

Advances in the Usability of Banking System Interfaces in Saudi Arabia

Norah Aldowaihi, Razan Alhossaini, Shahad Bin-Sweleh, Shrif Aldakheel, Malak Alamri
and Sarah Alhumoud

*Department of Computer Science, College of Computer and Information Sciences,
Imam Mohammed bin Saud Islamic University, Riyadh, Saudi Arabia*

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Abstract: Nowadays, most people manage their finances without the need to often visit branch offices and deal face-to-face with employees; instead, they use internet banking, automated teller machines (ATMs), and mobile banking. Therefore, the usability of those systems is crucial for accomplishing needed financial tasks. This study investigated the user interfaces of different banking systems, specifically, multilingual ones used in the Arab world (because the number of expatriates in this region is large and they speak various different languages). The results are presented in comparison to a previous interface analysis published in 2015. The study also presents a holistic overview of the requirements of socio-cultural design for banking interfaces. Finally, it presents the findings as design recommendations for socio-cultural aspects of Arab world banking interfaces.

1 INTRODUCTION

The rapid technical progress in the banking and financial sector is evident. This progress is led by the accelerating demand to take user needs into account.

Computerized banking interfaces are a vital means for providing an excellent user experience. Those interfaces will be highlighted in this paper. Although the interfaces of banking systems have a basic function to allow users to access their bank accounts and perform transactions safely, they have continued to become more sophisticated. This study explored different computerized banking systems in the context of the Kingdom of Saudi Arabia (KSA).

For the period 2017–2018 (Sau, 2021), more than 30% of the Saudi population were expatriates who did not speak Arabic. The total number of expats in the country was estimated to be 10,736,293. Also, for those individuals who do not have sufficient experience in using technology and people with different cultural, social, and economic backgrounds, there is a need that high-quality interactive design requirements for the use of technology systems have accounted for these differences. Accordingly, we studied the development of the banking interfaces over the last five years and the extent to which they have improved and their ease of use; we also looked at areas that must be corrected or improved to avoid and minimize errors.

This study included three types of banking systems: internet banking, automated teller machines (ATMs), and mobile banking.

2 LITERATURE REVIEW

According to (Moquillaza et al., 2017), the lack of accessibility and usability in ATM interfaces may contribute to a higher risk of making mistakes. Thus, they developed a graphical interface for BBVA Continental Bank. They focused on the needs of the users and interaction with the interface. Also, they conducted a usability test and then improved the interface. Finally, the designed interfaces were appropriate for implementation in the bank.

In (Ojeniyi et al., 2015), the authors examined user perceptions and their attitudes towards the ease of use of the online banking interface in the Commercial Bank of Nigeria using the technology acceptance model (TAM). It is also necessary to pay attention to the ease of use of mobile apps for the consumer.

Fierro and Zapata (Fierro and Zapata, 2016) focused on studying web banking applications and proposed relevant usability heuristics, which can be used as design guidelines to measure and enhance the usability of sites and thus increase user satisfaction. The proposed usability heuristics were chosen based on

a methodology Rusu et al.(Rusu et al., 2011) and evaluated by comparing their effectiveness to existing heuristics.

3 DESIGN CONSIDERATIONS FOR BANKING INTERACTIONS

In the following sections, we provide a general idea of the banking interactions that are provided to users outside the banking branch offices through ATMs or internet banking services utilizing web interfaces or mobile applications.

3.1 ATM-based Banking Interactions

Based on what was described in (Alhumoud et al., 2015), the researchers studied what the users required of ATM banking interactions in terms of design and ease of use and focused on several aspects.

In our study, these same aspects were studied in current systems for the year 2020. In addition, statistics on the distributions of the three banks' ATMs during the past five years were gathered from the Saudi Arabian Monetary Authority (Mon, 2021) to see whether the development of technology affected the number of ATMs, as shown in Table 1.

Table 1: Distribution of ATMs by Bank.

