approach was introduced by Siegel and Wood(2003) and doing evaluation in a four dimensional approach: usability testing, user feedback, user data, and web and internet performance data.

Using web evaluation: a multidimensional approach, we formulate a development plan for the website e-commerce website. Web evaluation are including usability testing and user feedback dimension, and excluding user data, and web and internet performance data since it is intended for newly launched e-commerce website.

Since web development plan is formulated up to the features, it is necessary to do web users satisfaction evaluation for web features. Using dimensional structure of website user satisfaction, we plotted each features in e-commerce website into suitable dimension of user satisfaction which also linked with web web evaluation in usability testing.

Result from formulation is areas of opportunity for web and features innovation. This result can be improved into whole concept of website which predicted increasing e-commerce web user satisfaction.

2. Website User Satisfaction Evaluation

Evaluating web user satisfaction is necessary in order to find areas of opportunity for innovation. In order to evaluating usability of features, there is a need to conduct in-depth evaluation in usability using dimensional structure of web evaluation.

2.1. *Website evaluation: a multidimensional approach*

Web based information dissemination now dominates many web, especially in strategic sectors such as science, technological, or biomedical. Demand of understanding web users become one of the most important issues for web companies. There is no evaluation method meets all need. It can be varied from many areas, depending on kind of variable that needed to be evaluated. Triangulation and integration of evaluative data from several sources is the most common way to overcome this problem.

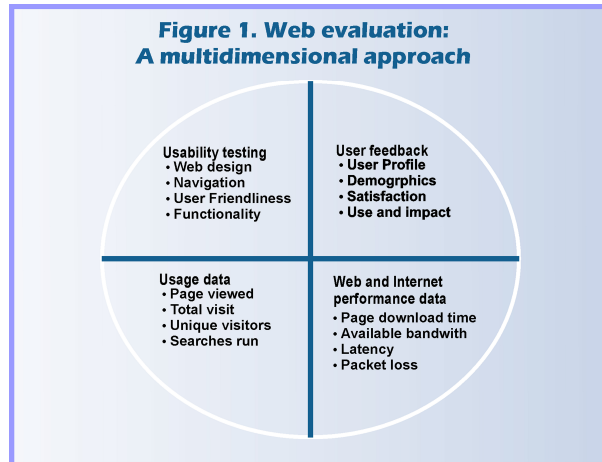


Fig. 1. web evaluation matrix for multidimensional approach

(Source: Siegel, &Wood, 2003)

Common method of web evaluation is survey. Survey is conducted based on performance metrics needs. There are many metrics that company want to know from customers such as behaviour, satisfaction, spending power, etc. Evaluation result is analyzed and used to formulating action plan and determining areas of opportunity for web company.

To determine areas of opportunity, suitable method that recommended is priority map for follow up matrix that developed by ForeSeeResults Inc. Scale of score of impact can be adjusted based on questionnaire method. Commonly, scale computed using Likert scale (5-point, 7-point, or 10-point) (Burns, 2008).

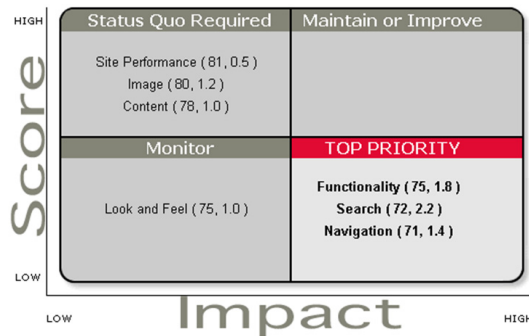


Fig. 2. priority map for follow up action

(Source: Siegel, &Wood, 2003)

2.2. Dimensional structure of website user satisfaction

Emerging of web user generated content model makes web company need to consider user perspective while accessing website. “Design of the content, structures, and presentation of hypermedia is likely to affect user satisfaction” (Muyllé, 2003).

Dimensions of user satisfaction is a detail process of usability testing in website evaluation method, multidimensional approach. Dimensional structure is needed to get more specific analysis in deeper element of web such as features, content, design, or even language.

