

A Usability Analysis of Mobile Apps Developed by Website Builder Tools

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ABSTRACT: *The unprecedented advancement in the use of handheld mobile devices provides users convenience and safety in urgent situations. In this paper, the objective was to compare the usability of mobile apps developed by mobile builder tools with a mobile app version of user interface guidelines design developed following mobile user interface context of use guidelines. The comparison was based on the user experience, thereby assessing whether the process of converting well-designed websites into mobile app versions can be automated. For the purpose of the research, three mobile versions were developed. All three apps were designed by an expert user with a computer science background but with no design experience in designing mobile apps. One of the three versions was designed using user interface guidelines that take into account the context of use, while the other two versions were developed using two different mobile builder tools. The usability testing was conducted on 15 users. The users were divided into three groups of five users. Each group tested the three mobile apps in a different order. Each user performed nine tasks for each version, and the time was calculated using a stop watch. Each user evaluated the tasks' level of difficulty for each mobile app and each mobile app's interface through posttask questionnaires and posttest interface evaluations after completing all the tasks for each mobile app version. The results uncovered that interactions using the User Interface (UI) guidelines-proposed version of the Presidency of Meteorology and Environment (PME) website were overall very easy, yielding a better user experience in that users spent the least amount of time performing tasks in this version than the other two mobile versions.*

Keywords: Mobile Web Builder Tools, Usability

I. INTRODUCTION

The last 10 years have seen unprecedented advancement in the use of handheld mobile devices. The use of the mobile device as a generic tool in everyday life increased due to major technological developments that have enabled more complicated functions and services to be integrated. The always-on nature of mobile phones, the ability to communicate anytime and from anywhere, and the continuously increasing support features have made these devices more convenient and able to provide critical information in urgent situations. Smartphones have blurred the lines between phones and personal computers by expanding in functionality from being merely a device that dials numbers to being a personal digital assistant [1]. Smartphones today have increased computing power, enhanced functionality, a larger screen size with higher resolution, and more mobile applications [1]. The success of Web applications depends on how well the user interface is designed [2]; however, designing a good user interface is a very challenging process [2]. There are three principles that need to be followed in designing mobile user interfaces [3]:

- Allowing users to be in control of the interface
- Reducing users' memory load
- Making the user interface consistent

Current mobile computing devices such as mobile phones share a common problem: attempting to offer users powerful computing services and resources through small interfaces. Such limitations include tiny visual displays and limited input techniques [4] and being used by different types of people who have different goals for operating such interactive products. As a result, human-computer interaction (HCI), which is the study of the

interaction between people and computers, has become much more important in recent years [5]. The main concern of HCI designers is how to design interactive mobile interfaces for high usability, which means that the resulting interfaces are easy to use, efficient for the task, ensure safety, and lead to a correct execution of the task [5]. Usable and efficient interaction with a computing device in turn translates into higher productivity [5].

Usability, which is the ability of users to achieve specified goals in a dynamic environment, with effectiveness, efficiency, and satisfaction [1], is one of the main concerns in mobile applications using small screens. The small display size of mobile devices limits their ability to transmit information effectively in comparison to desktop computers, regardless of the increasing quality of the displays [6]. Mobile devices present Humna Computer Interaction (HCI) designers with five main challenges [7]: (a) designing for mobility: As users become more mobile, they are likely to have a far-from-ideal working environment, and this environment will change significantly as the user moves; (b) designing for a widespread population: Users do not normally have any formal training on their technology devices and consider them as devices to be used rather than computers to be maintained; (c) designing for limited input/output facilities: Screen sizes will improve in resolution but will always be small due to the need for portability. In addition, keyboards are limited in size and the number of keys, and other pointing devices are often hard to use when on the move; (d) designing for incomplete and varying context information: Through various sensors and networks, mobile devices can be made aware of their context; this provides new information to the systems, but it causes problems with implying task and user-level activities from sensor information and unreliable sensor coverage. For example, work on position-aware tourism guides has highlighted many of these problems; and (e) designing for users' multitasking at levels unfamiliar to most desktop users: One of the keys to successful desktop design with mobile devices is multitasking and support for task interruption. The interruption in mobile devices is likely to be much higher given the environments in which the devices are used.