The National Commercial Bank	Riyad Bank	Al-Rajhi Bank	End of period
3,477	2,667	4,475	2016
3,630	2,592	4,794	2017
3,729	2,588	5,006	2018
3,723	2,558	5,215	2019
3,571	2,486	5,211	2020

Table 1 shows some decline in the number of ATMs, and this may be due to the advancement of other technologies, such as the development of mobile applications through which users can complete most banking transactions at most times and from remote locations without the need to go to branch offices or a physical ATM. For example, the number of the Alahli Bank's ATMs for the year 2019 was 3723, and in 2020, it became 3571, a decrease of 4%, that decrease is also evident with Riyadh Bank as well.

In (ATM, 2017), the Raddon company published a report on consumer use of mobile banking and its impact on other banking channels. One-third (33%) of the survey respondents reported that they used branch office facilities less because they used mobile banking services.

This is consistent with what we find conducting a survey to discover the use of banking services in Saudi Arabia. Among the 640 responses, the age distribution is, 36.6% of ages 18-24, 10.8% of ages 25-30, 23% of age 31-45, and 27.7% are more than 45 years old. Most of the responses, 86.1%, confirm that they use mobile banking more than any other banking service channel, Figure 1.

Also, 67.3% use Apple Pay as a means to contactless, payments (App, 2021) and 37% of them use Stc pay(stc, 2021), Stc pay is an e-wallet developed by the Saudi telecom company STC, enabling payments and international transfers with competitive costs. The use of e-wallets in Saudi Arabia is noticed to be more in the 18-24 age groups, as users are more enthusiastic about technology use for daily transactions, Table 2. Also, it is noted that age-group 31-45 use Stc pay more than any other age group, as it offers low-cost international transfer, making it a preferred way to transfer their employees' money abroad. Users more than 46 years old are the least to use e-wallets as 37% of them do not use Apple pay nor STC pay.

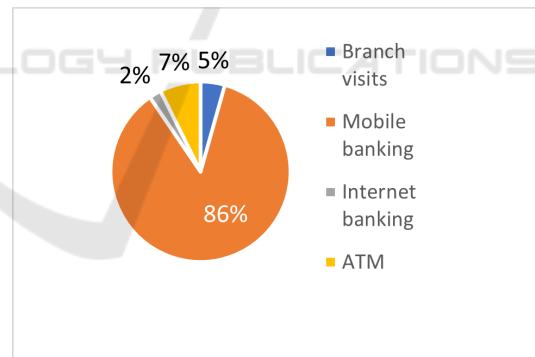


Figure 1: Banking modes used by the Saudi sample.

Table 2: The use of e-wallets among different age-groups in Saudi Arabis.

Age group	Use Apple Pay	Use Stc Pay	Not use either wallets
18-24	79%	39%	16%
25-30	77%	26%	23%
31-45	60%	42%	29%
46+	53%	37%	37%

3.2 Web-based Banking Interactions

Web-based banking provides required services to a bank customer using modern information technology (IT) systems (Blount et al., 2005). Thus, web-based banking service usage has increased and provided positive effects for both users and their banks.

Also, using the internet to deliver banking products has led to a reduction in the number of branch offices and associated employees (ATM, 2017) (Sathiyavany and Shivany, 2018). According to (Com, 2021), the use of internet banking services by the general population was 91.9% in the United Arab Emirates, and 45.7% in Jordan (Anouze and Alamro, 2019)). Moreover, according to (Com, 2021), 45% of users tend to use online banking as it makes access to financial services attractive. This was due to their ease, low cost, convenience, time savings, and operational efficiency (Romi, 2015).

3.3 Mobile Banking Interactions

Worldwide, there has been a rapid development of mobile applications and services, and a high number of mobile devices are being used that is expected to top 6.1 billion in 2020, compared to around 1.9 billion in 2013.