Dimension of web user satisfaction is divided as follows (Muyllé, 2004):

- Layout

- Information
 - Relevancy
 - Accuracy
 - Computability
 - Comprehensiveness
- Connection
 - Ease of use
 - Entry guidance
 - Structure
 - Hyperlink connotation
 - Speed
- Language customization

Information corresponds to the user’s satisfaction with the website nodes in which information is contained. Connection is concerns a user’s satisfaction with their relation to the system. Connection is divided into ease of use, entry guidance, website structure, hyperlink connotation, and website speed. Layout consisted of many visual qualities such as colors, textures, graphic elements, animations, moving three-dimensional typography, and hybrid image-text juxtapositions. It should help users to pursue their objectives. Language is analyzed to find influence for a user’s satisfaction level with a commercial site. It is including web user locational scope that could be using different language.

3. Methodology and Implementation

Website evaluation is conducted to identify user satisfaction which focus on web interaction during online interaction. To meet needs of web evaluation, this study is focus on multidimensional approach consists of usability testing and user feedback analysis. This approach should be covered user information needs on user satisfaction.

More depth result of usability testing is needed to find which kind of innovation that can be developed for E-commerce features. Dimensional structure of user satisfaction need to be included to get formulating innovation for features that needed to developed.

Website evaluation is done by spreading the questionnaires to 98 respondents young people containing questions related to satisfaction in e-commerce website.

3.1. User feedback analysis

3.1.1. User profile analysis

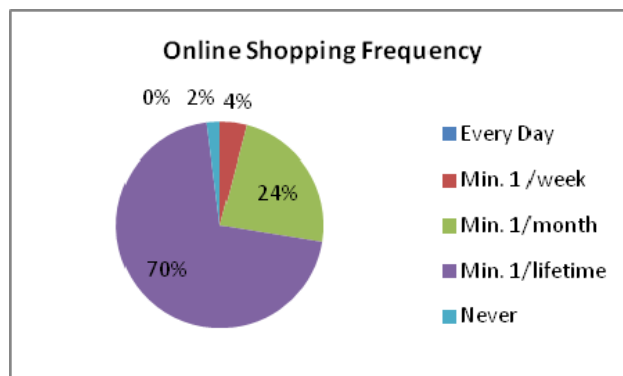


Fig. 3. Online Shopping Frequency

As much as 70% of respondents has been tried shopping online at least once a lifetime. Results showed 24% of respondents have made online shopping routine per month which indicates there is a group of respondents who routinely shopping online. These results indicate that online shopping system is currently only a routine requirement for a group of people and it takes the right format of e-commerce to increase user frequency.

3.1.2. Demographic analysis



Fig. 4. Online Shopping Place

Majority of respondents shopped in buy/sell forums (67%), and followed by social media (51%). These results indicate respondents prefer shopping online and connect with your fellow shoppers may interact with other buyers. Social activities that are likely to buy more for the needs of the respondents.

3.1.3. Satisfaction analysis

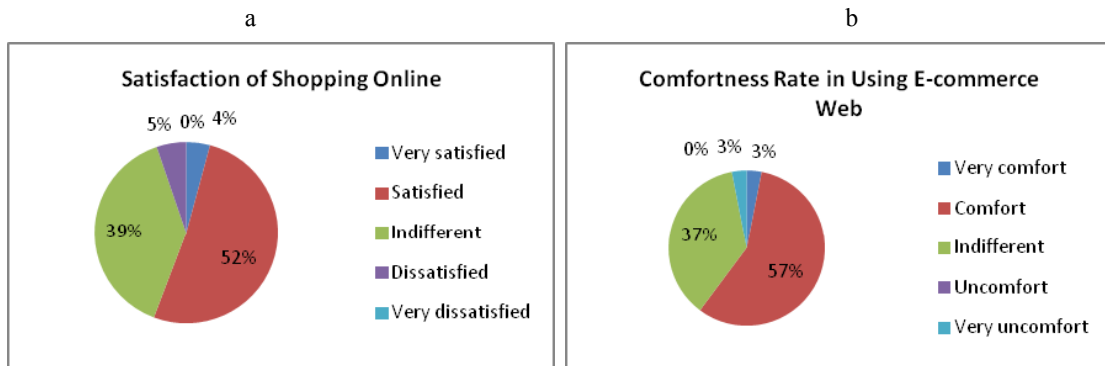


Fig. 5. (a) Satisfaction of shopping online; (b) Comfortness rate in using e-commerce web.