The user interface designed for a mobile device is the main concern in designing applications [3]. While there has been success in developing rules to guide the design and implementation of interfaces for desktop machines and their applications, the design of mobile device interfaces is still relatively unexplored and unsupported [7]. Many public and private entities design mobile app versions of their websites without basing their design decisions on powerful design approaches because there is a lack of research concerned with establishing guidelines, practices, and recommendations for designing usable mobile apps [9].

Content adaptation is a key part of the process of designing applications because content presentation needs to be adapted to meet both user preferences and the different capabilities and limitations of mobile devices and wireless technologies that are used by different users [8].

The mobile Web needs to be simpler than its desktop counterpart and more task based to get the job done [9]. Unlike desktops, the portable nature of mobile devices means that the context of use may change as the user traverses different conditions of use while performing the same task [9]. Designing quality mobile Web applications has its own set of complications, including [10] the fact that (a) mobile user interfaces are a new pattern for user interaction with smaller form factors, touch interfaces, acceleration sensing, orientation awareness, pervasive animation, and simulations of physical behavior; and (b) designers must consider more variables compared to designing a traditional desktop Web application because a user interface should be able to run on any device, regardless of its size, form factor, or feature set.

Noncommercial websites such as those of municipalities or local governments usually have small financial budgets to provide basic, daily services for citizens. Citizens expect to find most government services provided on e-government websites. Yet, with a lack of funding and expertise in website design and development, these governments often fail to provide an efficient and good user experience for their e-government websites. This problem has been compounded since most e-services are migrating to mobile and handheld devices. Thus, governments, with all their limitations, tend to find the easiest solution to provide their citizens with mobile versions of their websites, which is usually accomplished by using free and easy-to-use mobile Web builder tools to develop mobile versions of their e-government websites.

There are many types of mobile Web builder tools that develop mobile versions of websites easily. Mobile Web builders are useful tools for people without programming knowledge and are especially helpful for developing mobile government websites. Examples of such tools are Mobify, developed by Mobify Company; Mofuse, developed by Mofuse Company; and Dudamobile, developed by Dudamobile Company. In this paper, the objective was to compare the usability of mobile apps developed by mobile builder tools with a user interface guidelines design mobile app developed following the mobile user interface context of use guidelines collected and evaluated by Alhraigi (2014). The comparison was based on the user experience, thereby assessing whether converting well-designed websites into well-designed mobile app versions could be automated.

1. MOBILE WEB BUILDER TOOLS

Mobile Web builders are online tools advertised to develop professional-looking websites to be hosted online instantly. Online website builders are advertised as an easy way to get a professional-looking website for businesses and companies without PHP or HTML [11] programming skills. This allows users to create decent apps with minimum effort and without the knowledge of programming, Web designing, or the associated tools [11].

There are many types of mobile Web builder tools that develop mobile versions of websites easily. Examples of such tools are Mobify, Mofuse, and Dudamobile, all named after the companies that developed them. Many of the mobile Web builder tools give website developers templates to choose from that can match the developers' mobile Web purpose. The claimed advantages of using drag-and-drop design mobile Web builder tools is the reduction of development time and cost, the abundance of free graphics and stock photos, and content management.

II. CATEGORIES OF MOBILE WEB BUILDER TOOLS

During a comparative analysis of mobile builder tools, more than six different mobile builder tools were tested. The target included free and simple user interface builder tools. According to Al-Harigy (2014), mobile builder tools can be divided into three categories.

Category one. This group allows the user to choose certain interface widgets, navigation elements, and the content from the desktop website by opening it to the user so he/she can choose an item from the desktop website and then add it directly to the mobile version. As an example of this category is Mobify, which allows the developer to edit the mobile site version by launching the studio and using the tools available. However, since this tool does not support the Arabic language nor does it support browsers except Internet Explorer, and because it is difficult to use, especially for novices, it was eliminated and therefore not examined.

Category two. This group allows the user to build a mobile version by choosing the style, certain interface widgets, colors, buttons, and content without using the desktop version. This group gives the developer the ability to build the mobile version while adding HTML code to manipulate the content. An example of this category is Mofuse, which has a large set of features for building and managing the developer's mobile site. It offers different building tools and widgets that can help the developer edit the content and the design of the mobile site version. The developer can add or edit elements in the mobile site and choose the site layout and the colors of the interface elements. It also offers different types of elements such as contents, links, images, and maps to the mobile site pages.