In 2017, Saudi Arabia was ranked third in the world, with 73% of its population using smart mobile devices or about 23 million users (Sau, 2017). It was necessary for banking systems to provide suitable services through mobile devices. A large proportion of banking transactions these days are carried out through mobile applications, which provide comfort for users and speed in completing financial transactions in which a user can perform most of financial transactions from the comfort of a couch using his or her fingers with ease and simplicity. With regard to the context of banks in Saudi Arabia, they are in line with these changes and technical developments, as they seek, like other banks, to offer mobile applications.

Currently, in Saudi Arabia, many popular financial technical (fintech) applications have appeared, such as the STC Pay application (a digital secure wallet), and many banks have developed their own mobile applications, such as those from the Al-Rajhi Bank, Al-Inma Bank, and Al-Bilad Bank.

3.4 ATM-based Banking Interfaces

Nowadays, it is a challenge for any software developer to build functional interfaces. Little or no respect for user-centered design guidelines makes it difficult

to use devices, and the embedded systems of ATMs are no exception (Aguirre et al., 2019).

The ATM user interface consists of a keypad, a monitor, set of input options from which to choose, and a support screen that can display complete instructions for an ATM transaction. When the user wants to use an ATM, his or her first inserts the bank card into the machine and then is required to enter PIN using the keypad. The process is the same for all three banks in this study; the account of the user can be accessed and modified. Upon finishing, the user can select to make another transaction or exit the system after the transaction (US5, 2021).

There was an issue in the colours of the B2 ATM interfaces, as the colours issue in that there is an inconsistent and unclear use of them with respect to the operation buttons. For all three banks, and for the PIN entry interfaces, there is no visibility of system status to the operation, meaning that the user expects a visible sign indicating required PIN entry, but there is no sign or visual indicator as illustrated in the English version in Figure 2 for B1. In the main options menu, there were no icons or graphics in the buttons indicating the type of operation associated with it.

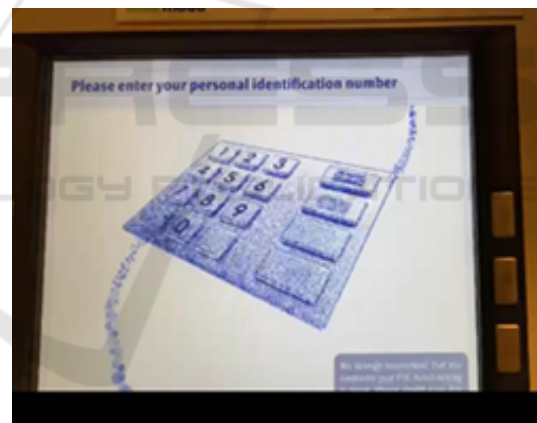


Figure 2: English interface of Al-Rajhi Bank (B1) ATM.

3.5 Web-based Banking Interfaces

We analyzed the online web interfaces in the manner of the previous study (Alhumoud et al., 2015), which used Nielsen's 10 usability heuristics that are shown in Table 3. The login interfaces supported both Arabic and English, and the contents of the pages were similar in both languages with mirrored alignment, as shown in Figures 3, 4, 5 for the Al-Rajhi Bank, Riyad Bank, and Alahli Bank, respectively.

All the banks' interfaces displayed an error message that appeared after a number of failed login attempts; it was presented in a red color, and the content described a wrong username or password. How-

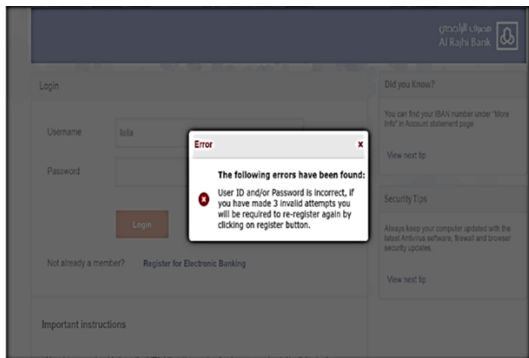


Figure 3: English web interface of Al-Rajhi Bank (B1).