As many as 52% of respondents claim to be satisfied online shopping. These results showed a good acceptance by the respondents to the online shopping in Indonesia. 4% of respondents admitted very satisfied online shopping.

This result also showed that majority respondent feeling comfort while using e-commerce website with 57% respondents claims comfort while using e-commerce website. Common format on the web e-commerce seems to have been well received by the majority of respondents.

3.1.4. Use and impact analysis

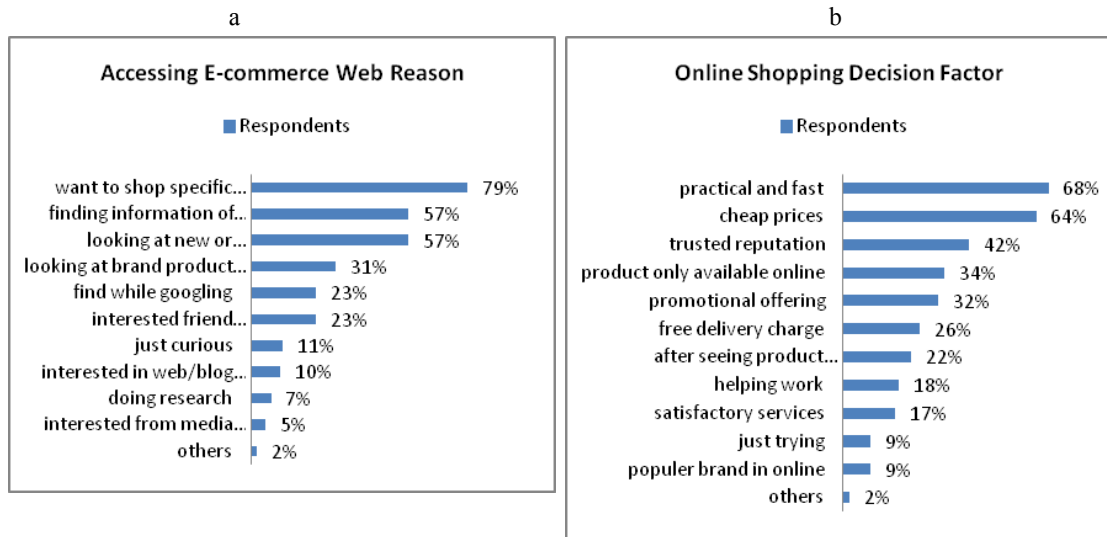


Fig. 6. (a) Accessing e-commerce web reason; (b) Online shopping decision factor.

As many as 79% of respondents access the e-commerce web shop because they want a particular product. Meanwhile, 57% of respondents access the e-commerce web because they want to see the latest items or discounts and 57% of respondents would like to find for specific product information.

Results showed that in order to meet the needs of users, web e-commerce should be able to have a collection of products that the user liked or needed as a prerequisite. In addition, the new collection and discounts, as well as detailed information on specific products must be met in order to meet the user access patterns of e-commerce web.

As many as 68% of respondents claimed to shop online because it is practical and fast. While 64% of respondents shop online for cheap prices. Online web store system is practical, simply with a click, making it encourages users to shop online. Trading forum format makes many sellers can join online web store with a wide variety of products and prices. This makes buying and selling forum format is very appropriate to be applied to e-commerce in Indonesia given the factors causing online purchases in Indonesia are related to low prices.

3.2. Usability testing analysis

Based on multidimensional approach, usability testing analysis were divided into 4 areas (Siegel, Wood, 2003):

1. Design.
2. Navigation.
3. User friendliness.
4. Functionality.

Usability analysis is done by asking questions on the 5 point Likert scale questions related to parameters analysis design, navigation, user friendliness, and functionality. Usability analysis results that will be used in the next section is combined analysis of dimensional structure (Bevan, 2005).

