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ATM INTERFACE IN SAUDI ARABIA BANKS: A COMPARISON AND USABILITY AFFECT HCI[1]

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ABSTRACT
Every bank in Saudi Arabia has an Automated Teller Machine (ATM) facility throughout the country. However, due to its complex layout, people who are not familiar with technology are still not prepared to use it. Each ATM has its layout that confuses users too. In this paper, an attempt has been taken to identify problems and flaws in many of the current ATMs layouts. A comparative analysis is conducted between different ATMs, therefore explains causes of the need for optimal interface depending on ease of use which increases usability with consideration of the ability and psychology of people using ATMs.

KEYWORDS: - Human computer interaction, Automated Teller Machine, ATM layout, ATM, Usability, Ability and Psychology.

INTRODUCTION

In Saudi Arabia, many banks offer thousands of fee-free Automatic Teller Machines (ATMs) for their customers. The ATM made the lives of customers easier by avoiding long waiting in the queue for simple services. Through a wide network of ATMs around Saudi Arabia the customers can access their bank accounts 24x7 by using ATM card, which is the strongest reason to make it important for bank customers. ATMs provide some financial services, such as cash withdrawal, balance inquiries, print mini-receipt, and view account information etc.

The interface is the basic part of enabling communication between the user and the machine. The bank customers interact with the ATMs interfaces which can be considered as a computer. Therefore, during the design phase, the ATM interfaces must comply with the design rules for human-computer interaction (HCI). When the ATM is designed with less consideration of HCI, bank custome will face difficulties in using it.

Consequently, there will be waste of time and effort to explain the process of use to customers. In this paper, we will investigate and compare the ATMs in Saudi Arabia. In addition, we will propose a good user interface design for ATM which achieves high efficiency and usability under the umbrella of HCI.
The paper is organized as follows: section II presents a review of related works. Section III describes the methodology; where the experimental comparison method and the proposed interface are descried. Section IV presents a discussion on results. Finally, section V presents a conclusions and future work respectively.

RELATED WORK

The research paper by Kevin Curran and David King [1] studied different of UK Bank ATM navigation menus and suggested a best kind of ATM menu. They implemented OptiATM menu design (means optimal ATM menu) which is more usable and capable than others ATMs. It designed with an extra function, which solved the problem of users needing to reinsert their cards to perform another transaction and reduce the transaction time. Also, their study focused on the user interface design and how to ensure users perform the tasks easily. The authors [1] observed that good interface design has to follow these characteristics:

1. Effectively: the ATM user gets exactly what he wants from the system.
2. Safely: it is essential for safety-critical software systems.
3. Enjoyably: generally, if the interface is effective and efficient to use, it has to be attractive and enjoyable to use as a consequence.
4. Efficiently: This is the main point of this research paper. If the ATM menus were improved, the use of ATM would be more efficient.

The authors in [2] studied a lot about the user-centered design approach for interactive kiosks. They investigated the relationship between user experience, usability and the customized functions introduction (based on user profiles) in the ATM system interface. A redesign process was then carried out based on the results obtained from the usability tests and the profile based functions to solve usability problems and improve the complete user experience. For the purpose of comparing the user experience and usability between the old and the new interface and to check the efficiency of the design approach, a prototype was developed and tested.
Armin Kamfiroozie and Marzieh Ahmadzadeh [3] presented a model for personalizing ATMs which is provides extra services, also helps users to perform their tasks more speedily based on their needs. In personalized ATMs all records of the clients are stored in customer-relationship management system and will retrieve from it and other databases. These data are collected and updated at several levels: when the account is opened, when the account is used for the purposes mentioned or according to customer requirements, when the card is used. These data like personal information, the purchases records and completed transactions such as time, place or the websites where the purchases have been done and so on. By analyzing and processing these customers' data and personal information, the ATM screens and menus can be predicted and showed based on the clients' needs.
ATM's secure interaction includes many different aspects, like technical design and artificial management reasons and rules. In the meantime, ATM will be developing to the more intelligent and more secure direction [4]. ATM's users like to deal with graphical passwords more than string passwords because it's more memorable [5]. The authors observed in [5] that multiple graphical passwords are mostly more effective than multiple PIN numbers. Also, they showed graphical passwords increased the security without compromising usability.
Khalid Al-Saleh and Salaheddine Bendak [6] assessed the dimensions of ATM machines and their suitability for users in Middle Eastern countries. They measured the Dimensions of all ATMs used in Saudi Arabia and compared with recommended dimensions based on anthropometric measurements of the user population; their results show that there is a mismatch between the dimensions of ATMs used in Saudi Arabia and the recommended dimensions based on the user population. The study suggested a new set of dimensions for ATMs to be used in Saudi Arabia, It is suggested that banks take recommended dimensions into consideration. Nagul Cooharojananone et al. [7] proposed a new design for ATM interfaces, based upon the seven most frequently used transactions by ATM machines. The new design interface improves the

