Possibilities for Cultural Customization of Mobile Communication Devices: The Case of Iranian Mobile Users

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Abstract. Global producers of mobile communication devices recognize the importance of cultural differences in the emerging markets; however it seems that the main concentration in both academic and business areas is on the large number of users with low incomes, while users from other classes of these societies are not studied well. In this study after set of integrated reviews on areas of Mass Customization, New Product Development and Mobile HCI an experiment was planned based on the unexplored aspects of users' culture and mobile communication devices relationships. A number of young educated users from middle class tested a new smart phone during its marketing process in Iran. They were sampled based on a global producer's marketing program. After a phase of self documentation, users selected two applications of the device for the usability tests and found culture related usability problems during the tests. Finally they proposed solutions in a participatory design process.

Keywords: Cultural Customization, Mobile HCI, New Product Development, Mass Customization, Smart Phones, Emerging Markets.

1 Introduction

Nowadays mobile communication devices are not only tools for mobile communication, but also means of mobile computation. In recent years global producers have concentrated on exploring markets in developing countries and their specifications. A reason for this attention is the saturation of mature markets in developed countries. Also the phenomenon of the 'next billion mobile users' in emerging markets (EMs) is an opportunity for producers of mobile communication devices [1]. Because of the cultural and economic heterogeneity of EMs and developing countries, cultural differences became an important issue in the user research of mobile devices. At the same time there is a similar interest among academics, especially in the Base of the Pyramid (BOP) concept which represents the low-income and high-population potential users in developing countries [2]. However in some developing countries, *middle class* users who usually live in urban areas are a major part of the mobile users. These users do not fit into the definition of BOP users as they have their own cultural specifications which

M. Kurosu (Ed.): Human Centered Design, HCII 2011, LNCS 6776, pp. 177–186, 2011.

influence their use of mobile devices. It seems that this group of users has received limited focus in culture related studies. Furthermore, according to an integrated review about culture and mobile HCI, there are interesting references about the influence of users' cultural background in both HCI and mobile HCI domains, but only few of those research studies suggest processes or models for culture oriented design [3]. This paper aims to contribute to the lack of academic literature discussing cultural aspects in product design, especially design of mobile communication devices, by presenting a case study focusing on Iranian users. Iran is a country with 68 percent urban population, ranked 19th in the world in terms of purchasing power parity [4]. These characteristics along with specific cultural, social and politic characteristics make Iran a suitable alternative for studying middle class mobile users in the context of cultural differences. The case study has been done in cooperation with the marketing department of a global producer of mobile communication devices, providing access to lead users of this product category.

The main research questions for this study were formulated as follows:

1. What may be, for global producers of mobile devices, the most important aspects to focus on in terms of market segments, products, product characteristics or components, when they want to consider cultural differences in Iran in the design of their products?
2. What are the opportunities for the cultural customization from the perspective of a global producer? Are there any specific needs, characteristics or problems that should be addressed in pursuing these opportunities?

Answers to the above questions are used as input for a more general discussion on cultural customization of mobile communication devices for middleclass users in Non-Western markets, considering the current marketing and manufacturing contexts.

2 Case Study Approach

In preparation of the case study, a literature review was done to explore current the understanding of how the cultural backgrounds of users, in particular those in emerging economies, may play a role in their use and appreciation of mobile communication devices such as mobile phone, digital assistants, etc. The review, presented in section 3, suggested unexplored areas of research, and provided as such input for the case study reported on in section 4. In the case study, a combination of semi-structured interviews, self-documentation and usability tests has been used, and where selected based on available resources and time. The case study was done in the context of the launch of a new smart phone in Iran by a global manufacturer, allowing for access to lead users and participation in user studies.

3 Literature Review

How culture may affect the design of mobile communication devices, and vice versa, can be viewed from different perspectives, such as Mass Customization, New Product Development (NPD), mobile Human Computer Interaction (HCI), and this section explains how elements from each perspective have been used for design the case study presented in this paper.

3.1 Mass Customization and Cultural Customization

The shift from Mass Production to Mass Customization shows that users' needs and desires are key parameters that not only shape the design of products, but also manufacturing systems [5]. Mass Customization has two main requirements for it to become relevant: modularity of the products' components and existence of a configuration system which can manage the production of customized products based on mass produced components [5]. Because of its specifications, the mobile communication device industry can be a good candidate for mass customization, as both of above characteristics of mass customization potentially exist in this industry [6]. In the context of finding solutions for considering users' cultural specifications in mass customization, Marcus has suggested a number of recommendations for individual components of user interface design of websites, according to the cultural context [7], using Hofstede's cultural model. This model represents cultures by five dimensions appointing a set of scores for these dimensions for different countries, allowing comparison of different countries by their scores [8]. Marcus' idea was later used in a more comprehensive model by Röse [9] for human machine systems. In both models, there is a concentration on individual components of the design. However in an experiment about cultural customization of mobile communication devices with a similar approach, results showed that it is not possible to predict users' final decisions about a product, only by measuring their tendencies towards individual product components [6]. Users usually look at the product as an independent entity, which is different from a simple combination of its components. That is why the case study presented in this paper focuses on qualitative research with an in-depth study on users.