Category three. This group can convert a desktop website to a mobile version without changing the content or the links. It keeps all the website components as they are, and then it gives the user the ability to change the design by adding or removing anything, such as pages or widgets. An example of this category is Dudamobile. Dudamobile creates a mobile version of the desktop website by taking everything from the desktop website and inserting it directly into the mobile site version. The developer can then publish the site directly if editing is not needed. However, the program also allows the developer to edit the pages of the developed mobile site by offering some layouts and widgets.

III. THE DEVELOPMENT OF THE THREE VERSIONS OF PME

This research was concerned with converting an e-government website that citizens might need to use in an emergency situation into a mobile version. The assumption was that the civil defense website has the most important and updated information citizens can use if they are facing a natural disaster. In a search for sample government websites, we found that most of the important services for citizens were not applicable or not familiar to Saudi citizens, on whom this research was to be conducted and by whom the mobile app versions were to be tested, so the Presidency of Meteorology and Environment (PME) website was chosen. PME is an example of a citizen-centered e-service website that can be used in an emergency to provide information that users may need in critical situations.

The PME desktop website was chosen for the following reasons: (a) It did not have a mobile version; (b) it contains more current, updated information compared to other e-government websites; (c) it has an early warning system and weather forecast features that can be used for emergency situations, such as dangerous sand storms or flooding; and (d) it contains services that could be used by the citizens on the go and in emergencies, including weather forecasts, early warnings, and emergency calls.

Three mobile apps were developed for the PME. All three apps were designed by an expert user with a computer science background with no design experience in designing a mobile app. One of them was developed using an HTML5 programming code based on the mobile guidelines by Al-Harigy (2014). The other two versions were developed using two different mobile builder tools: Mofuse and Dudamobile. The three mobile

versions were developed in 2014. The design on the interface was drawn in a diagram to determine the place for each part of the interface according to design decisions such as the place of the logo and the page contents. The mobile guidelines by Al-Harigy (2014) were collected from different sources to create a group of user interface context of use mobile guidelines. This collection process was challenging because the literature was lacking in terms of research on designing mobile apps that takes into account the context of use. After going through a process of review and filtration from all the guidelines collected, a set of 59 guidelines in different categories, corresponding to the most important requirements, was identified.

a. Version 1 of PME

This version was developed using the Mofuse builder tool. Fig. 1 shows the interface of this version.



Figure 1: The interface of the mobile app developed using Mofuse.

The developer tried to follow the mobile guidelines by Al-Harigy (2014) as the Mofuse builder tool allowed, but there were some obstacles and constraints in the builder tool that forced the developer to ignore some guidelines. The disadvantages of this tool were as follow: (a) the user interface did not include a link to the Arabic version of the website; (b) each link on the page that opens another page on the website had to be a button and couldn't be used as a hyperlink, which caused the page to be full of buttons; (c) the form didn't have a reset button to clear the text boxes to allow the user to fill the form in again; (d) the user interface did not provide a functional bilingual website because it did not create an Arabic version of the mobile website; and (e) it took a long time to load the resulting mobile version.

b. Version 2 of PME

This version was developed using the Dudamobile builder tool. Fig. 2 shows the interface of this version.



Figure 2: The interface of the mobile app developed using Dudamobile.

The developer also tried to follow the mobile guidelines in Al-Harigy (2014) as the Dudamobile builder tool allowed but ignored the guidelines when they could not be applied. The disadvantages of this tool are as follow: (a) It takes all the buttons, links, and content from the desktop website and puts them into a mobile version as they are; (b) it does not create home or back links at the bottom of the website pages; (c) if an image is too large on the desktop website, it doesn't customize it to make it compatible with the mobile version of the site; (d) it didn't take a long time to convert the desktop site to a mobile version, but the result was not compatible with the context of mobile devices because it resulted in the user having to scroll through more than three screens, and thus, the user would require a long time to find the information he/she needs, especially since the desktop website contained many functions and services; and (e) it did not create breadcrumbs to let users know where they are while browsing the website.

c. Version 3 of PME

This version was designed using HTML5 code. The software used to develop the user interface guidelines-proposed version for the PME website was Adobe Dreamweaver CS6. The user interface guidelines-proposed version was built to be compatible with iOS iPhone5 mobile devices. Although it was designed for iOS iPhone5, it could also be used for Android mobile devices. The design decisions were made according to the user interface context of use mobile guidelines in Al-Harigy (2014) and their related context of use.