effectiveness, efficiency, and satisfaction of usability. The study compared the new design and a well-known existing design, the new design interface was better than the existing ATM interface for all seven tasks. The study considered the HCI principles for designing and testing the new interface using usability criteria as the evaluation. The results showed that a new ATM design reduced the error rate as well as increased effectiveness, efficiency, and satisfaction. Wasswa Katono and Isaac [8] the study identified the most important e-service quality evaluation dimensions in an emerging market context, focused specifically on automatic teller machines (ATMs). The study investigated the e-service evaluation criteria of ATMs by developing and validating a psychometrically sound instrument and then uses that same instrument to identify the e-service evaluation criteria. The study establishes that ATM users consider tangibles, card issues, reliability and location as important evaluation criteria of ATM services. Based on the moderate overall satisfaction with service score.

Yong Hwan Kim, et al. [10] the study is concerned with the user interface (UI) design of touch screen based on the reaction time of Automated Teller Machine (ATM) user. The study on interface design assumes that reducing the reaction time of an ATM user enhances the user's level of satisfaction and that a button arrangement of the shortest reaction time is the optimal route for interface design. The study examined the total reaction time and hit rates of users depending on the user group, layout of menu, and number of menu buttons. The result of the study showed that as the number of menu items reduced, the time for menu navigation decreased accordingly. This corresponded to the finding that the trace of a user's sight on the monitor screen moved in a "Z" shape from the upper left side to the right side and from the lower left side to the right side. Hence, it was thought that in order to save a user's reaction time on the first page, it was best to arrange menu items in both the top and bottom on the first page of the ATM's touch screen interface. The study states the necessity to integrate or reduce screen items and to decrease the depth of information to be processed. In addition, the quantity of information to be handled at each time also needed to be reduced.

Getting through with these important researches, we can summarize a lot of experiences from which the design of ATM can be improved.

METHODOLOGY

EXPERIMENTAL COMPARISON METHOD:

Some of the current ATMs in Saudi Arabia were observed by visiting each of them for the purpose of using and testing them and then trying to discover their usability issues and were they not applying the HCI design principles. This helped us to propose an optimal ATM that recovers all the issues and achieves high efficiency and usability.

ATM's interface allows communication between the user and the machine. For that reason, good user interface design is very important for high-usability levels. According to that we observed the following problems:

- Some of the ATMs do not show a button to return back to the previous interface to change the option or to return back to the home page (e.g. when the user wants to do another transaction after the withdraw he has to re-insert his ATM card).
- Some ATMs do not achieve one of the most important design principles, which is principle of memory since they are not using small icons or symbols next to the operations' buttons that usually used to help users understanding them faster.
- Some interfaces have many buttons which make the interface crowded; crowded screens are difficult to understand and, hence, are difficult to use.
- Some messages and operations' names were not written concisely and clearly.
- Some interfaces have inappropriate background and colored fonts or icons that distract or make the user feel unpleasant.
- Some buttons in the interface have been in inappropriate measurements.
- The differences between the banks in the description of transactions and in the order of operations were observed and this does not enhance the principle of habit and consistency.

- In some ATM machines, the options of menu are not aligned with their parallel menu key.
- Most of the ATMs machines' systems don't support more than two languages (Arabic, English).

Proposed interface:

We compared seven of ATMs in Saudi Arabia by a series of transaction performance tests for helping in identify best and worst features of each ATM. This led us to build an interface with all the optimum features of existing ATMs and none of the poorly performing features.

In order to support concision principle in the new interface, we reduced the number of the operations' options to just include the basic operations. It helps to improve the interface usability where it makes the interface simplest and user can find the option in fastest way. Also, we put the most frequently used options on the right-hand side of the screen, where the first user's attention goes, and the less important ones on the left hand side.

We visualized the operations by small icons in order to support the memory and habit principles that makes the interface being understood, more easily and more efficient. Also, small tips added next to the transactions interface to help users with the transaction.

The return back button has been added in the new interface. It is necessary to enhance the usability; it lets the users to do another transaction without needing to cancel whole the operation and need to reinsert the card.

In the new interface, habits of users have been considered by choosing the menu names and options that are users familiar with. In addition, the new interface enhanced the graphical design colors and background.

