

Culture Design of Information Architecture for B2C E-Commerce Websites

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Abstract. Culture is widely treated as an essential factor for the success of e-commerce, yet the concept itself is still clouded in bewilderment. Furthermore, there has been little research on usage behavior in the context of developing countries; e.g., Islamic countries. By using Islamic culture as the case study, this study highlights the website information architecture practical design indication and reports the partial analysis of the investigation on how culture design of information architecture (IA) for B2C e-commerce website will has a positive affect to the user performance tasks (browsing, searching and purchasing books activities). Analyses of one-way between-groups multivariate analysis of variance (one-way MANOVA) and paired-samples t-test were performed. The result showed that the task time performance of the Middle East and the Malaysian users are different and faster when using the culture centred e-commerce website. Thus, provides empirical evidence on the positive influence of culturally design website to performance.

Keywords: Website Information Architecture, Culture Centred Website, Muslim Online User, Islamic Culture.

1 Introduction

The relevance of cultural issues to the design of global human-computer systems [22] necessitates website designers to have a thorough understandings of the cultural constraints in usage behavior. However, there has been little research on usage behavior in the context of developing countries such as from Islamic countries. This lack of understanding of the cultural issues that are unique to that country also contributes to the large scale diffusion for e-commerce in developing countries [12] [29]. This may also partially explain the lacking of research or priorities given for Islamic websites [24] from Arabic or Islamic countries on user interface and website IA in the online environment.

The number of Muslim users are steadily growing and this growth has provided the opportunities for rapid diffusion of e-commerce due to the nature of the environment and culture. In 2002, United Nations Conference on Trade Development reported that the Arab e-commerce market value was expected to grow to five billion dollars by 2005, with Saudi Arabia and Egypt as the major players [11]. As Middle East region

predominantly associated to Islam, this expected growth has provides the motivation for this study to investigate the usage behavior of Muslims in culture-centred e-commerce website towards creating a better understanding on Muslims behavior. However, culture remains difficult to study even to HCI practices and there are still many unsolved problems concerning the extent to which culture may affect the usability [22].

This study will also highlights practical guideline and empirical evidence on the positive influence of culturally adapted design to user performance. The understanding and results put forward by this study may be useful for those who want to reach out to Muslim users. The paper is organized as follow. The next section provides the literature review of the current studies related to e-commerce and culture. This section will also highlight an analytical framework on the adaptation of the cultural values on the website IA design by using Islamic culture as the case study. Then, the method used in this study is described and the results are reported, which is followed by conclusion, limitations and future implication.

2 Literature Review

2.1 E-Commerce and Culture

The degree of cultural adaptation exhibited on the country-specific websites is still considered at an early stage [21]. However, in recent years, there were emerging studies oriented towards enhancing the understanding for the role of culture in e-commerce. For instance, studies related to the e-commerce in Thai Culture [4], e-commerce for Chinese users [6] [14], e-commerce use for the Egyptian consumers [9], e-commerce differences between US and China [2] [18] [21], e-commerce acceptance in Malaysia and Algeria [30] and cultural considerations in India and Australia for Internet shopping [1] that mold the understanding to the intersection between culture and e-commerce. Generally, it is widely recommended that researcher identify cultural traits corresponding to the use of e-commerce. The growing usage of systems in diverse cultural contexts put forward the extent to which the use of such system is actually a matter of culture [22].

Various outcomes can be seen if cultural issues to be put in parallel with the development of design for e-commerce. For example, culturally-adapted web content enhances usability, accessibility and web interactivity with relevant cultural groups [20]. There are also indicators that culture may influence attitudes about e-commerce [19], affects the behavior [3] [16] [20], preferences of people [5] [16], satisfaction [5], loyalty [5] [20] and success of e-commerce [17]. It is important that the existence of the relevant cultural features alone does not fully guarantee the success for a particular website [20]. For example, trust also has been identified as one critical issue [5] [6] [8] [20] and essential element for success of e-commerce [23]. Individual culture may also play the role in forming the foundation for the development of trust [23].

According to Smith and Yetim [22], effective strategies that are critical to the success of a particular information system should address cultural issues in both, (1) the product and; (2) the process of information systems development. Pertaining to the product of development, cultural variation in actions, signs, conventions, values, norms or meanings raise novel research issues ranging from methodological, ethical

and usability issues of culture [22]. Relative to the process of development, culture variation affects the manner in which users participate in design and act as subjects in evaluation studies [22]. Thus, this study attempts to reduce the gap and issues related to the product and process of e-commerce development by highlighting practical design guideline and providing modest empirical contribution on how culture design of information architecture (IA) for B2C e-commerce websites will has a positive affect to the user performance in performing tasks (*browsing, searching and purchasing activities*). The next section highlights the analytical cultural framework and the associated IA website designs derived by using Islamic culture as the case study.

