The Cultural Aspects of Design Jordanian Websites: 
An Empirical Evaluation of University, News, and Government Website by Different User Groups

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The International Arab Journal of Information Technology, Vol. 1, No. 0, July 2003


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Abstract:
This study attempts to describe a comparative study of a number of Jordanian local websites used in Jordan. The purpose of the study is to determine the different kind of “cultural markers” that influence user’s website usability. Furthermore, this study attempts to identify Jordanian cultural sensitive design elements to use for culturally centered Jordanian website design. In addition, this paper studies the effect of both cultural dimensions and users interface components on user’s acceptance using Technology Acceptance Model (TAM). The outcome shows similar preference perceptions, whilst others differ.

Keywords: Culturability, TAM, Website Localization, Cultural Usability, Metaphors, Mental Model, Navigation, Interaction, Appearance, Hofestede Cultural Dimensions, Ease of Use.

1. Introduction

Website users around the world are different in cultures, speak different languages, pertain to different religions and exhibit different habits and customs. Most website development research has concluded that, localizing websites to a locally appointed or targeted community attracts and retains more website users. The problem of website localization began when many companies in the world noticed that, the number of website visitors have decreased gradually day after day due to the complexity of the website. This is because website interface reflecting company needs rather than target users needs. For example, they spend much time navigating which led to the lack of service promotion and real commercial loss.

Website localization is the process of adapting a website to make it accessible, usable, understandable, and culturally suitable for target audiences [26], [1], which is divided into three levels:
1. Linguistic Level: It includes adapting website by translating dates, time, currency formats, addresses, measurements, weights, and punctuation.
2. Cultural Level: It includes adjusting graphics, visual elements, images, terminologies, metaphors, colors and all cultural aspects of certain audience groups.
3. Technical Level: It aim at redesigning the current websites to be more culturally usable, by changing the current website components that included in the two previous levels.

Website can be divided into two categories.
- First: It made in local context and one culture, and visited by other users with different cultural background. This type of website is highly contextualized and embedded in the nuances and interaction styles of particular culture and serves the needs of a particular audience.
- Second: It designed specifically for cross-cultural participation, which strives to reach a cross-cultural population, needs of an international audience [2].

Designing website interfaces for different users has always been a challenge because of the diversity belongs to different countries, religions, languages, life styles, cultures perceptions and expectations of using the website.

2. Related Work

There are many different definitions, approaches and models of culture in the literature, but there is no agreement on a specific definition of culture [25]. Thus, culture is defined in terms of the cultural aspects that influence human usability achieved through the use of website.
Important work in defining cultural dimensions has been undertaken by many researchers [6], [7], [8], [9], [10], [11], [12], [13]. Hofstede [9] conducted a survey of IBM employees in 40 different countries and proposed a model that entailed five dimensions: Power Distance, Individualism vs. Collectivism, Masculinity vs. Femininity, Uncertainty Avoidance Time Orientation. Cultural usability is defined as a search for a design approach that "situates the practices of technology within its cultural and social contexts", it is a combination of culture and technology with interpretation and implementation [14], Cultural usability is concerns with a study of cultural effects on product design and work on website design [15]. “Usability issues must take on in a cultural context” and coined the term “culutrability” as “the merging of culture and usability.” The role of culture in user interfaces has also been addressed by Evers and Day [15]. Sheppard and Scholtz [27] and Sun [28] conducted pilot studies to determine if the absence or presence of cultural markers affects the user's preference or performance.