The interface of the UI guidelines-proposed version that was developed for the PME website had the following features: (a) It was very simple because the more attention an interface requires, the more difficult it would be for the mobile user to maintain awareness of the surrounding environment [12]. (b) It contained only the important information citizens would need in an urgent situation while the user was moving. (c) It had four buttons that presented the most important services for citizens. (d) It included the copyright information of the website. (e) It included a link to the Arabic version of the website and a link to the full site and vice versa. (f) It offered two sizes for the font: normal (default size) and large.

The main interface layout of the UI guidelines-proposed version of the PME website had the following services on the homepage, as shown in (Fig. 3):

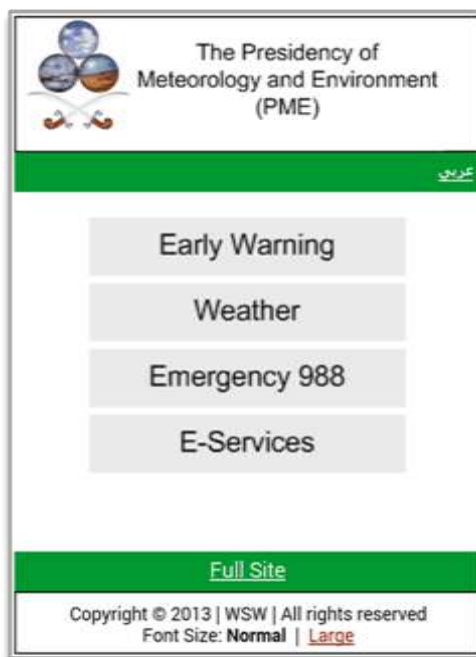


Figure 3: Homepage of the UI guidelines-proposed version of the PME website.

Early warnings. It contained information about the areas that have been or could be exposed to natural disasters. In the full site, this service opens a map of Saudi Arabia and identifies warning level areas on the map in four colors, green, yellow, orange, and red, which refer to disclaimer regions, alert regions, advanced alert regions and warning regions, respectively. Then, a user can click on a colored circle on the map to view an explanation of the area's situation.

In the mobile version, the image of the map was eliminated, dividing the region into four categories: (a) Disclaimer regions display information about the regions that may be exposed to a natural disaster; (b) alert regions refer to the possibility of an area being affected by the climate phenomenon of air; (c) advanced alert regions refer to the possible impact of the phenomenon of air and the necessity to take caution; and (d) warning regions warn of severe meteorological phenomena or floods and the need to take caution and seek civil defense instructions, guidance, and directives.

Weather. It also contained information about the weather forecast, which was divided into three links: today's weather, tomorrow's weather, and the 5-day weather;

Emergency 988. It also contained the number for emergency services.

E-Services. Finally, it contained three links that could be used to send notifications about cases of pollution incidents. These links are as follow: (a) Notification by email sends an email to notify authorities about cases of pollution incidents; (b) notification by phone provides numbers to call to notify authorities of pollution incidents; and (c) notification by SMS sends SMS messages to notify authorities about cases of pollution, which seems to be not yet provided by the PME but is stated on its website as "coming soon."

The pages of the mobile app were designed with specific properties according to the user interface context of use guidelines and the context of use addressed by Al-Nuaim and Al-Harigy (2015). During the prototype design, the following user interface design decisions were made:

- The logo and the website name were included on all the pages and in the same place to address the "where am I" navigation guideline.
- The ability to change the language to Arabic was included on the homepage.
- The main navigation menu was on the homepage only and was not repeated on every page.
- A link to the full site was on the homepage.
- The copyrights of the website were included on every page of the UI guidelines-proposed version.
- Each page contained breadcrumbs to allow users to keep track of their locations within the website to address the "where I have been" navigation guideline.
- Links to go back or go home were provided on all the pages.
- The page had a resolution of 320 X 480, which is the size of the iPhone5 screen.