The next step is categorizing each areas based on average score and data interpretation that used in Likert Scale. Since each question uses a Likert 5-scale, relatively influential factors limit stands at 3.4.

Result of analysis could be references for company to determine main features that need to be developed or need to be discarded because did not have significant impact. Usability testing parameter is described in question number as listed.

Table 1. Usability testing

No	Question	Average Score	Validity Test	R Table Score
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6.1	Layout and Graphics	3.28	0.482	0.361
6.6	Product Collection	3.88	0.518	0.361
Design Average		3.58		
No	Question	Average Score	Validity Test	R Table Score
6.9	Security and ease of transaction	4.11	0.508	0.361
6.10	Payment method	3.88	0.520	0.361
Navigation Average		3.99		
No	Question	Average Score	Validity Test	R Table Score
6.3	Mobile Access	3.03	0.419	0.361
6.8	Customer services	3.49	0.609	0.361
6.9	Security and ease of transaction	4.11	0.508	0.361
6.10	Payment method	3.88	0.520	0.361
User Friendliness Average		3.63		
No	Question	Average Score	Validity Test	R Table Score
6.2	Data Security	3.66	0.478	0.361
6.4	Price	4.11	0.396	0.361
6.5	Discount and Gift	3.32	0.398	0.361
6.6	Product Collection	3.88	0.512	0.361
6.7	Brand Partner	2.92	0.610	0.361
6.9	Security and ease of transaction	4.11	0.508	0.361
6.10	Payment method	3.88	0.520	0.361
Functionality Average		3.70		

Based on result in Table 1, design is the lowest average score and navigation has the highest score. In general, all of the factors contained in usability testing has a significant impact on the decision to shop for online users since all factors has average score more than 3.4.

3.3. Web user satisfaction analysis

Development plan of e-commerce web focus on features that can be improved and differentiated from existing e-commerce in Indonesia. It can be formulated using in-depth analysis of usability testing which known as dimensional structure for web user satisfaction. Questionnaire is conducted to solve formulation of dimensional structure for web user satisfaction.

Dimensional structure for the web user satisfaction is related to dimensional structure developed web usability. In this study, the dimensions of language as variables examined through a questionnaire related to the use of the website is limited to areas in Indonesian language. Dimensional structure on the part of the study consisted of a layout, information, connection.

The data processing is divided into 3 parts: processing index average (using a 5-point Likert scale), the influence of processing scores, and processing scores expectations.

Table 2. User satisfaction

Layout Average	3.59
Information (Relevancy) Average	3.87
Information (Accuracy) Average	3.89
Information (Computability) Average	3.85
Information (Comprehensiveness) Average	3.89
Connection (Ease of Use) Average	3.18
Connection (Structure) Average	3.37
Connection (Speed) Average	3.41
Connection (Entry Guidance) Average	3.43

Analogue to usability testing analysis, each factor that relatively influential factors limit stands at 3.4. In table 2, connection (ease of use) and connection (structure) is under the limit value of acceptable factor. Further development of these results will be discussed in section 4.

Table 3. Features influence and eexpectation score

Features	Influence Score	Expectation Score
Price nego	2.57	2.27
Promotion	2.43	2.20
Product collection	2.75	2.73
Free shipping	2.39	2.14
Contact center (email)	1.79	2.06
Contact center (chat)	2.15	2.17
Handle of complaint	2.11	2.01
Navigation	1.69	1.73
Speed of access	2.26	2.04
Rate dan review	2.17	2.07
Login	1.61	1.78
Credit card payment	1.67	1.84
Paypal payment	1.52	1.72
Connect social media	1.65	1.76
Mobile version layout	1.55	1.72

Table 3 describes how features are evaluated based on influence and expectation using 3-point Likert scale. Feature score is categorized into “least”, “acceptable”, and “most” influenced/expected. 3-Likert scale method create “least” limit stand at 1.00 - 1.66, “acceptable” limit stand at 1.67 - 2.33, and “most” limit stand at 2.34 – 3.00.

Based on Table 3 result, login, paypal payment, and mobile version layout is categorized as least influenced features. Meanwhile, product collection is the only feature that categorized as most influenced feature.

On the other hand, there is no features that categorized as least influenced features and there is only product collection as most expectation result.