3.2 New Product Development and Culture

A literature review of scientific articles was done by the authors, of which publication is forthcoming. The review suggests that consumer culture is often considered in the last phases of NPD, when a product is developed and is going to be launched in the market. Especially the diffusion process is a core part of these research studies. In the diffusion process a new product or idea is gradually accepted by the customers in a market [10]. Customers can be categorized as innovators, early adopters, early majority, late majority, and laggards according to the time that they adopt and accept a new product. Other studies have explored other phases of NPD such as the design and conceptualization of products. These studies suggest methods like concept testing [11] for understanding users with specific cultural backgrounds, instead of attribute based methods such as Conjoint Analysis or Quality Function Deployment (QFD). Base of the Pyramid (BOP) consumers are of great importance to studies which target EMs. These consumers usually cover a large population and have low income [2]. However, it seems that there is less attention to more elite consumer segments in these countries which usually have higher incomes but represent a smaller segment of the population [2]. This is one of the unexplored areas which is considered in the experimental phase of this research.

3.3 Mobile HCI and Culture

A similar review was done of articles in the mobile HCI domain [3], targeting HCI and mobile HCI articles that discuss users' cultural differences. The review suggested

that a large number of research studies relied on the Hofstede's cultural dimensions for defining culture, while there was just one example of defining specific dimensions and attributes for defining the culture in the context of consumer electronics [12].

In addition, a majority of the data which is used in case studies in these articles is collected using conventional research methods like questionnaires. Methods like user research through observation, verbal protocols, heuristics, cognitive walkthrough, and post-event protocols were only used in few studies. In short, the majority of articles reviewed did not propose a solution or model for culture oriented design. In addition there are few examples of user research in this area of research, although it is recognized that more samples may exist in the industry which are not published in academic literature. To go a step further, as it will be explained in the next section, the user research phase in this study includes observations and usability tests. The user studies were done in the context of an actual new product launch, providing opportunities to obtain a good understanding of the business and industry context.

3.4 Guidelines Resulted from the Theoretical Review

The literature research led to the following aspects that were considered in the design of the case study presented in this paper:

1. Mobile users in EMs who do not belong to the BOP were not a core part of the studies. This may however be an area for further research.
2. Understanding the architecture of products and their components is necessary for developing a customization process, however in order to consider users' cultural specifications relying on users' tendencies towards attribute and components is not enough. It is important to study the way that users interact and think about the product as a "whole" (not just a combination of its attributes).
3. Conducting user research in collaboration with industry is a relatively unexplored area in the context of addressing cultural aspects in product design, which can bring interesting opportunities for investigating users' culture and mobile communication devices relationships.

4 Case Study Design

In December 2010 and January 2011, a case study was done in cooperation with a large global manufacturer of mobile communication devices. This Original Equipment Manufacturer (OEM) has a representative office in Iran, which has as main responsibility to market its new products and to provide after sales services and support. The cooperation allowed for interviews with the company's marketing team, and access to users that were selected from a sample of users known to be early adopters of new technologies. They typically belong to middle and upper middle economic ranks, and not the BOP. They usually have an influence on other market segments markets; therefore they are good choices for marketing research when targeting all segments of the market is not feasible.

4.1 Semi-structured Interviews with the Company's Mobile Marketing Team in Iran

In order to get a deeper understanding of the company's industry and business context, four marketing managers for mobile phones in Iran were interviewed. The main insights from these interviews included:

- **Relationships between Cultural Specifications and Market Behavior**

No examples exist of intentional customization of mobile communication devices for the Iranian market. There are however a few cases where a product was adopted very fast in Iran and achieved high sales rates in comparison to other countries in the world. This success (which was not predicted) made that the Iranian market was selected as the lead market for the next generation of that product, and therefore the main consumer research activities were conducted in Iran. However, even in these cases, the products that were developed based on this consumer research were presented globally and not only in the regional Iranian market.

- **Main Categories of Users in EMs, and Their Situation in Iran**

The company's main marketing strategy for mobile phones is the early concentrating on the "Innovator" and "Early adopter" segments of consumers. Tehran is the lead regional market in which the products are launched first and usually products which are successful in Tehran will be successful on the national level as well. Therefore users who belong to the BOP are not a core part of the marketing activities. Unlike countries like India or China these users do not cover an important segment of Iran's market in terms of population, and the middle class has a priority.