Various cultural aspects are identified such as nationalism, language, social context, time, and currency, units of measure, cultural values, body positions, symbols, and esthetics [16], by combining it in a checklist that need to be addressed during global interface design [17]. The impact of culture on usability and design was described by presenting variables for incorporating culture into design to improve the localization term. Also conceptual localization was suggested to match a user's culturally specific mental model of the software and functionality as an effective way to design international interfaces [18]. Culture specific recommendations and guidelines for website designers has been given as it is important in website design as well as the differences between cultures affect the understanding of the websites [19]. Many developed research today tries to find a link between cultural dimensions and website design. Marcus and Gould [20] detected the existence of cultural markers web design elements that are prevalent in websites of a particular culture (e.g. color, icons, and symbols). In addition to that, cultural dimensions have been applied to global interface design, tested users behavior, variations in understanding colors, icons, pictures, symbols, phrases etc [21]. “Culturability” is a new term added in the web usability matrix by both Barber and Badre [22] to emphasize the importance of the relationship between culture and usability in website design.

The primary goal of many research projects is to determine whether Hofstede’s cultural dimensions affect the performance achieved through the use of human-computer interaction [23].

The study of the impact of colors on internet navigation and consumers has been extensive, but it is still at the beginning as far as cross-cultural localization is concerned. In particular, the use of color cluster research could help in identifying clusters of colors with similar meanings [24].

Some of cultural usability researches are developed to evaluate some of e-banking websites used in Arab world such as Egypt, and Kuwait [30], [31]; it introduced the Cross-Use experiment, aiming to evaluate the mapping between website design elements and cultural attributes using a user-in-context evaluation approach. The experiment was conducted using the developed prototypes was able to classify cultures differently, and highlighted those design markers that affects cultural differences in the design of e-banking websites.

The influence of culture on Arabic Websites has been studied [29] by evaluating some of universities websites that used in Arab world such as Egypt, Jordan, United Arab Emirates, and Palestine [33], the purpose of the evaluation is to know if these websites reflect their culture, in addition to know if the websites share attitudes about design in different Arab countries.

From other side some researchers in Arab world as Oman [32] investigated the extent of the usage of the published usability guidelines and tools in the design of the user interface of a website, and whether the designers consider using Cultural User Interface (CUI) profile or something similar to capture the target culture preferences and expectations.

3. Methodology

The research model is built depending on Hofstede cultural model, user interface components, Technology Acceptance Model (TAM), and usability attributes as shown figure 1:
Cultural Model: Cultural differences are based in deeply rooted values that can be categorized along five fundamental dimensions: power distance, collectivism-individualism, masculinity-femininity, uncertainty avoidance, and long and short-term orientation [9]. His research is based on a large-scale survey which was carried out between 1967 and 1973 and which covered 53 countries representing the major regions of the world. These were rated for each dimension, usually on a scale from 0 to 100.

User Interface Components: Marcus [34] attempts to apply those dimensions to global web interface design, by mapping Hofstedede dimensions to metaphors, mental model, navigation, interaction, and appearance.

Technology Acceptance Model (TAM): This model is based on Davis’s approach [35], which has been changed to incorporate cultural aspects with two factors: usefulness which refer to the degree to which an individual believes that using a particular system would enhance his or her job performance, and ease of use that refer to the degree to which an individual believes that using a particular system would be free of mental or physical effort.

Website Usability: Usability often refers to the elegance and clarity with the interaction in designed website; some attributes are used to measure the usability such as Overall reaction to the website interface, User’s impression about webpage, Terminology and website Information, and Website capabilities [36].

3.1 Research Questions
The goal of this research is to find answers to the following research questions:
Q1: Do websites used in Jordan reflect user’s culture?
Q2: Does the culture affect user interface acceptance?
Q3: Do the user interface components affect the user interface acceptance?
Q4: Does the user interface acceptance affect the website usability?
Q5: Does the culture affect user interface components?
Q6: Does usefulness affect ease of use?
Q7: Does the different type of websites used in Jordan share the same culture markers?
Q8: Do websites designers and developers consider the cultural dimensions in website design process?
Q9: Do website designer and developers follow specific criteria in website design or any guidelines?
Q10: Do factors such as age and academic level affect the website perception?

