The Role of National Culture on the Design and Usability of E-Commerce Websites: An Indonesian Case

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Abstract. The purpose of this study is to observe national culture influence on the effectiveness of Indonesian e-commerce website. Ninety Indonesian subjects participated voluntarily in this study. Subjects were instructed to complete a transaction in three different tailored e-commerce websites. The first e-commerce website is designed following cultural guideline of web design. The second e-commerce website is designed opposing the guideline, whereas the third e-commerce website is designed in combination between following and opposing the cultural guideline. Completion time and error during task were recorded. In the end of the task completion, subjects filled out a questionnaire about the importance of design items that correlate with cultural dimensions. Result shows no significant differences on completion time and error for task completion among the three e-commerce websites, although the first e-commerce website has lowest process time and error. Most of design items that relates to cultural dimensions is rated positively by participants. Result of the study reveals that national culture is worth to be considered in the design of the Indonesian e-commerce website. Implications of the results were discussed.

1. Introduction

In 2016, internet users worldwide reach number of 3.4 million1. The use of internet is not only for a new means of communication, but people also use internet for business such as for marketing and trading both nationally and internationally [2,3]. As the evolvement of internet use for business is increasing, there is an urgent need to recognize issues related with website utility and performance, in particularly related with design of website that are used in marketing and trading, i.e., ecommerce websites

Indonesia, as one of the emerging developing countries, also shown high increase of internet users as well as ecommerce websites. Indonesian e-commerce growth is enormous compared to other emerging Asian economies by 2020 (coming third behind China and India), with an estimated annual growth rate of 50 percent [1]. To increase ecommerce website utility and performance, it is important to study the target group of the website. Moreover, to effectively engage the user, Fogg et al. [4] underlined the importance of design in particular based on overall visual design of the website. This is in line with Kuniavsky [5] and Nielsen [6] who stated that in the design of product in general, the usability and user experience that described functionality of the product, the efficiency of the product use, and the desirability factors to use the product, is particularly important.

Within the global information technology environment, the use of World Wide Web (www) in e-commerce has underlined the importance of considering culture in the design to increase usability of the...
interface [7]. Because culture influence the interaction among people, it is hypothesized that culture also influence the way people interact with computer.

In relation with appearance of the e-commerce website and culture, Lo and Gong [8] stated that companies that want to extend their business to global market cannot obey local culture to increase its appeal to the targeted audience. However, there are two views of cultural influence of ecommerce [9]. On one hand, some argued that the transnational e-commerce giants created a trend of standardization in web and its content [10]. On the other hand, some argued that there are evidence of cultural sensitivity in the web design and its content [11,12,13]. Although Lo and Gong [8] stated that recent studies seems to lean towards the latter approach, the issue of cultural influence on ecommerce is by no means closed.

The most widely known study on national cultural differences is Hofstede’s study, which proposed cultural differences between countries in 5 dimensions which are power distance (PDI), individualism vs collectivism (IDV), masculinity vs. femininity (MAS), uncertainty avoidance (UAI), and long-term orientation (LTO). PDI relates to the extent to which less powerful members expect and accept unequal power distribution within society or culture, high PDI refers to society who accept unequal power distribution within society. Individualism vs collectivism (IDV) implies ties between family and society. Collectivism refers to cohesive group in society whereas individualism refers to loose tight in society. Masculinity vs. femininity (MAS) refer to different gender role in society. Masculine roles of assertiveness, competition and toughness whereas feminine roles of orientation to home and children and tenderness. Uncertainty avoidance (UAI) refers to the extent in which member of society feel anxious about uncertain matters. High uncertainty avoidance is characterized by formality, punctuality, and legal rules and regulation. Long-term orientation (LTO) stands for the fostering of virtues oriented towards future rewards, whereas short time orientation stands for the fostering of virtues realted to the past and present, in particular respect to tradition.

In relation between national culture and e-commerce design, Marcus and Gould 16 develop a cultural guideline for designing website based on Hofstede’s cultural dimension. For instance, high power distance countries prefer highly structured website. High individualism countries prefer protection of personal data. High masculinity countries are navigation oriented. In addition, Baumgartner [17] also reviewed several dimensions of culture that play an important role on website design, which are context, technological development, uncertainty avoidance, time perception, and authority conception. Hall [18] defined context as the amount and specificity of information in a given situation. A high context communications is characterized by a condition in which most of the meaning is in the context. On the other way around, in low context communications, everything must be explicitly stated. Baumgartner [17] rate technological development from advancement to backwardness. Developing an interface for a user ranging from intermediate to expert is very different from developing interface for the novice user. Hall [18] proposed time perception as response to time. There are two types of time perception: monochronic (sequentially) - characterized by schedules, promptness and do one thing at a time; and polychronic (synchronously) time - characterized by the shifting of time attention and plans, do several things at a time, and plans are easily changed. In the user-interface design, monochronic time perception prefer writing pre-queries for information retrieval while polichronic people prefer browsing through the information space [19]. Authority conception refers to the conception of organizational power and leadership common to an organization’s members. Condon and Yousef [20] ranges authority from democratic to authoritarian. A democratic society might teach people that they have rights to question authority, whereas authoritarian society do not.