2.2 Cultural Framework and Associated IA Design Prescriptions

Cultural dimensions are often used for creating the understanding for the intersection among e-commerce, culture and online consumer behavior [20]. Hence, related design prescriptions to Islamic culture dimensions as theorized by Wan Abdul Rahim et al. (2008) are as seen in Table 1, to reflect practical design indications of the associated cultural values [27]. The application of cultural dimensions can be used in practical terms in designing more effective websites for Muslim users. The justification for the usage of the designs were also based on our prior theoretical works on website IA [25][26].

Table 1. Adapted IA design prescriptions to Islamic dimensions [26] [27]

Islamic Dimension	IA Dimension	Design Prescriptions
High Uncertainty Avoidance	Navigation	<ul style="list-style-type: none"> - Navigation schemes to prevent users from lost - Simple clear metaphor, limited choice & restricted data - Local & contextual navigational system - Include customer service, navigation local stores, local terms, free trial
	Content	<ul style="list-style-type: none"> - Mental model and help systems on reducing "user error" - Redundant cues (color, typography and sound, etc) to reduce ambiguity and chunk info by topic / modular. - Include tradition themes, local stores & local terms, customer service and navigation, free trials & download
Universalism	Navigation	- Global & local navigational system
	Content	- Chunk information by task or topic
Polychronics	Navigation	- Local & contextual navigational system
	Content	- Chunk information by topic or modular
Masculinity (MAS) & Femininity	Navigation	- (MAS) Navigation oriented to exploration & control
	Content	<ul style="list-style-type: none"> - Content focused on truth & certainty of beliefs. - Rules as a source of information & credibility.
Individualism (IND) &	Navigation	- (IND) Global & customizable navigational system
		- (COL) Contextual navigational system

Table 1. (continued)

Collectivism (COL)	Content	<ul style="list-style-type: none">- (IND) Chunk information by task- (COL) Chunk information by modular- (COL) Include family theme, clubs or chatrooms, loyalty programs, community relations, symbols of group identity, newsletter & links to local websites
High Power Distance	Content	<ul style="list-style-type: none">- Include hierarchy info & pictures of important people with title.- Include quality assurance, awards, vision statements & appeal in pride of ownership.- Tall hierarchy in mental models- Highly structured access to information
	Context	<ul style="list-style-type: none">- Significant, frequent emphasis on the social & moral order (e.g. portrayal of nationalism/religion) and symbols
High Context	Navigation	<ul style="list-style-type: none">- Local and contextual navigational system
	Content	<ul style="list-style-type: none">- Chunk information by topic or modular- Use politeness, soft sell approach in message delivery
	Context	<ul style="list-style-type: none">- Strong preference for visual- Use implicit cultural marker like visual & color- Emphasize on aesthetics value

3 Research Method

The main research questions (RQ) formulated for this study are:

- RQ1: Do Muslim (Middle East and Malaysian) users performance differs when performing tasks (*browsing, searching and purchasing*) in targeted B2C e-commerce websites for their culture?
- RQ2: Do Muslim (Middle East and Malaysian) users perform better when performing tasks (*browsing, searching and purchasing*) in targeted B2C e-commerce websites for their culture?

An experimental session with 44 Middle East and 44 Malaysian postgraduate students was conducted. The full discussion on the experimental method and the initial result was published in our prior work which focuses on the task of browsing and searching for specific books [28]. However, here, we provide the subsequent analysis on the partial findings that involve the tasks of user browsing, searching and purchasing the specified books. The dimensions of ‘power distance’ and ‘uncertainty avoidance’ were used to incorporate the IA cultural designs in the two business-to-consumer (B2C) e-commerce prototypes. In general, ‘power distance’ refers to the condition where weaker member accepts inequality in power distribution whereas ‘uncertainty avoidance’ dimension relates to the condition where a society feels vulnerable of taking risks in unpredictable situation [13].

The first website (‘Iqra Book Store 1’) reflects the high direction for the dimensions of ‘power distance’ and ‘uncertainty avoidance’. The designs of the Iqra Book

Store 1' reflects the cultural dimensions of Islamic culture as theorized by Wan Abdul Rahim et al. [27]. The second website ('Iqra Book Store 2') however reflects the opposite direction the dimensions of 'power distance' and 'uncertainty avoidance'. This was used for comparative purpose in the experimental session. The summary of design on website prototypes are as shown in Table 2, which is being derived from Table 1.