- **Smart Phones and Ordinary mobile phones in Iran**

For the company, a relatively new brand in Iran, it is relatively hard to find its way in this segment of the market for ordinary mobile phones, given the dominant presence of two other globl OEMs. Therefore marketing activities are concentrated on smart phones as this market has more space for new players. At the time of the interviews, a Word Of Mouth (WOM) program was developed for one of the company's smart phones. This product is intended for users who want to shift from ordinary mobile phones to smart phones. In the WOM program, 200 users aged between 18 and 35 were provided with a free smart phone. These users were selected based on their social networking capabilities, their interest in using consumer electronics and the average time that they usually spend for the electronic communication during a day. In addition, all these users were first time users of smart phones.

- **Recommendations for the Main Areas of Customization**

According to the initial marketing research on smart phones, the main competition is in the area of secondary features of smart phones. Secondary features usually deal with non-communication functions of mobile phones, such as multimedia, web and entertainment. Consequently, primary features include functions such as call and SMS which are basic communication requirements in a mobile phone. For most producers, after several years of development these primary functions are quite mature today and the computation side of mobile communication devices is more in demand. Moreover,

because of the nature of smart phones, software components were recommended for the customization process, since in their opinion the scale of market in Iran is not large enough for customized hardware components.

These insights from the interviews provided answers to the first research question, and as such the background for the user tests which were done to obtain insights in the opportunities for cultural customization of smart phones for the Iranian market.

4.2 Usability Testing

A team of 15 volunteers selected from the 200 users in WOM program participated in the experiment, before WOM program was started. While these volunteers had the general specifications of the participants of the WOM program, they have also an additional characteristic, which was their educational background. In order to play the user/designer role, they had backgrounds in computer engineering, industrial design and graphic design. They participated in the usability tests which were of a participatory design nature [13]. The participants were invited to share their design ideas before and after the tests, revealing a number of solutions for the existing deficiencies of the smart phone that were identified through the tests.

The next subsections will present the steps of participatory design process.

Self-documentation and Selection of Features for Cultural Customization. Before starting the main tests, the participants were asked to explore similar products without any limitations. It should be mentioned that the test product was not available in Iran's market at that time, which was two months before the start of WOM program.

The participants used different ways for the exploration like testing similar products in showrooms, informal interviews with friends and relatives who were using these products, and reading online reviews. At the end of their research which took two weeks, they self-documented their results and gave suggestions about which components or features might be suitable for customization on the Iranian market. At the beginning of the user tests of the main smart phone model under consideration, a summary of self-documentation reports was presented to the participants, as well background information from the company itself. These two sources include a set of components and features which can be potentially customized for Iranian users. The main suggestions were SMS, music player, maps, GPS, and security features. After a discussion and voting, SMS and music applications were selected for the cultural customization process by the participatory design team. Although the marketing team preferred the secondary features for the study, the self-documentation studies showed that Iranian mobile users use SMS as a social networking tool, and find current SMS features inefficient. Another issue indicated by the self-documentation studies were problems with music files in Iran, which usually do not have correct and complete music tag information (such as artist's and album's names, year, and genre). Therefore Iranian users usually use folder management to browse and play music files, while many recent music player applications of mobile communication devices use music tag information for browsing and playing tasks.

Aim of the Usability Tests. The experiences from the self-documentation studies were an important part of the usability tests. As the main findings from using a range of different smart phones were that 1) Iranian users encounter problems with the current

SMS application particularly in forwarding messages, and managing the previous sent or received messages, and 2) Iranian users do not have access to the music files by folders in current music applications on the device and this will cause some usability problems, two tasks were designed for the usability tests accordingly. In addition, short structured interviews were designed focusing on their current use of SMS and music player applications on their phones and portable music players. The tasks and interviews were modified and finalized after a pretest.

Usability Tests and Structured Interviews. Participants were tested under the same situations. For each test, a representative from the research team was responsible for guiding the participants' behavior while he or she was performing the tasks, whilst another facilitator recorded a video during the tests. It was tried to capture the users' fingers and the smart phone interface when they perform the tasks. The camera was fixed on a tripod focusing on the smart phone interface and the users' fingers when they performed the tasks. In addition, short structured interviews were done before each test.

Analysis of the Results. A review of the results of the interviews with the participants showed that the majority of participants use SMS for social networking, and similarly they prefer using folder management for browsing music on their current portable music players instead of using tag information. After the analysis of the tests' recorded videos, a number of common errors were observed. There were 12 common errors in the SMS tests, and 9 common errors in the music task. These errors not only confirmed the usability problems found through the self-documentation studies, but identified several other problems.