- The menu buttons on the homepage were arranged vertically from the most important button for users, and all of them were visible at once. The vertical arrangement of the elements in a mobile device is more suitable because the height of the mobile device screen is bigger than the width, so this prevents horizontal scrolling, which is generally not preferred by users.
- The color grey was chosen for the buttons on the homepage with a black font color to ensure the contrast and minimize the number of colors used on the icons.
- The maximum number of page depth was less than three pages to minimize the number of clicks, keeping the number of levels in a hierarchical structure few in number.
- The interface was optimized for the portrait presentation format.
- The font size was 14, making the text readable for users.
- The ability to enlarge the font size to 16 was included to ensure readability in bad conditions.
- Bold font was used for the headings or subheadings only, while the italic style was not used at all.
- The font color was black on a white background to be sure there was a good contrast between the two and to limit the number of colors used.
- Underlining was used for links only and visited links were indicated with a red color.
- A drop-down menu was used on the page for the 5-day forecast to select the city instead of using a table with scrolling, as done on the pages for today's and tomorrow's weather forecast, in order to balance the choices between scrolling and pages.
- The fonts were from the sans-serif family, including Arial and Helvetica. Arial was chosen because it is supported by mobile devices and has less character spacing, which makes it more suitable for the limited screen size of mobile devices.
- Images were not used, except for the logo and the main menu on the homepage, to minimize the loading time required for the website on mobile devices.
- Scrolling was used instead of pagination and the maximum scrolling was less than three screens. Paging is normally used in presenting content in steps, but in this case, the user needed to get the information by making the least number of clicks.
- Only vertical scrolling was used.
- The place of the links, logos, navigation, and content were consistent with the UI guidelines-proposed version to minimize the time needed by the user to find the information. This was also applied to the font size and color.
- The built-in function for making 988 emergency calls by clicking a button was used on the homepage.

IV. TESTING

The three mobile app versions of the PME website were tested. According to Al-Nuaim and Al-Harigy (2015), there are many contexts of use, and thus, the related user interface context of use guidelines must take this into account when designing mobile apps.

According to [13], there are five parameters for usability, which were covered in this research: (a) *Efficiency of use* means that all the users can achieve the goal and complete the tasks accurately in an period of time close to or less than the expert's time; (b) *Subjective satisfaction* refers to the satisfaction and positive attitudes of users; (c) *Learnability* suggests that the UI guidelines proposed-version is easy to learn for first-time users and they can rapidly start working with it; (d) *Memorability* means that the UI guidelines-proposed version is easy to remember for the casual user; and, finally, (e) *A low error rate* requires that the UI guidelines-proposed version has a limited number of errors.

Usability tests for the three versions of the PME's mobile app were conducted with 15 participants who were local Jeddah citizens, both male and female, whose ages ranged from 20 to 40 years of age and who had different educational backgrounds and different mobile device operating systems.

The participants were divided into three groups, and the usability testing was conducted in each group. All users in every group examined and evaluated the three apps, but each group had a different app order to avoid user fatigue and familiarity bias. The group testing orders were as follow: (a) *Group one* examined the apps in the following order: UI guidelines-proposed version, Mofuse version, Dudamobile version. (b) *Group two* examined the apps in the following order: Mofuse version, Dudamobile version, UI guidelines-proposed version. (c) *Group three* examined the apps in following order: Dudamobile version, UI guidelines-proposed version, Mofuse version.

Each participant tested the three mobile apps by performing nine tasks for each app, and the time for each task was calculated using a stopwatch. Each participant was asked to use his/her phone device in the testing by opening the link to the three versions from his/her phone. They received the links for the three versions as an

SMS message. Another expert user with a background in computer science performed the tasks, and the time, measured in seconds, was calculated for each task using a stopwatch. This time was used as the base time or as a criterion for comparison between the three versions. The usability test tasks were typical tasks that simulated information or broadcasts needed by users in urgent situations while they were on the move in real time. The tasks included finding all of the cities that had early warnings and the warnings' durations, as well as viewing descriptions of the early warning situation in a city, making emergency calls, sending notifications about incidents, locating the weather forecast for a city, and customizing the experience.

Two methods were used for evaluating the mobile apps' usability: performance measures and subjective measures. Performance measures were done by giving a set of nine tasks to all 15 users to examine the three mobile app versions, and the times on each task were calculated for each user for each app version. Subjective evaluations were conducted after users finished the tasks for each mobile version. They evaluated the tasks' level of difficulty for each mobile app and the mobile apps' interfaces through posttask questionnaires and posttest interface evaluations after completing all the tasks for each mobile app version. Users performed the testing while moving in different environmental conditions (e.g., lighting, heat, indoors, outdoors, etc.), and they were asked to use one hand while performing the tasks in order to test the applicability of the proposed UI guidelines and to simulate the different contexts of use while using each mobile app. All of the tasks were read to the users by the observer of the test because they were walking while performing the tasks.