3.2 Research Hypothesis
Each main hypothesis is divided into sub-hypothesis as the following:

H1: Relation between cultural dimensions and user interface acceptance.
H1:1 There is significant relation between cultural dimensions and user interface acceptance with ease of use.
H1:2 There is significant relation between cultural dimensions and user interface with usefulness.

H2: Relation between user interface components and user interface acceptance
H2:1 There is significant relation between user interface components and user interface acceptance with ease of use
H2:2 There is significant relation between user interface components and user interface acceptance with usefulness

H3: Relation between user interface acceptance and website usability
H3:1 There is significant relation between user interface acceptance with usefulness and website usability
H3:2 There is significant relation between user interface acceptance with ease of use and website usability

H4: Relation between culture dimensions and user interface components
H4:1 There is significant relation between Power distance and user interface components
H4:2 There is significant relation between Individualism and user interface components
H4:3 There is significant relation between Masculinity and user interface components
H4:4 There is significant relation between Uncertainty Avoidance and user interface components
H4:5 There is significant relation between Long Term Orientation and user interface components

H5: Relation between user interface acceptance attributes (usefulness and ease of use)
H5:1 There is significant relation between user interface acceptance with usefulness and ease of use.

H6: Differences in website usability due demographical users’ characteristics
H6:1 There is no significant differences in website usability due to age
H6:2 There is no significant differences in the website usability due to educational level.

4. Pilot Experiment
Three different website categories: University (University of Jordan), news (Ad-Dustour Newspaper), and government (Greater Amman Municipality) were evaluated by 135 users such as students, teachers, employees, and news readers, 89 use University of Jordan website, 35 use Ad-Dustour newspaper website, and 11 use Greater Amman
Municipality website. In other side Interviewing sample of five website designers and developers who are developed and build the different websites, to know if they consider cultural markers and if they follow specific methodology in website design. The evaluation process was done by using questionnaire, which built from the crash and then translate into Arabic language.

5. RESULTS AND DISCUSSION

5.1: WEBSITE'S ANALYSIS RESULTS

As shown in appendix A:
1. University of Jordan website values express that this website is of high power distance, collectivistic, feminine, low uncertainty avoidance, and long term orientation website, which is comparable with Marcus and Hamoodi [29] analysis for universities website in some of Arab countries such as United Arab Emirates, Jordan, and Egypt.
2. Ad-Dustour Newspaper website values express that this website is low power distance, collectivistic, masculine, low uncertainty avoidance, and short term orientation website.
3. Greater Amman Municipality values express that this website is high power distance, collectivistic, feminine, high, uncertainty avoidance and long term orientation website.

5. 2: CULTURAL USER’S ANALYSIS

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Mean</th>
<th>Users’ Characteristics</th>
<th>Hofstede Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Distance</td>
<td>76.197</td>
<td>High</td>
<td>80</td>
</tr>
<tr>
<td>Individualism</td>
<td>59.580</td>
<td>Collectivist</td>
<td>38</td>
</tr>
<tr>
<td>Masculinity</td>
<td>69.194</td>
<td>Feministic</td>
<td>53</td>
</tr>
<tr>
<td>Uncertainty Avoidance</td>
<td>70.703</td>
<td>High</td>
<td>68</td>
</tr>
<tr>
<td>Time Orientation</td>
<td>70.814</td>
<td>Long</td>
<td>-</td>
</tr>
</tbody>
</table>