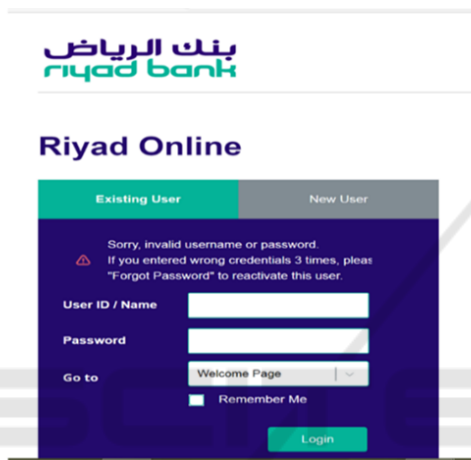


Figure 4: English web interface of Riyad Bank (B2).

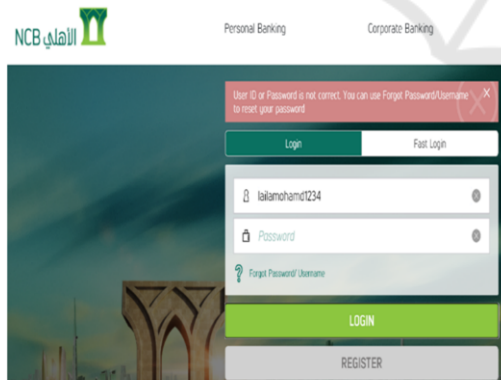


Figure 5: English web interface of Alahli Bank (B3).

ever, the message that was displayed to the user was slightly different in each bank interface. B1, B2, and B3 each allowed three unsuccessful attempts, after which access to the account would be suspended for security reasons. However, only two of these banks, B1 and B2, displayed warning messages about the number of attempts the user was allowed to make before the account was suspended, as shown in Figure 4

for B2.

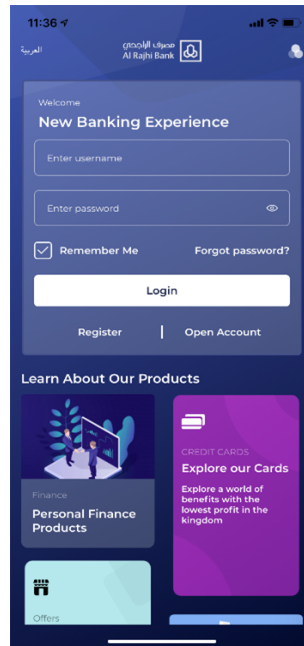


Figure 6: English mobile banking interface of Al-Rajhi Bank (B1).

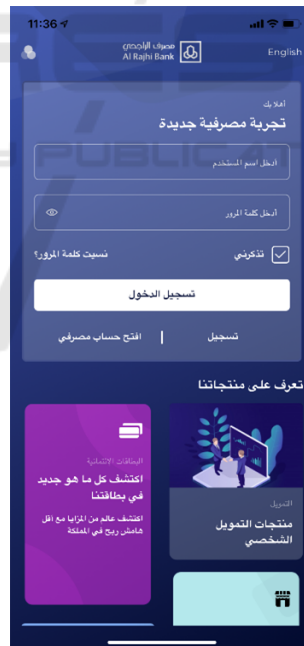


Figure 7: Arabic mobile banking interface of Al-Rajhi Bank (B1).

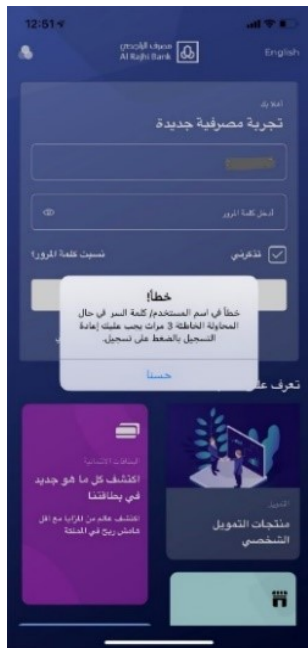


Figure 8: Arabic mobile banking interface for wrong password attempt in B1.