Table 2. Summary of design on website prototypes

Cultural Dimension	Power Distance	Uncertainty Avoidance
Iqra Book Store 1 (High)	- Religion symbol / color - Highly structured access to information (with sub- categories)	- Link open within window - Symmetrical layout
Iqra Book Store 2 (Low)	- Basic logo / non-religion related color - Low structure access to information (without sub-categories)	- Link open new window - Non-symmetrical layout

Two website prototypes were used; in two separate treatments, for the experimental sessions. A three minutes basic training was given. Then, in both separate treatments, subjects were instructed to perform the following specified tasks:

- (1) Registering with the website
- (2) Seek the price information of two given books:
 - "Belief of the Beliefs" and "Hadith: Summarized Sahih-Ul-Bukhari" (*Iqra Book Store 1'*) (*1st treatment*)
 - "Provisions for the Seekers: A Manual of Prophetic Hadiths" and "The Book of Beliefs" (*Iqra Book Store 2'*) (*2nd treatment*)

Then, find out the total purchase amount.
- (3) By using a shopping cart tool, add the two books. Then, 'check out' and make purchase of the books by using the provided 'dummy' credit card number, expired date and 'Card Verification Value' (CVV) number.
- (4) Finally, click 'log out'.

The results and discussion in next section was done based from the complete time performance recorded for respondents doing all specified tasks; (1), (2), (3) and (4).

4 Results and Discussion

Data transformation has been made to the 'timesite1' variable (*performance time recorded while browsing and purchasing book using 'Iqra Book Store 1'*) and 'timesite2' variable (*performance time recorded while browsing and purchasing book using 'Iqra Book Store 2'*). This was done to meet the assumption of normal distribution, as suggested by Field (2005) [7]. A hypothesis was developed to provide the answer for the RQ1. The hypothesis is as shown as follows:

H₁: Muslim (*Middle East and Malaysian*) users time performance differs in doing tasks (*browsing, searching and purchasing books*) when using websites of their own cultures.

An analysis of one-way between-groups multivariate analysis of variance (one-way MANOVA) was performed to investigate the Muslims (Middle East and Malaysian) users, performing tasks (browsing, searching and purchasing books) in two different websites. This separate analysis was done to investigate whether sub-cultural groupings of Muslims (Middle and Malaysian) users are different. The analysis is important to show that the characteristics of sub-cultural grouping of Muslims are heterogeneous for between-groups but homogenous in within-groups. The differences may be due to other cultural factors such as nationality, gender and others. However, this assumption need to be tested in a different study. Two dependent variables were used: 'timesite1' and 'time-site2'. The independent variable was 'region group' Muslims (by Middle East or Malaysian) users. Preliminary testing was conducted for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices and multicollinearity, with no serious violations. There was a statistically significant difference between the Muslims (Middle East and Malaysian) users on the combined dependent variables: $F(2, 85)=38.15, p=.000$; Wilks' Lambda=.53; partial Eta squared = .47 as shown in Table 3.

Table 3. Summary of multivariate tests

Effect	Value	F	Hypo df	Error df	Sig.	Partial Eta Square
Intercept						
Pillai's Trace	.981	2215.32	2.00	85.00	.00	.981
Wilks' Lambda	.019	2215.32	2.00	85.00	.00	.981
Hotelling's Trace	52.13	2215.32	2.00	85.00	.00	.981
Roy's Largest Root	52.13	2215.32	2.00	85.00	.00	.981
Region						
Pillai's Trace	.473	38.15	2.00	85.00	.00	.473
Wilks' Lambda	.527	38.15	2.00	85.00	.00	.473
Hotelling's Trace	.898	38.15	2.00	85.00	.00	.473
Roy's Largest Root	.898	38.15	2.00	85.00	.00	.473

Table 4. Summary of multivariate tests

Source	Dependent Variable	Type III Sum of Square	df	Mean Square	F	Sig.	Partial Eta Square
Corrected	Time_Site1	2.968	1	2.968	49.56	.00	.37
Model	Time_Site2	3.209	1	3.209	40.92	.00	.32
Intercept	Time_Site1	133.18	1	133.18	2224.18	.00	.96
	Time_Site2	237.03	1	237.03	3022.84	.00	.97
Region	Time_Site1	2.968	1	2.968	49.56	.00	.37
	Time_Site2	3.209	1	3.209	40.92	.00	.32
Error	Time_Site1	5.150	86	.060			
	Time_Site2	6.744	86	.078			
Total	Time_Site1	141.30	88				
	Time_Site2	246.99	88				
Corrected	Time_Site1	8.117	87				
Total	Time_Site2	9.952	87				

When the results for the dependent variables were considered separately, both of the dependent variables reached the statistical significance using a Bonferroni adjusted alpha level of .025. We will only consider our results significant if the probability value (Sig.) is less than 0.25. The first dependent variable was 'timesite1': $F(1,86) = 49.56$, $p = .00$, partial Eta squared = .37 as shown in Table 4. The second dependent variable was 'timesite2': $F(1,86) = 40.92$, $p = .00$, partial Eta squared = .32.