Culture has been proven to influence many aspects in human life as well as in ergonomic application, particularly in Indonesia. For example, culture has proven to influence measures of mental workload [21, 22, 23] and food consumption [24]. In addition, in the design of product and workplace in Indonesia, cultural factors also plays an important role [25, 26]. Cultural influence on the user interface design has been observed for years. Researchers have observed website design in a single country or within culture design [27, 28, 29]. Investigations of cultural influences on the website design have been conducted across cultures as well [12]. However, as stated by Lo and Gong [8], more research are needed in the issue of cultural influence on ecommerce design.
Although there is increased research interest in national culture influence on design of e-commerce website, as far as acknowledged by authors, research on the cultural influence on the e-commerce website in Indonesia is lacking. An exception is a study conducted by Syarief [30] about user perception of web icon of Indonesia as part of a cross cultural study. Considering the high growth of ecommerce in Indonesia and the fact that Indonesia is highly potential for penetration of foreign e-commerce, this is an important area for research.

The purpose of this study is to observe influence of culture in design of e-commerce web sites for Indonesian case. Participants were instructed to complete a buying task in three different e-commerce websites that are designed based on cultural guidance, totally opposite of the cultural guidance, and half based on cultural guidance. Usability testing were applied to observe the effectiveness of each design, assessed by completion time and error. User experience of participants were assessed by means of questionnaire.

2. Methodology

Ninety subjects participated in this study (mean age= 20.3 year, SD=1.65, 60 female). They are bachelor students of Bandung Institute of Technology (ITB) Indonesia who participate in this study voluntarily.

Usability testing and user experience were applied in this study. Usability is defined as the extent to which a product can be used by specified users with effectiveness, efficiency, and satisfaction in specific context of use [31]. Usability was tested by observing reaction time, ambiguity, and error rate using data lodging and video recording. User experience was assessed by means of questionnaire in the end of the experiment.

Three different e-commerce websites related with food were designed. The first e-commerce website was designed following the cultural guideline proposed by Marcus and Gould [16] and Baumgartner [17]. The second e-commerce website was designed by opposing the cultural guideline. The third e-commerce website was designed by mixed of following and opposing the cultural guideline.

According to Hofstede [14] and Johnson and Widyanti [21], Indonesia has high score in PDI, MAS, and low score in IDV and UAI. Therefore, for example for e-commerce website 1, in relation with Indonesian high PDI, the design include having a logo with a large size, using passwords, giving feedback and guidelines that are clear and unequivocal steps, using formal wording, and having shape drop-down menu. In relation with Indonesian low IDV, the e-commerce website use clear slogan and detailed product description. In relation with UAI, the e-commerce website use passive verb, have cart purchases. The menu choices were many and the overall menu was shown.

Within subjects experiments were applied in which participants were instructed to complete a shopping task in the three e-commerce website. The task was given in the 11 inch laptop. Balance latin square number is applied in the order of the e-commerce website that must be completed by participants. Completion time is recorded in the end of experiment and a recording camera was set at the back of participants. Sketchman Studio [32] usability software was used for screen recording. In the end of the experiment, a questionnaire was given to the participants. The questionnaire asks the importance of several statements related to cultural e-commerce website design. Likert scale ranging from 1 (not important) to 4 (very important) was used for these statements.

3. Result

ANOVA shows there is no significant difference in completion time among the three e-commerce websites. However, as can be seen in Fig. 1, as expected, e-commerce website one has shortest process time, whereas e-commerce website two has longest process time. Ecommerce website 3 has process time between ecommerce website 1 and 2.
Figure 1. Processing time for each page of e-commerce website

Result of the video recording for each participant has been analyzed based on error and ambiguity during transaction process as can be seen in Fig. 2. As expected, error and ambiguity in e-commerce website 1 was lower than the second design and similar with the third design. Figure 2. Respond of participants for each statement in the questionnaire related to cultural design can be seen in Table 2. Out of 13 statements, nine statements were responded in accordance with cultural guidance in e-commerce website design.

4. Discussion
Usability testing shows that there are no significant differences in effectiveness among the three website design. However, data of web 1 shows shortest reaction time compares to web 2 and web 3. Error number during process of web 1 and 3 is lower than web 2. User experience that are observed by mean of questionnaire reveal that participants give agreement about importance of statements that related to cultural guidance in ecommerce website design, except for UAI and MAS.

