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Belachew U. Regane
belachew.regane@aau.edu.et

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The African Conference on Information Systems and Technology (ACIST)

USER INTERFACE DESIGN FOR MOBILE FINANCIAL SERVICES: USERS PERSPECTIVE

Belachew Regane
School of Graduate Studies, Software Engineering Track, Addis Ababa University, Addis Ababa, Ethiopia
belachew.regane@aau.edu.et

Sisay Yemata
School of Graduate Studies, Software Engineering Track, Addis Ababa University, Addis Ababa, Ethiopia
sisay.yemata@aau.edu.et

ABSTRACT

Users belonging to different countries have different exposure and perception to trust the technology to adopt it. Users' trust and adoption rate are challenging issues in mobile financial services. Thus, the purpose of the research is how to design trustful user interface. Market research is conducted to collect data. Using the data, personas and use cases developed. The result of personas and use cases used to develop prototypes. Prototype A and B designed differently to give choice to users to investigate users' trust. Prototype A is designed to make it easy to use and clear workflow. Whereas prototype B is designed to make it navigate more in detail vertically to accomplish tasks. Finally, users asked to choose one of the prototypes as their best preference. The easiness to use, clear workflow and attractiveness make prototype A to be preferred and better trusted.

Keywords

Mobile Financial Service, User Interface Design, Trust Issue, Mobile Devices, Adoption Rate.

INTRODUCTION

The proliferation of mobile devices and applications, and the unique facets of mobile computing have made the effective interaction of with these devices more important. Mobile devices introduce new opportunities and challenges for financial institutions, particularly in the use of mobile financial service (MFS) technology (Abebe, 2016, Mullan et al., 2017 and Johnson et al., 2018).

MFS is defined as "a system that allows customers of a financial institutions to conduct a number of financial transactions through a mobile device such as a mobile phone or personal digital assistant (PDA)" (Feng-Shang and Yung-Shen, 2014).

Mobile financial services offer different services. Money transfers, bill payment, salary disbursement, and money savings are few of the services. Among these, peer to peer money transfer is the most common service type (Rajiv and Ishan, 2015).

Human computer interaction (HCI) can enhance the usability of the MFS technology. It can provide approaches and frameworks which can enhance both the product/service and process of considered MFS design. HCI at the forefront of user centered design and as a discipline concerned with design, implementation and evaluation also plays a role in the design and evaluation of successful MFS for mobile devices.

Interface design and usability is challenging issues in mobile financial services. Due to nature of mobile devices (like screen size, memory capacity, power capacity etc) designing generic user interface is till now unsolved problem. User interface design issues have impacts (positive or negative) on usability and users trust. Lack of trust forms a major barrier to adopt mobile financial services. Clear work-flow, ease of use, and effective navigations are important concerns to meet customers need in using mobile financial services. The more your interface design and usability issues are solved, the more users trust your services through the technology (Randy, 2007).

Problem definition

Users belonging to different countries have different exposure and perception to trust the technology to adopt it. Mobile financial services is one of newly emerging technology to provide users virtual money anywhere anytime. Users' trust and adoption rate are challenging issues in mobile financial services technology. The challenges mainly arise from the nature of mobile devices (Ayana, 2014 and Chun-Wei et. al, 2018).

According to Randy (2007), smaller screen size, low resolution, multifunctional keypads, lower processing power, low memory capacity, limited bandwidth and limited battery life are some of unique characteristics of mobile devices. These concerns make design of user interface challenging tasks. The result of these design is important in obtaining users trust.

Data collected through market research for the context of Ethiopian mobile financial services users shows that lack of trust in the technology is one among many barriers which results in low adoption rate of mobile financial services. The mobile applications (apps) have an interface designed based on unstructured supplementary service data (USSD). It is complex and not user friendly. So, users lack trust in using virtual money fearing that they might lose their money through transactions. Types of mobile applications may influence the use of MFS. Limited number and type of mobile apps make users reject the services due to poor interface support of the applications.