Because the users of ATMs are from different countries with various languages; such as the foreign worker and visitors, the ATM machine must provide maximum languages as much as possible. We supported our system by several languages.

RESULT AND DISCUSSION

We achieved the HCI principles and rules that were not respected in some of the current ATMs. Our proposed system provides the high degree of usability. Also, we attempted in our proposed system to avoid the waste of effort and money in training. We designed the new interface as following:

- In Fig.1, the first interface shown up after entering the card is the selecting language interface. It contains eight most popular languages used in Saudi Arabia. In the right side, the most used languages. On other side, the languages used less.
- Then the entering pin interface as shown in Fig.2. It contains the tips on left side to help the users with special needs to know what they have to do.
- In the main menu, we put only six main operations that will avoid the crowd on the screen. Each option has a small icon explaining the operation to increase the usability especially for the users with special needs and take advantage of memory principle. We connected each operation option with parallel menu key by coloring them with same color as shown in Fig.3.

In withdraw interface as shown in Fig.4, five different cash amounts are provided as options and another option allow user to write the amount depending on the user's need. We also provided the back option to return to the previous page without ejecting the card. Also, it shows the main menu button that is appeared in each interface to increase the navigation simplicity.

Fig.1: selecting languages interface.

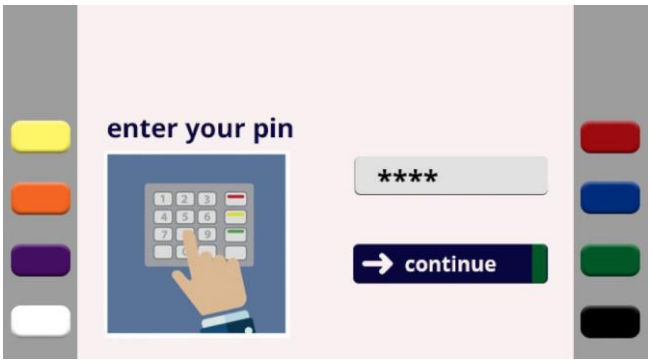

Fig.2: Entering pin interface

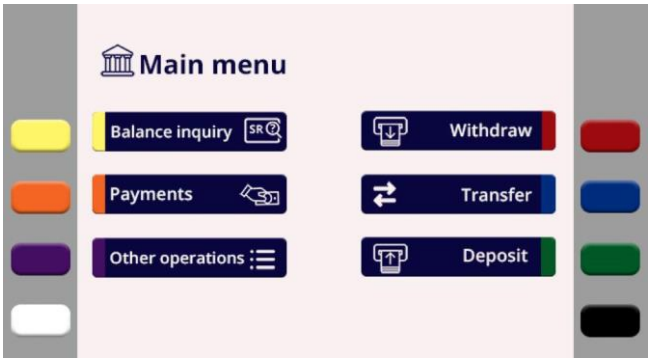

Fig.3: Main menu interface.

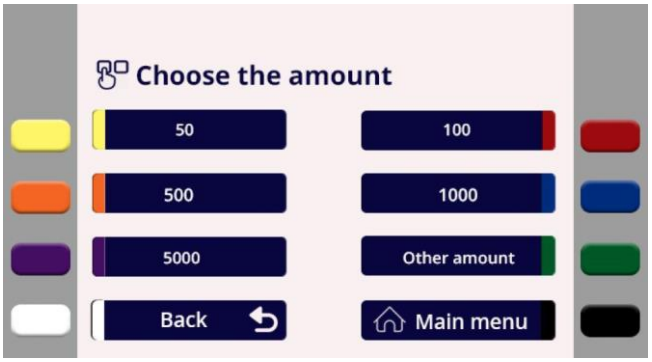

Fig.4: Withdraw interface.

CONCLUSION AND FUTURE WORK

The main purpose of this paper is to propose the user friendly interface of ATM which respects the rules of HCI. We detected some defects through comparing different interfaces of the banks' ATM in Saudi Arabia. These defects prevented the interfaces of ATMs from complying with the principles of HCI (Choa, 2009) [11]. Our research showed that users need better and flawless ATM's interface. Therefore, understanding of the users' needs is essential to the success of any proposal and depending on that, we have achieved the objective of this paper by providing the solution for the design of the ATM interface that is highly usable under the umbrella of HCI. There can be several interesting extensions of this work; one of them is to support the interface with speech instructions feature. Also, adding speech recognition technique to identify the user language in the beginning, before the main menu, to show the interface in user language.

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