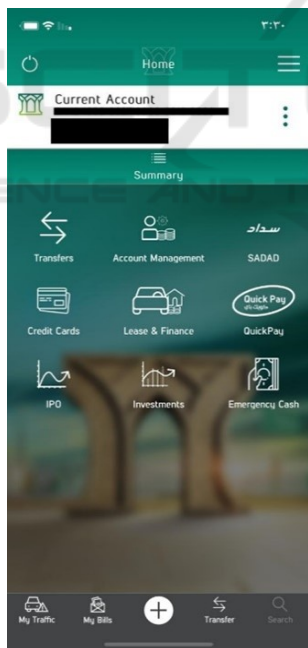


Figure 9: English mobile banking main menu of Alahli Bank (B3).

3.6 Mobile Banking Interfaces

The design considerations for both the web-based and mobile banking modes were to some extent similar, but there are some special considerations that must be

followed in each mode for proper appearance, such as the size of displays, hardware constraints, use contexts, and so on. Mobile devices have much smaller screens than desktops, and therefore designers must be aware of which elements are important to include and which can be omitted. Also, designers need to take into account that mobile users use their finger with touch screen interfaces, so the buttons must be of a decent size to enable clicking on them properly. The two most common mobile platforms are Apple iOS and Android. The login interface for all three banks supported both Arabic and English. The contents of the pages were similar in both languages and mapped to the corresponding alignment (Arabic is written and read from right to left, unlike English, which is left to right). Examples are shown in Figures 6, 7 for B1.

The failed login interfaces were checked with a correct username and wrong password in both the English and Arabic interfaces (the latter are shown in Figure 8). For all the banks, there was consistency between the system messages in the Arabic and English interfaces when entering the wrong password. Also, all the banking interfaces suggested correcting the erroneous credentials without specifying the error to be in the username or the password. Only B1 showed a warning message of how many attempts were allowed before account suspension upon entering a wrong username/password more than two times.

As for the main transactions in the mobile phone interfaces, they were organized either in the form of icons or in the form of a list supported by illustrations and text designations appropriate to the local culture as shown in Figure 9 for B3 as an example.

In our analysis, we noticed that the mobile interface design for all three banks supported visibility relatively better than in the previous evaluation done in 2015. For example, in B1 and B3, the number of steps needed to complete a task such as transferring money from one account to another is shown as (step 1 of 3). User actions should also have an immediate interface reaction. Instant feedback reassures the user that the system is doing what is expected; this happens in the mobile interfaces of B1, B2, and B3, for example, at the end of the transfer process, a message displays the status of the transfer either as a success or failure. An example of the error prevention heuristic is found in the interface of B1; the buttons that were not available at a certain point were disabled. For example, when transferring an amount of money to another account, one cannot click the “Next” button until the amount is entered. In contrast, in B3’s interface, under the same conditions, one can press the “Next” button, and an alert appears stating that the amount should be entered before continuing the pro-

cess. In the interface of all three banks, recognition rather than recall was supported, in which the user could choose from among the existing suggestions; this reduces the short-term memory load. In the B1 interface, there was a help and facilitation service in which inquiries were answered. In addition, the application was directly linked to communication sites and the bank’s website, and it also provided security advice.

The interfaces from the three banks were characterized by simplicity and a design appropriate to the local culture and ease of use for beginners, as the basic services were displayed through the main interface, either in the form of icons, as with B2 and B3, or in the form of a list, as with B1.

Table 3: Aggregate Evaluation of Banking Interfaces of B1, B2, and B3.