Now a days, according to Feng-Shang and Yung-Shen (2014), Johnson et al., 2018 and Van and Dubus (2019), customers using MFS are relatively rare. Although the growth rate of customers using MFS is exponentially increased, the actual customers are still limited. Thus, exploring new customers to use MFS is an important issue by investigating and solving problems in the area. Therefore, the research questions that has been answered through this research project are the following. These are:

1. How to design trustful user interface that can be adopted by potential MFS users?
2. Do users have trust in a well-designed mobile application in relations to interface and usability design?

This research project study investigated the above research questions to solve the problems exist in mobile financial services to design easily usable interface by MFS users. So, the concern of research

project was to understand users' adoption behavior. Then after, it was used to design users interface for the efficient use of MFS technology.

Generally, the objective of the research project is to design trustful users interface for mobile financial services by investigating the effect of different user interface design on users trust.

METHODS

To achieve the objective of the study, market research was conducted to collect data from primary, secondary and tertiary user of mobile financial services. Type of data collected relate to participants background information and MFS technology related information. Using the data collected through observations and interviews, personas and use cases were developed. The result of personas and use case is used to develop prototypes.

Two different prototypes called prototype A and prototype B is designed and proposed as solution to investigate its impact on MFS users. Prototype A is well-designed with minimal number of labeled buttons and sub buttons, the fewer links and the smaller navigation tree with clear work-flow to make it ease of use and useful. It is a prototype of application based on USSD designed with the intention of making the operations easier for users using fewer functions and clear interface. This create easy navigation through interface. On the other hand, prototype B designed with numbered list of services menu, more links and a deeper navigation tree. It is also a USSD based application prototype designed to be accessed by calling/dialing number like *889#, *818# etc. which are used by most of mobile financial services providers in Ethiopia.

User-centered design methodologies is implemented through market research for the design of mobile financial services prototype development. Visual components such as labeled buttons are used to develop prototype A to reduce interaction problems. Whereas numbered listed menus is used for prototype B. The process consists of analyzing challenges and opportunities of MFS, buttons and text based USSD mobile apps design, and finally, evaluation of mobile financial services application prototypes. As a consequence the design guidelines implemented differently in both prototype A and prototype B.

RESULT AND DISCUSSION

Target Users of the MFS applications are categorized into primary users, secondary users and tertiary users. Primary users include customers of banks and clients of microfinances institutions (MFIs). Secondary users are Association of Microfinance Institutions (MFIs), National Bank of Ethiopia, researchers in the area. Tertiary users are the institutions (banks and MFIs), Network service providers and Mobile apps developers. Research questions used to collect data from target users and finally, used to develop personas and use cases (**Appendix A**).

Prototypes of application

Mobile financial services apps prototypes were designed in two different ways (**Appendix C** and **Appendix D**). Prototype A is an app designed based on USSD using labelled buttons. It is a horizontal prototype that provides a wide range of functions, but with little detail. To use the app, first user should login to the app using PIN CODE. After the user login, can access different labeled buttons with different services type. Once the user select one service type, she/he can accomplish the task on one page or navigating to maximum of two pages with necessary steps.

Another prototype is Prototype B (**Appendix D**). It is also an app based on USSD. It is a vertical prototype that means it provides a lot of detail for only a few functions. For example, to access services type menu, first of all users have to call/dial *889# [in case of bank] or *818# [in case of MFIs]. Then, the user has to select login menu to continue or exit menu. After that, the user has to entering PIN CODE to access numbered listed services menu. Once the user select one of the service, he/she has to navigate

pages vertically in detail to accomplish tasks. Both prototypes are designed here for touch screen mobile devices.

Generally, prototype A and Prototype B designed differently to give choice to users to investigate users trust in relation to user interface design. Prototype A is designed to make it easy use and clear work flow. Whereas prototype B is designed to make it navigate more in detail vertically to accomplish tasks. This all done to see which prototype design is better preferred and trusted. Finally, users asked to choose one of the prototype as their best preference. Users' of MFS preferred, prototype A as a better designed prototype.