The results supported H_1 that the time performance recorded for Muslim (Middle East and the Malaysian) users differs when using the websites targeted for their own culture ('Iqra Book Store 1'). Although, there was significant support from previous hypothesis that the Muslim users performed better in culture-centred website, however, the performance time between the Middle East and Malaysian users was different. This was suggested based on the findings of the inspection of the mean scores which showed that the Muslims (Middle East users reported higher levels of time performance for the 'Iqra Book Store 1' ($M = 1.41$, $SD = .26$) than the Malaysian users ($M = 1.05$, $SD = .23$) as shown in Table 5. This was also suggested based on the findings of the inspection of the mean scores which showed that the Middle East users reported higher levels of time performance for the 'Iqra Book Store 2' ($M = 1.83$, $SD = .29$) than the Malaysian users ($M = 1.45$, $SD = .27$).

Table 5. Mean score for time-on-task performance

	Group	Mean	Std. Deviation	N
Timesite1	Middle East	1.414	.260	44
	Malaysian	1.047	.229	44
Timesite2	Middle East	1.832	.294	44
	Malaysian	1.450	.266	44

A hypothesis was developed to provide the answer for the RQ2. The hypothesis is as shown as follows:

H_2 : Muslims (*Middle East and Malaysian*) users perform faster for doing tasks (*browsing, searching and purchasing books*) in website targeted for their own culture.

A paired-samples t-test was done separately to the Muslims (Middle East and Malaysian) users. First, a paired-samples t-test was conducted to evaluate the cultural dimensions impact on the time performance recorded for the 'Iqra Book Store 1' and the 'Iqra Book Store 2' for the Muslim (Middle East) group users. There was a statistically significant increase in the time performance score recorded for the 'Iqra Book Store 1'; 'timesite1' ($M = 1.41$, $SD = .26$) to the time performance score recorded for the 'Iqra Book Store 2'; 'timesite2' ($M = 1.83$, $SD = .29$), $t(43) = -7.924$, $p < 0.0005$ in doing tasks (*browsing, searching and purchasing books*). The Eta squared statistics (0.59) showed a large effect size.

Second, a paired-samples t-test was conducted to evaluate the cultural dimensions impact on the time performance recorded for the 'Iqra Book Store 1' and the 'Iqra Book Store 2' for the Muslim (Malaysian) group users. There was a statistically significant increase in the time performance score recorded for the 'Iqra Book Store 1'; 'timesite1' ($M = 1.05$, $SD = .23$) to the time performance score recorded for the 'Iqra

Book Store 2'; 'timesite2' ($M = 1.45$, $SD = .27$), $t(43) = -8.208$, $p < 0.0005$ in doing tasks (*browsing, searching and purchasing books*). The Eta squared statistics (.61) showed a large effect size.

The results support H_2 . Both empirical results showed that the Muslim (Middle East and Malaysian) groups performance were much better for the 'Iqra Book Store 1' compared to the 'Iqra Book Store 2', in doing tasks (*browsing, searching and purchasing books*). This assumption was based on the time performance score which recorded an increase for the 'Iqra Book Store 2' for the Muslim (Middle East) ($M = 1.83$, $SD = .29$), $t(43) = -7.924$, $p < 0.0005$ and also for Muslim (Malaysian) users ($M = 1.45$, $SD = .27$), $t(43) = -8.208$, $p < 0.0005$ in doing tasks (*browsing, searching and purchasing books*).

5 Conclusion

This study highlights practical design guideline and empirical evidence on the positive influence of culturally adapted design to user performance for performing tasks (*browsing, searching and purchasing books*) in e-commerce website. The understanding and results put forward by this study is useful for those who wants to reach out to Muslim users. However, this study has several limitations. Culture may not be the only reason that affects the usage behavior of users. This research focused only on the website category of online bookstore of website prototypes. The role of cultural dimensions and prescriptions imposed in this study might potentially posed different results for other categories of products and services. However, this assumption needs to be tested in a different study. Further possible extensions of the study by having more updated measure for cultural diversity across nations as well as their purchasing behavior may serve as a better indicator of how truly people behave in e-commerce environment. On the practical side, this study provides valuable information to companies that are considering on adapting the e-commerce website to cultural design. This study can also serve as point for future study in the emerging area of cultural usability.

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