Heuristics	ATM Banking			Mobile Banking			Online Banking			All		
	B1	B2	B3	B1	B2	B3	B1	B2	B3	B1	B2	B3
Visibility of system status	3	0	1	0	2	2	0	1	3	3	1	2
Match with real world	1	0	0	0	2	2	0	1	2	0	1	1
User control and freedom	4	4	3	0	0	3	0	2	3	1	2	3
Consistency and standards	3	0	1	0	1	1	0	1	1	1	0	1
Error prevention	0	0	0	2	0	3	2	0	0	0	0	1
Recognition rather than recall	0	0	2	0	1	2	0	0	2	0	0	2
Flexibility and efficiency	1	1	2	2	1	1	2	1	3	1	1	2
Aesthetic/minimalist design	3	1	1	0	1	2	0	2	2	1	1	1
Error recovery	2	1	0	0	3	3	0	3	2	0	2	1
Help and documentation	1	2	3	0	2	4	0	1	3	0	1	3
Total	18	9	13	4	13	23	4	12	21	7	9	17

4 HEURISTICS EVALUATIONS

The banking interfaces were examined using Nielsen’s 10 usability heuristics (Nielsen, 1994). Each system was evaluated based on a number of main interfaces (e.g., login screen, transfer to a beneficiary); the assessment was applied to three banks in Saudi Arabia. The considered banks were the Al-Rajhi Bank, Riyadh Bank, and Alahli Bank, referred to in the study as B1, B2, and B3, respectively. For all three banks, we present the overall heuristic evaluations and describe each banking interface design consideration individually in Table 3.

In this study, we compared what we found in 2020 to the interface analysis results made in 2015 for the

same banks (Alhumoud et al., 2015). First, regarding the system status visibility heuristic, this was improved over the ratings in 2015. However, regarding aesthetic and minimalist design, it needs to be improved for B1. When a user inserts a card into the ATM, the user waits for a clear message telling him or her to enter the PIN or has signs showing the location of the PIN such as “XXXX.” While the user waits, “- - -” is shown on the screen at a small size, which may be hard to notice, even for people with good vision. Also, the message was visible but was at the top of the screen where it was not clear enough. Compared to the interfaces in 2015, in 2020, the names of the processes and their meaning were clearly matching; the user could likely understand the meaning of a process without asking, guessing, or searching. In mobile banking and online banking for the three banks, control and freedom were available; the user could go one step back if he or she made a mistake. In the ATMs of all three banks, this was still not possible; the user needs to cancel the process upon making a mistake. Now, for all the banks for error prevention, there are many messages shown to the user at each step. Regarding the recognition heuristic, we noticed an improvement, as all three banks offered clear options, and the user can choose from them instead of being required to remember the required service. Regarding aesthetic /minimalist design, the ATMs of B1 need some improvement; for example, the main screen that asks to enter the PIN had background drawings that may obscure the phrase. Regarding error recovery, the B2 and B3 mobile banking interfaces still need improvement, as they did not show any improvements to the 2015 interfaces. Finally, regarding help and documentation, this important feature was not found in B2’s and B3’s ATMs and mobile banking, as it is only available from B1. In B1’s services, the user could easily access help information.

5 CONCLUSION

This paper presented a comparison between the banking interfaces studied in 2015 (Alhumoud et al., 2015) and the interfaces from the same banks studied in 2020. The analysis focused on three types of interfaces: ATM-based banking, web-based banking, and mobile banking.

The interfaces examined belonged to the Al-Rajhi Bank (B1), Riyadh Bank (B2), and Alahli Bank (B3) in Saudi Arabia. The study carried out the comparison using Nielsen’s heuristics (Romi, 2015). It showed that there were major advancements and enhancements in terms of usability and the user expe-

rience. Specifically, one of the main changes was seen for all the banks in all their interfaces. Other changes observed include, but are not limited to, the naming and representation of the main transactions or sub-transactions that were enhanced with clear meanings that matched the real world or were tied to clear metaphors, also the control and freedom were available in mobile banking and online banking for the three banks, since the user could go one step back if he or she made a mistake, and we noticed an improvement in recognition heuristic, as all three banks offered clear options, and the user can choose from them instead of remember the required service.

However, there were some features that did not change in the ATMs of all the banks under consideration, such as user control and freedom, in which the user still cannot move between processes if he or she makes a mistake. Moreover, there are marked improvements in usability and functionality for the mobile and internet banking services since 2015.

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