For instance, although forwarding the messages is a common habit in SMS social networking, the forward function is just accessible by keeping the finger on a message for few seconds, and it is not available by a single touch or using the options button. Therefore none of the participants were able to forward a message during their first experience with the smart phone, and other SMS related functions were more accessible. Apprently, the forward function was considered as a function which is not going to be used frequently by users. However, according to the self documentation by the participants, and also according to the interviews, Irians users often prefer a kind of group SMS communication instead of pair communication. This can be related to some cultural specifications such as collectivism.

In the music related task, all participants had problems in finding and playing all tracks of an artist, as the music files did not have standard tag information.

Gathering of Requirements and Survey Design. The same participants attended in two problem solving sessions. In these sessions they were asked to 1) sketch new structures for SMS and music applications in which current features and functions are better arranged; and 2) create new ideas for features related to these tasks. For example, participants classified all of the functions in the SMS application in three access levels in a way that social networking functions (such as forward) were more accessible. They also propose a new feature for sending fiestas' or national ceremonies' greetings, in which the device automatically adds the recipients' names to the beginning of a message which is sent to multiple contacts. An option for browsing music files through folders was also suggested for the music player

application. Finally five modifications and five new features were proposed. The results of requirement gathering step were then translated to a survey which will be answered by the first 200 users of the device, who are selected for the WOM program. Five modifications are presented by modified user interface designs and five new ideas are described by text in the survey. The survey is designed in the form of a scalar questionnaire so users will show their tendencies towards each new or modified item. This article was written when the results of the survey were not available yet.

5 Discussion

In the real conditions, global producers possibly target the more innovative groups of users who can influence other parts of the society. Therefore new products which are accepted by these users, have more chances to be used by other groups. This is a point that user research, even in small scales can have a considerable influence. Another advantage of concentrating on more innovative users is more variety in possible research methods. Because of their relatively high level of education and knowledge, it is feasible to find participatory design teams in which participators can play designer-user roles. Recommendations by the marketing and participatory design team showed the domination of software side in smart phones. Flexibility of mobile applications and mobile operating systems for customization can bring more opportunities for cultural customization as well, even after purchase. Looking at the wide range of features in a smart phone, usability tests with only two features showed that there are a large number of usability problems which can be connected to the cultural or regional differences. These problems sometimes are tied together in a way that it is not possible to draw a border line between regional and cultural ones. For example, some participants who mentioned SMS social networking in their self documentation reports, referred to Iran's government restrictions for social networking websites as a possible reason for this behavior. However, also the tendency of Iranian culture towards collectivism may be a contributing factor [8].This combination of intercultural variables and cultural specifications has been noted before. In her solution for culture oriented design, Kerstin Röse recommended two phases for development of a culture-oriented human machine system. The first phase can cover intercultural variables (like the restrictions by Iran's government), and the second one includes looking at cultural specifications (such as collectivism) [9].

6 Conclusion

Although at the time of writing this paper, the final survey results were not available yet, the study suggests that through human centred design can reveal clues for cultural customization of mobile communication devices. Using a combination of different human centred design research methods, such as self-documentation, video recording, and interviews, a number of usability problems were identified for Iranian users that may be attributed to cultural factors. Using the same user sample as was been used for marketing research purposes facilitated the access to users whose characteristics were very suitable for the user studies As it was shown in this study, the global OEM, focused on more innovative users for a WOM program mainly because of their influence on other segments of the market. This WOM program was used to arrange a

participatory design team which was able to participate in the customization process. This is a process that can be experienced in similar situations. While the marketing team samples a group of innovative consumers, the same sampling can be used for a participatory design team. The new product can be tested and recommendations for the customization will be available before the launch of the product in the market. Considering the flexible software features on smart phones, applying these recommendations in the final version of the product can be feasible.

To conclude, the research questions can be answered as follows:

1. This example shows how one of the global producers in Iran used marketing strategies which were more focused on innovative users and advanced products. Although other producers can have different strategies, it is possible to conclude that in the case of mobile communication devices, the main concentration of global producers in EMs is not only on ordinary mobile phones and BOP users. Advanced products and innovative users are also important in these markets.
2. Because of the computation abilities of smart phones and flexibility of applications and operating systems, these devices are more flexible for cultural customization. The tests showed that there are usability issues in both entertainment and primary communication features in the selected device that can be related to the cultural and regional specifications. This can be true for other similar products as well.

Further research studies can be done in multiple countries to make comparisons possible.

Acknowledgments. The authors would like to appreciate Mr. Farzin Shariati Corporate Marketing Director and Mr. Babak Amjadi MC Marketing Manager of LG Electronics, LGEIR, Tehran Office because of their great help and support during the study.

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