V. RESULTS

The results of the performance evaluation show that the UI guidelines-proposed version, which was designed using the user interface context of use mobile guidelines by Al-Harigy (2014), had the least usage time compared to the other two mobile app versions. The calculated times for the UI guidelines-proposed version were the lowest for all the tasks performed for all the users. Statistical analysis done on the calculated times for all three versions show there were statistically significant differences between the users' performance on the UI guidelines-proposed version of the PME website and the other two versions, which were developed using mobile website builder tools, even when the order of testing the three versions was interchanged. Although some of the older users were not familiar with the use of mobile devices and mobile apps, the average time on tasks for them on the UI guidelines-proposed version was less than the other two versions, and their times were close to the time on tasks calculated for the expert. Some other users even completed tasks in less time than the expert. Even though the UI guidelines-proposed version was the last version to be evaluated in group two, where the users suffered from fatigue, as they had to perform nine tasks for each mobile version and answer two questionnaires after doing, it still had the least usage time for most tasks. The performance evaluation addressed four of Nielsen's five usability parameters: learnability, memorability, efficiency, and low error rate.

The following figure (Fig. 4) shows the overall time average for the three mobile versions.

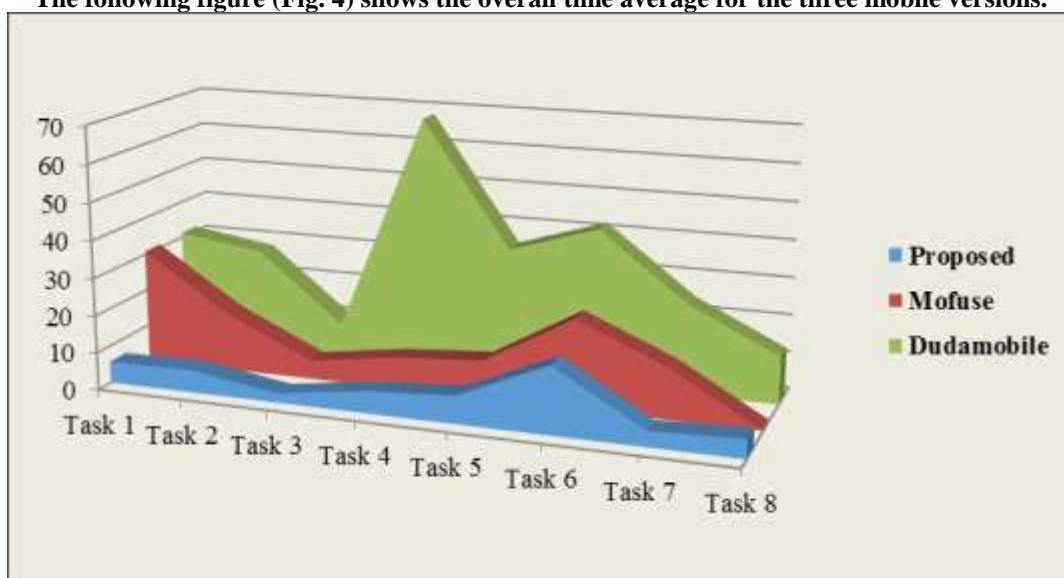


Figure 4: Overall average time for the three mobile versions.

Subjective evaluations were conducted after the users finished the tasks for each mobile app version. The mobile apps' interfaces were evaluated by giving each user a posttask questionnaire and a posttest interface evaluation after completing all the tasks for each app version. The posttask questionnaire was for rating each task