Figure 3. Respond for each statements related to cultural related-design

| Statements                                      | % of positive respond | % of negative respond | comparison with cultural guidance |
|-------------------------------------------------|-----------------------|-----------------------|-----------------------------------|
| Logo is clear and big                           | 90.0                  | 10.0                  | as expected                       |
| Consumer has to make an account in order to     | 74.4                  | 25.6                  | as expected                       |
have transaction in ecommerce website
Existence of transaction step and procedure
Vertical hierarchical menu
Menu that has separated in many views
Detailed description of the product sell in the website
Non-controversial slogan
Buying icon in the form of basket
Use of formal and standard sentence
Use of contrast color between background and text
Ecommerce website has many pages
Option of favorite menu and new menu
Clear navigation such as Home > menu A > product X

| Feature                                      | Rating | Probability | Note    |
|----------------------------------------------|--------|-------------|---------|
| have transaction in ecommerce website       | 98.9   | 1.1         | as expected |
| Existence of transaction step and procedure  | 87.8   | 12.2        | as expected |
| Vertical hierarchical menu                   | 82.2   | 17.8        | not expected |
| Menu that has separated in many views        | 95.6   | 4.4         | as expected |
| Detailed description of the product sell in the website | 90.0   | 10.0        | as expected |
| Non-controversial slogan                     | 98.9   | 1.1         | not expected |
| Buying icon in the form of basket            | 95.6   | 4.4         | as expected |
| Use of formal and standard sentence          | 96.7   | 3.3         | as expected |
| Use of contrast color between background and text | 40.0   | 60.0        | not expected |
| Ecommerce website has many pages             | 92.2   | 7.8         | as expected |
| Option of favorite menu and new menu         | 94.4   | 5.6         | not expected |
| Clear navigation such as Home > menu A > product X |       |             |         |

Compared with previous study which observe within national culture in website design, result of this study is slightly in line with previous studies. For example, Tsikriktsis [33] found that two cultural dimensions (i.e., MAS and LTO) are associated with higher web site quality expectations in England. Ahmed et al. [34] found similar result for Malaysian university web design. In contrast, a study conducted by Mousavi and Khajeheian [35] found inconsistency of Iranian university website with Hofstede’s theory in particular for dimension of IDV, PDI, and MAS. However, UAI is consistent between the design and Hofstede’s dimension in this case.

Talking about cross-cultural comparison in the design of website between culture, mix result has been found. The importance of incorporating national culture in website design have been found in cross-cultural study between Chinese and the Hollander [36], between USA and Japan [37], between Malaysia and Britain [38], and between USA and Korean [3]. However, a study conducted by Sinkovics et al. [39] in comparison of German, USA, UK, and Latin America found somewhat different result as national culture is not playing crucial role in the website design.

The mix result described above can be explained by what is proposed by Smith et al. [40] who said that generic cultural factors can make a significant contribution to website usability. However, according to Smith et al., caution must be taken as there are large differences in the importance of the cultural factors since some are significant and others are not.

This study has several limitations. First, only three web designs are used in the experiment. More options of ecommerce web may enrich the result and analysis. Second, the web that is used is a tailor-made e-commerce design. Real e-commerce website is better to be used. The third limitation is that the participants of the study belongs to Indonesian Javanese ethnicity since the users of the ecommerce web
are majority living in the Java Island. However, considering that there are various aspect of differences in Indonesian ethnicity [25], considering different ethnic among participants are worth underlined. Also considering that the study was relatively small in sample, there is merit in conducting larger scale studies that consider larger sample across country locations. Third limitation is that there is an unbalance number between male and female participants. Although there is a hypothesis that gender will influence preference of website design [41], result of this study proved that gender is not playing important role in the preferences of website design. The present study is novel in two aspects: it focuses on the Indonesian case which is rarely studied before, and it objectively and subjectively observed the role of national culture in e-commerce website design.

5. Conclusion
For Indonesian e-commerce customer, it seems that Indonesian culture influences user experience and usability of e-commerce website. However, not all cultural dimensions play an important role in e-commerce website design. Only power distance index (PDI) and individualism-collectivism (IDV) are the cultural dimension that must be considered by e-commerce web developer who want to take a part in Indonesian ecommerce industries. Since cultural dimensions play an important role in Indonesian e-commerce design, it must be taken into account in the design of e-commerce website in Indonesia to be effective. Once a better understanding of design characteristic in Indonesian culture is gained, future design can be based on the characteristic. Not only the design will meet usability, but also will lead to financial increase as well.

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