Cultural User’s Analysis shows that users in Jordan are high power distance, collectivistic, feminine, high uncertainty avoidance, and time orientation. Referring to Hofstede analysis for Arab world, Jordanians users’ culture characteristics are near to Hofstede analysis for Arab world as the following:
1. High Power Distance: Ranking of 80, these societies has a highly rule-oriented with laws, rules, regulations, and controls in order to reduce the amount of uncertainty, while inequalities of power and wealth have been allowed to grow within the society [9].
2. High Uncertainty Avoidance: Ranking of 68 indicates the society’s low level of tolerance for uncertainty; the society does not readily accept change and is very risk adverse [9].
3. Masculinity: Ranking of 52, this would indicate that while women in the Arab World are limited in their rights, it may be due to more Muslim religion rather than a cultural paradigm, research results shows that users in Jordan are feminine which does not contradict with Hofstede analysis for Arab world, while his analysis was for some Arab Gulf countries such as United Arab Emirates, Kingdom of Saudi Arabia, and Kuwait which separate between women and men rights, jobs, and life activities.
4. Individualism: Ranking at 38, this translates into a collectivist society which people are closed and integrated to groups.
5. Hofstede does not measure the fifth culture dimension for Arab world; his culture analysis does not contain any values of Time Orientation for Arab countries, results shows that users in Jordan are long-term orientation, which is compatible with the nature of Muslims’ religion and their belief about the afterlife, and their respect to traditions.

5.3: RESEARCH INSTRUMENT RELIABILITY

Cronbach's Alpha was calculated to show study instrument reliability Cronbach's α is defined as:

$$
\alpha = \frac{K}{K-1} \left(1 - \frac{\sum_{i=1}^{K} \sigma_{X_i}^2}{\sigma_X^2}\right)
$$

Where K is the number of items at the questionnaire , \(\sigma_X^2\) is the variance of the observed total test scores for the current sample of users, and \(\sigma_{X_i}^2\) is the variance of component i for the current sample of users. It is commonly used as a measure of the internal consistency or reliability of a psychometric test score for a sample of examinees [37]. In this study, Alpha is used to measure the instrument reliability; Alpha was calculated for each factor depending on its number of items at the same time it was calculated for as total number of items, the values of Alpha is shown below.

<table>
<thead>
<tr>
<th>No</th>
<th>Factor</th>
<th>Items at Each Factor</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Distance</td>
<td>6</td>
<td>0.61</td>
</tr>
<tr>
<td>2</td>
<td>Individualism</td>
<td>4</td>
<td>0.64</td>
</tr>
<tr>
<td>3</td>
<td>Masculinity</td>
<td>5</td>
<td>0.63</td>
</tr>
<tr>
<td>4</td>
<td>Uncertainty Avoidance</td>
<td>4</td>
<td>0.61</td>
</tr>
<tr>
<td>5</td>
<td>Long Term Orientation</td>
<td>6</td>
<td>0.60</td>
</tr>
<tr>
<td>6</td>
<td>Usefulness</td>
<td>5</td>
<td>0.82</td>
</tr>
<tr>
<td>7</td>
<td>Ease of Use</td>
<td>6</td>
<td>0.87</td>
</tr>
<tr>
<td>8</td>
<td>Web Pages</td>
<td>4</td>
<td>0.79</td>
</tr>
</tbody>
</table>
From the above table, we notice that the reliability coefficients for the study factors ranged from 0.60 – 0.90 and this coefficients consider acceptable, because it is equal to 0.60 and none of it less than 0.60

5.4: STUDY MODEL TESTING

We conducted path analysis using the AMOS program, it is a fully integrated software package used in the context of aviation maintenance, repair and operations that helps to manage the maintenance, engineering and logistics requirements of modern situations. AMOS is distributed and developed by Swiss Aviation Software Ltd. AMOS is used in this study to test the study model. The path analysis allows the validation of the study model in testing how well hypothesized model fits the data by using a range of fit indices specifying the approximate fit of a model to data. Pearson Chi square to Degree of Freedom (DF) ratio (\( \chi^2/DF \)) and Comparative Fit Index (CFI) [37] were utilized to estimate overall and incremental model fit of the competing models. A significant \( \chi^2 \) value suggests that the data depart significantly from the model, and a CFI of less than 0.9 indicates an inadequate fit of the model. We further employed the Root Mean Square Approximation (RMSA) [38], where a RMSA of 0.05 or below indicates an acceptable approximate fit of the model. To accept the model, we used [39] criteria in that an RMSA value of .06 or less, and a CFI value of .95 or more, together indicates adequate model fit.