on each app version on ease of use on a scale from 1 to 5 (1 = very easy). It contained 47 questions that were divided into five sections to rate the UI guidelines-proposed version in terms of the text legibility, effect on the content readability, clarity, ease of use, aesthetics, and overall satisfaction. All of the questions were close ended. Each section had different rating scales according to the type of response appropriate for each item. According to the post-task questionnaire, 100% (15 users) rated the tasks on the UI guidelines-proposed version as very easy, and based on the users' comments, the UI guidelines-proposed version was the most usable website compared to the other websites. On the Mofuse version, all the users rated only four tasks out of nine as very easy. However, their ratings for the Dudamobile version were different, and some of the tasks on Dudamobile were rated as difficult or even very difficult. Statistical analysis of the subjective evaluations showed the satisfaction and positive attitude of the users toward the UI guidelines-proposed version compared to the Mofuse and Dudamobile versions. Also, the UI guidelines-proposed version interface was rated by the users as the most preferred website among the three websites in terms of the website content readability, the effect of the interface elements on the text legibility and clarity, and the interface elements' ease of use. The subjective evaluations addressed the fifth parameter of Nielsen's five usability parameters, which is satisfaction.

Overall, the results of the performance and subjective measurements show the satisfaction and positive attitudes of the users toward the UI guidelines-proposed version of the PME website. The results uncovered that interactions with the UI guidelines-proposed version of the PME website were overall very easy, yielding a better user experience, whereby users spent the least amount of time performing tasks. Thus, the UI-proposed guidelines for designing a context-aware mobile app user interface were useful for producing a good user experience using the PME mobile app.

VI. CONCLUSION

A website designed for the desktop is not appropriate to be used on the small screen of a mobile device, which prevents a mobile user in a critical situation from accessing important information from such a website. Due to the intensive use of mobile devices and variable contexts of use, a mobile website user interface with a good user experience is of urgent need.

Based on the importance of designing a context-aware government mobile app, and due to the lack of research in this field, in this paper we explored whether designing government websites using the user interface context of use mobile guidelines in Al-Harigy (2014) would produce a better user experience than the websites developed using mobile builder tools.

Governments must not neglect developing their e-service websites required in real time by their citizens, especially for services needed in urgent situations that cannot be postponed nor delayed. These websites are very important for citizens because any error in design could lead to not finding the information in an appropriate amount of time, which may result in harm or damage to lives and property. The design and development of government websites must follow user-centered design approaches and methodologies, especially when they relate to human life. Due to these reasons, the human element in designing user interfaces, be it for a desktop or mobile device, cannot be ignored or automated.

From the statistical analysis conducted on the calculated times for each task for the three apps, we found that the UI guidelines-proposed version had the least usage time compared to the two mobile apps of the PME website built using mobile builder tools.

After using the Web builder tools to build mobile app versions of the PME desktop website, the following conclusions were drawn. First, mobile Web builder tools from categories one and three are not suitable for building a mobile site that has limited amount of information because these tools take everything existing in a desktop version and put them as they are in the mobile version unless the developer changes them manually. Additionally, mobile Web builder tools from category two are more suitable than categories one and three for developing a website that can be appropriately opened with mobile devices because they give the user the ability to build the mobile version as needed, though they do contain some obstacles, such as the limitations of the templates used for the interface design. Finally, mobile Web builder tools are more appropriate for business websites because they have layouts and templates categorized by the purpose of the mobile site.

REFERENCES

- [1]. M. Shitkova, J. Holler, T. Heide, N. Clever and J. Becker, "Towards Usability Guidelines for Mobile Websites and Applications," in *Proceedings of the 12th International Conference on Wirtschaftsinformatik*, Osnabrück, Germany, 2015.
- [2]. S. M. Day, "60 User Interface Design Tools A Web Designer Must Have," 2013.
- [3]. I. Zamzami and M. Mahmud, "Mobile Interface for m-Government Services: A Framework for Information Quality Evaluation," *International Journal of Scientific & Engineering Research*, vol. Volume 3, no. Issue 8, pp. 1-5, 2012.