4. Implication

Implementation of this study have implications for the development plan of making an e-commerce website. This section contain further implication of study implementation.

4.1. Priority follow up matrix

Priority follow up matrix is a tools that is designed to help identify correlation between factors and impact on web user satisfactions. There are 4 steps that can be summarized by using priority follow up matrix:

1. Maintain or improved.
2. Top priority.
3. Status quo required.
4. Monitoring.

The following table describes the relationship between web usability evaluation with web satisfaction dimension structure based on score and impact. It will be used in formulating follow up action.

Table 4. Relationship of web usability evaluation and web satisfaction dimensionalstructure

Score	Impact
Dimensional Structure	Usability
Layout	Design
Connection (Structure) Connection (speed)	Navigation
Connection (Easy of use) Connection (Entry guidance)	User friendliness
Information (Relevancy) Information (Accuracy) Information (Computability) Information (Comprehensiveness)	Functionality

By using a 4x4 matrix prioritize follow-up, the relationship dimensional structure and usability yield spreads as Figure 7. This questionnaire using 5-point Likert scale and the expected threshold is important scale on average. Therefore, the threshold used for this matrix is 3.4.

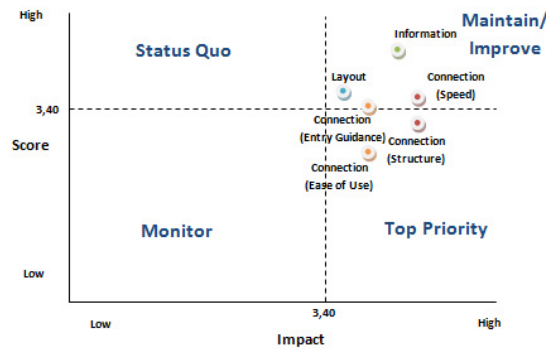


Fig. 7. Matrix prioritize follow-up for relationship of dimensional structure and web usability

Recommendation from a 4x4 matrix prioritize follow-up are listed in the following table.

Table 5. Web usability matrix prioritize follow up

Recommendation	Information	Dimension
Top Priority	Repair and create differentiation	Structure Ease of use
Maintain/Improve	Maintain, improve if necessary	Layout Relevancy Accuracy Computability Comprehensiveness Speed Entry guidance

Same with the previous result, priority follow up action is used in identifying recommendation for features. By using a 4x4 matrix prioritize follow up on each feature listed in the questionnaire based on the value of the impact and influence of the expectation value as a score, the obtained details on the policies adopted by the entire web development features to plan new e-commerce as the picture below.

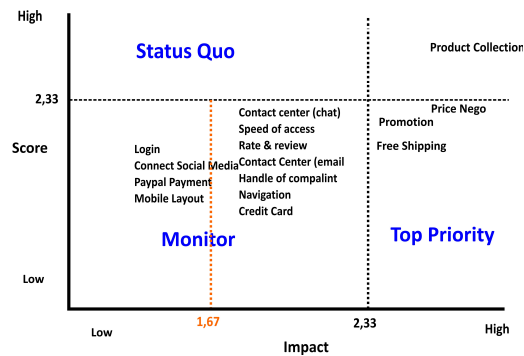


Fig. 8. Matrix prioritize follow-up for features analysis

Threshold in Figure 8 are on a scale of 2.33 due to the questionnaire consists of 3 choices. Top priority features group could be considered as areas of opportunity and maintain/improve features group should be treated as mandatory features that should exist on e-commerce web.

Detail recommendations for each of the features listed in the following table.

Table 6. Web usability matrix prioritize follow up

Rec.	Information	Dimension
Monitor	Perform regular monitoring to detect changes in the dimensions of the market impact.	Impact > 1,67 Contact center(chat) Speed of access Rate & review Handle of complaint Contact center(email) Credit card Navigation Impact ≤ 1,67 Login Connect social media Paypal payment Mobile layout version
Top Priority	Repair and create differentiation	Promotion Free shipping Price nego
Maintain/ Improve	Maintain, improve if necessary	Product collection

4.2. Features selection

Features for web development is selected by including maintain/improve and top priority recommendation, and eliminating the less significant impact features.