After data collection and conducting the path analysis to test the study model, the chi-square was (5.11) with DF= 2 and significant level 0.088, which indicted that model of this study fit with data, another fitness indices was calculated such as CFI which its value was 0.97, which show a good value for model fitness. In addition, CFI value was 0.97, which show good value for model fitness; in addtion to that, RMSA value was 0.13, which is more than accepted value 0.05 as mention by [38]. As overall conclusion the goodness of fitness indices shows that the model data fit with the model that suggested by researcher, which shown in figure below:

5.5: HYPOTHESES TESTING

In order to test the hypotheses Pearson product-moment correlation coefficient (PMCC), it is a measure of the correlation between two variables and denoted by (R), giving a value between +1 and −1 inclusive. It is widely used in the sciences as a measure of the strength of linear dependence between two variables. It is calculated between the study factors to answer the research questions as the following:

H1: There is relation between cultural dimensions and user interface acceptance with ease of use and usefulness.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Ease of Use</th>
<th>Usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Distance</td>
<td>0.25</td>
<td>0.21</td>
</tr>
<tr>
<td>Individualism</td>
<td>0.28</td>
<td>0.33</td>
</tr>
<tr>
<td>Masculinity</td>
<td>0.01</td>
<td>0.13</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>0.19</td>
<td>0.12</td>
</tr>
<tr>
<td>Time Orientation</td>
<td>0.30</td>
<td>0.25</td>
</tr>
</tbody>
</table>

As shown in the above table the correlation between cultural dimensions and user interface acceptance with ease of use were significant correlation between cultural dimensions and user interface acceptance for dimensions (Power Distance, Individualism, Uncertainty, and Long Term Orientation) the Correlation Coefficients R were (0.25, 0.28, 0.19 and 0.30) respectively, correlation between cultural dimensions and user interface acceptance with usefulness ,and all of them were significant at level less than 0.05. As to factor Masculinity, and Uncertainty they were not statically significant.
H2: There is significant relation between user interface components and user interface acceptance with ease of use and usefulness.

<table>
<thead>
<tr>
<th>Component</th>
<th>Ease of Use</th>
<th>Usefulness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>Sig</td>
</tr>
<tr>
<td>Metaphor</td>
<td>0.38</td>
<td>0.00</td>
</tr>
<tr>
<td>Mental</td>
<td>0.34</td>
<td>0.00</td>
</tr>
<tr>
<td>Navigation</td>
<td>0.31</td>
<td>0.00</td>
</tr>
<tr>
<td>Interaction</td>
<td>0.35</td>
<td>0.00</td>
</tr>
<tr>
<td>Appearance</td>
<td>0.29</td>
<td>0.00</td>
</tr>
</tbody>
</table>

As shown in the above table, the correlation between cultural dimensions and user interface components with ease of use, were significant correlation between interface components dimensions (Metaphor, Mental, Navigation, Interaction and Appearance ) with ease of use the correlation Coefficients were (0.38, 0.34, 0.31, 0.350 and 0.29) respectively, and 31 the correlation between cultural dimensions and user interface components with usefulness were significant correlation Coefficients were (0.41, 0.30, 0.34, 0.36 and 0.24) respectively , and all of them were significant at level less than 0.05.

Users believe that ease of use and usefulness of the website is increasing by enhancing the use of user interface components as the following:

1. Using expressive, familiar, common, understandable metaphors and icons because it give understanding to the task.
2. Organizing data on website and let it to be structured which is help to understand content.
3. Facilitate the website navigation by, using alerts, messages, guidelines, sites maps, leading wizard, in addition to order the web pages make motion between them free and easy.
4. Find others feedbacks from users that they believe, it will increase the interaction with the website, because they believe to some extent that forms, alerts, messages , guidelines, sites maps, leading wizard, chats , and email box increase the interaction with website.
5. Support the website with different choices for colors, and font’s styles which are increase the users’ acceptance.