- [4]. K.-Y. Huang, "Challenges in Human-Computer Interaction Design for Mobile Devices," in *Proceedings of the World Congress on Engineering and Computer Science WCECS 2009*, San Francisco, USA, 2009.
- [5]. G. J. Kim, "Human-Computer Interaction, Fundamentals and Practice," Taylor & Francis Group, LLC, USA, 2015.
- [6]. S. Shrestha, "Mobile Web Browsing: Usability Study," in *Mobility '07 Proceedings of the 4th international conference on mobile technology, applications, and systems and the 1st international symposium on Computer human interaction in mobile technology*, Singapore, 2007.
- [7]. H. Al-Nuaim and L. Al-Harigy, "User Interface Context of Use Guidelines for Mobile Apps," *International Journal of Human Computer Interaction (IJHCI)*, vol. 6, no. 3, 2015.
- [8]. J. Gong and P. Tarasewich, "Guidelines for Handheld Mobile Device Interface Design," in *Proceedings of DSI 2004 Annual Meeting*, 2004.
- [9]. H. Al-Khalifa, "Development of Mobile Government Websites: A Functional Design Approach," in *Proceedings of the 13th International Conference on Information Integration and Web-based Applications and Services*, 2011.
- [10]. M. Kumar and O. P. Sinha, "M-Government – Mobile Technology for e-Government," in *International conference on e-government*, India, 2007.
- [11]. A. Tsiaousis and G. Giaglis, "Evaluating the Effects of the Environmental Context-of-Use on Mobile Website Usability," in *7th International Conference on Mobile Business*, Barcelona, 2008.
- [12]. J. L. Lentz, "User interface design for the mobile web - Best practices for designing applications for multiple device platforms - IBM," IBM Corporation, 2011.
- [13]. M. Evans, "Advantages And Disadvantages Of Using Online Website Builders And CMS," 21 January 2015. [Online]. Available: <http://tweakyourbiz.com/marketing/2015/01/21/advantages-disadvantages-using-online-website-builders-cms/>.
- [14]. L. Chittaro, "Distinctive Aspects of Mobile Interaction and their Implications for the Design of Multimodal Interfaces," *Journal on Multimodal User Interfaces*, vol. Volume 3, no. Issue 3, pp. 157-165, 2010.
- [15]. J. Nielsen, "Usability 101: Introduction to Usability," 2012.
- [16]. webcandy, "Advantages of a Custom Website versus using a Website Builder Tools," webcandy, 2013. [Online]. Available: <http://www.webcandy.ca/resources/web-candy-blogs/11-web-design-blogs/74-advantages-of-a-custom-website-versus-using-a-website-builder-tool>. [Accessed 15 April 2014].
- [17]. Y. Cui and V. Roto, "How People Use the Web on Mobile Devices," in *WWW '08 Proceedings of the 17th international conference on World Wide Web*, Beijing, China, 2008.
- [18]. M. Dunlop and S. Brewster, "The Challenge of Mobile Devices for Human Computer Interaction," *Personal and Ubiquitous Computing*, vol. Volume 6, no. Issue 4, pp. 235 - 236, 2002.
- [19]. K. B. Lee and R. Salman, "The Design and Development of Mobile Collaborative Learning Application Using Android," *Journal of Information Technology and Application in Education JITAE*, 2012.
- [20]. S.-Y. Hung, C.-M. Chang and S.-R. Kuo, "User acceptance of mobile e-government services: An empirical study," *Government Information Quarterly* 30, Elsevier, pp. 33-44, 2013.
- [21]. G. D. Abowd and A. K. Dey, "Towards a better understanding of context and context-awareness," in *proceeding of the 2000 conference on Human Factors Computing Systems*, Netherland, 2000.
- [22]. J. D. Davies, "Improving the Usability of Mobile Applications Through Context-Awareness," 2007.
- [23]. R. A. Yaiz, F. Selgert and F. d. Hartog, "On the Definition and Relevance of Context-Awareness in Personal Networks," in *Third Annual International Conference on Mobile and Ubiquitous Systems: Networking & Services*, pp. 1-6. IEEE, California, USA, 2006.
- [24]. J. Häkkinen, "Usability With Context-Aware Mobile Application, Case studies and design guidelines," Oulu, Finland, 2006.
- [25]. P. D. Costa, L. F. Pires, M. v. Sinderen and J. G. P. Filho, "Towards a Services Platform for Mobile Context-Aware Applications," in *IWUC*, 2004.
- [26]. A. Avila, "Application of a Context Model in Context-Aware Mobile Government Services," 2006.
- [27]. A. K. D. a. G. D. Abowd, "Towards a better understanding of context and context-awareness," in *proceeding of the 2000 conference on Human Factors Computing Systems*, Netherland, 2000.
- [28]. Z. Kutar, "Benefits of Using a Website Builder," 26 June 2013. [Online]. Available: <http://www.successful-blog.com/1/benefits-of-using-a-website-builder/>.