Features that should be eliminated is features that has significant impact less than 1.67, and did not linked with connection (structure) and connection (ease of use) factor in web usability. The recommendation of features that has significant impact less than 1.67 is listed as follow.

Table 7. Recommendation list for less impact features

No	Features	Impact Score	Connection Feature	Rec.
1	Connect social media	1,65	Yes	Repaired
2	Login	1,	Yes	Repaired
3	Paypal payment	1,61	Yes	Repaired
4	Mobile version layout	1,55	Yes	Repaired

Features that included in top priority should be improved and becoming key added features that could be competitive value of e-commerce web. Meanwhile, features that categorized as monitoring but not included in Table 7 should be maintained since it still had impact although not significant. Detail results for e-commerce website recommendation features are listed as follows.

Table 8. Detail results for e-commerce website recommendation features

No	Features	Recommendation
1	Price nego	Improved
2	Promotion	Improved
3	Product collection	Copied
4	Free shipping	Improved
5	Contact center (email)	Copied
6	Contact center (chat)	Copied
7	Handle of complaint	Copied
8	Navigation	Copied

9	Speed of access	Copied
10	Rate dan review	Copied
11	Login	Repaired
12	Credit card payment	Copied
13	Paypal payment	Repaired
14	Connect social media	Repaired
15	Mobile version layout	Repaired

4.3. Website development plan

New e-commerce website concept can be formulated based on user feedback and recommendation from usability testing. Since questionnaire had included user demographics and user satisfaction question identification, user feedback variable can be summarized to formulate new web concept with variables as state below.

Table 9. Variable collected from user feedback result

Variables	Best Results
Online shopping place	- Buy and sell forum (67%) - Social media (51%)
Access tools for online shopping	- Laptop (82%)
Reason for shopping online	- Below market price (56%)
Uncomfortness factors	- Product quality not like in a picture (61%) - Complex navigation (58%)

Result of web concept formulation using this two analysis tools shown in following table.

Table 10. Web concept fomulation

Requirements	Connection (structure)	Connection (ease of use)
- Buy and sell forum - Social media	Web facilitating users to buy or sell	Web have many customization with ease of use.
- Laptop	Web should be running smoothly in all browser	Web should be easily to access and does not have many additional information
- Below market price	Web must easy to access and give many advantages for seller to manage their product	-
- Product quality not like in a picture - Complex navigation	Web is interactive with simple navigation	Users can be easily update and manage content

Features is improved to give great experiences for users. Based on method that used in this study, features that recommended to improve is feature that has a good influence score but has medium or low expectation score. Set of specific action plan that need to be taken in improving each features is described in following table.

Table 11. Improved web features plan

Features	Improved Plan
Price nego	<ul style="list-style-type: none"> Buyer can decide whether they want to open nego or not. Creating button (similar like) called 'buy'.
Promotion	<ul style="list-style-type: none"> Create button/menu to facilitate customer reporting annoying seller. Create 'resell' button to help buyer get their products spread by worth of mouth.
Free shipping	<ul style="list-style-type: none"> Create group seller where users can offered another users to manage business operation in different places.

Besides improved features, it need to do improvement for features that recommended to be repaired. Improvement formulation can be joining two features into one functionality, copying from websites outside e-commerce, or proposing new solution that can fixed current features problem. Specific action plan for repaired features is described in following table.

Table 12. Repaired web features plan

Features	Repaired Plan
Connect social media	<ul style="list-style-type: none"> Joining features so users have to login using social media without filling additional form that take a much time.
Login	
Paypal payment	<ul style="list-style-type: none"> Create multiple payment method including paypal as the latest option. Joining Indonesian paypal partner which creating payment gateway that connected with Indonesian bank.
Mobile version layout	<ul style="list-style-type: none"> Creates apps version that only has main features inside website.

5. Conclusion

It can be summarized that website product development in this study is focused to improve web structure and ease of use. Questionnaire result indicating that those factors has significant impact in influencing customers doing online shopping, but expectation is still lag beyond an appropriate result. It could be opportunities for e-commerce website to build competitive advantages by advancing web structures and increasing ease of use.

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