H3: There is significant relation between user interface acceptance with usefulness, ease of use and website usability

As shown in the above table , the correlation between user usefulness and website usability was (0.93) with significant level less than 0.05 we means there is significant relation between usefulness and website usability, and there is a strong relation between user interface acceptance (usefulness, and ease of use) and website usability, in general usability researches attempt to ensure the degree of users acceptance toward their systems they used, ease of use and usefulness are used to achieve this goal, users believes that ease of use, and usefulness are important parts, which increase and affect website usability.

H4: There is significant relation between cultural dimensions and user interface components.

As we notice from the coming results, there is a relation between all culture dimensions and user interface components, users’ culture characteristics affect the website design, and this effect appears through metaphors, icons, organizing website content, navigation way, interaction with the website, appearance of the website by choosing the colours, and fonts’ styles, the expert websites analysis emphasis this relation , results shows that two of three important websites used in Jordan are reflect users’ culture characteristics (UJ, and GAM) as we mentioned at Jordanian Websites’ Analysis section .
H5: There is a relation between user interface acceptances attributes (usefulness and ease of use)

<table>
<thead>
<tr>
<th>Interaction</th>
<th>0.30</th>
<th>0.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>0.22</td>
<td>0.01</td>
</tr>
</tbody>
</table>

As shown in the above table, there is a strong relation between usefulness and ease of use, while both attributes are important to determine the degree of user’s interface acceptance.

H6: There are no significant differences in website usability due to age, and educational level.

<table>
<thead>
<tr>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Pages</td>
<td>2.992</td>
<td>2.036</td>
</tr>
<tr>
<td>Terminology</td>
<td>12.496</td>
<td>1.168</td>
</tr>
<tr>
<td>Learning</td>
<td>15.256</td>
<td>1.188</td>
</tr>
<tr>
<td>Website</td>
<td>5.490</td>
<td>1.035</td>
</tr>
</tbody>
</table>

The goal of this test is to know if there are differences in website usability (Web Pages, Terminology and Website Information, Learning, and Website Capabilities) due to demographical users’ characteristics (age, and educational level). In order to test the hypotheses one way Analysis Of Variance (ANOVA) was used. ANOVA is a calculation procedure that compares means of two or more groups in order to determine whether the differences among the means are statistically significant or could occur by chance [40]. It compares the how far apart the means of all groups are with how much variation there is within each group. A large value of F indicates that there is greater difference between groups than within groups.

Form the above table, we notice that the F value were not significant for all web perception factors which the significant level were more than 0.05 so that there are no significant differences in the web perception due to age and educational level, so age and educational level of users do not affect website usability.

5.6 WEBSITE DESIGNERS’ AND DEVELOPERS’ RESULTS

As shown in the above table, most of website designers for the three websites do not follow a specific methodology in design and they do not consider the cultural markers for the target audience of the website, or considering their needs. Others, foreign and local websites, inspire them. They have directives to change website appearance, which relate to structure rather than colors, and visual representations.

It is noticed that organization board is the responsibly for website content, rather than designers. In addition to that, the organization board is looking for new redesigned website to be technologically more sophisticated than the old one.

6. CONCLUSION

Unless a website meets the needs of the intended users, it will not meet the needs of the organization providing the website. Website development should be user-centered, evaluating the evolving design against user requirements. The design
should take account of established guidelines for web writing style, navigation, page design, and website structure. It is important to understand the culture of users as one of the new HCI fields, users from different cultures were found not only to have different preferences about interface design, but also to use different criteria of acceptance [15]. Culturability is the new definition for the merging of culture models and usability, it defined as usability in presence of influential cultural factors [22], the term website localization exploits a user-oriented design process and aims at developing specific interfaces to meet the needs of particular local markets and users.

REFERENCES:


Design and Global Development: Held as Part of HCI International