As indicated by Burak (2014), a mobile application designed with reduced but high priority features using labeled buttons, might benefit financial service providers while implementing MFS technology. This might increase trust of user. On the other hand, poorly designed user interface might reduce the trust of the users on mobile financial service applications.

CONCLUSION

Mobile devices bring big opportunities to financial sectors. Mobile financial services is one of the technology which enhance financial sectors ahead one step. However, trust issue is one among many factors to adopt the technology. To investigate such issue in the case of MFS users' in Ethiopia, data collected through market research. The data used to develop personas and use cases. Personas and use cases used to develop two different prototypes A and B to investigate the impact users interface design has on MFS users in relation to trust issues.

Based on the personas and users preference, prototype A has been seen as a better designed prototype. Even if both mobile financial services applications prototypes were designed based on USSD, easiness to use, clear work flow, effective navigations and attractiveness makes prototype A to be preferred and better trusted. This implies that well designed user interface has positive impacts on users of mobile financial services so that it increases trust of users.

FUTURE WORKS

The objective of mobile financial services applications evaluation is to evaluate trustworthiness of the user interface through its easiness to use, clearness of work flow, usefulness, attractiveness and level of user satisfaction of mobile financial services technology. This evaluation should be implemented after MFS applications fully developed. Thus, evaluating the MFS applications in the industry is future work of the study.

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Appendix A: Market Research Questions

Section 1: General Background

Please check the most appropriate answer.

1. What is your age?

    ____ 18 – 30

    ____ 31 – 40

    ____ 41 – 55

2. What is your highest education level?

    ___ High School

    ___ Undergraduate

    ___ Graduate

3. What is your gender?

    ___ Male

    ___ Female

4. What kind of mobile phone do you have now?

    ____ Regular Mobile Phone

    ____ Smartphone with Touch Screen

    ____ Other, please specify: _____

5. What kind of keypad do you have on your mobile phone?

    ____ Physical

    ____ Touch Screen

6. How much time do you spend on your mobile phone in a typical day?

    ____< 30 minutes

    ____30 – 60 minutes

    ____ > 60 minutes

7. What are your major activities on your Smartphone?

    ____ Making phone calls

    ____ Sending text messages

    ____ Taking photos

    ____ Playing games

    ____ Browsing the Internet

    ____ Checking E-mail

    ____ Listening to music (as MP3s)

    ____ Managing daily activities

____Other, please specify: _____

8. How easily can you learn to use a mobile phone? (Please give a score from 1 to 7. 1: not easy at all; 7: very easy)

_____

Section 2: Idea of Mobile financial services

1. What is mobile financial services? Please explain.

2. Do you think mobile financial services could benefit you? Why or why not?

3. Are you currently using any application to manage your financial information?

4. Are you interested in using mobile financial services apps to manage your financial information?

5. What are your concerns about using mobile financial services apps on a mobile device?

6. What is your level of trust in using mobile financial services apps?

7. What type of mobile financial service often do you use? And how frequently do you use the service?

8. Are you satisfied with mobile financial services apps? How easy it is to use this service?

9. What should be improved in mobile financial services apps?

Personas and use cases

Persona_1

****

Name: Gemechu

Age: 32

Educational status: graduated from Addis Ababa University in MSc in computer science and now he is PhD candidate.

Employment status: was lecturer at Debre Birhan University for last 4 years.

Family status: He is married and have two children.

Location: Addis Ababa.

Technology usage: most of the time he use his phone to brose different websites, social medias (like Facebook), to check email and to check his financial information.

Time usage: he use his time properly for his PhD study. Beside this, since he is Orthodox Christian, he use his time to attend spiritual ceremony at church.

Financial Tasks: lack of trust on mobile financial service force him to use physical bank. For money transfer and different payment (pay money to beneficiaries), he should be appear physically at bank to get the service. Most of the time, at bank, there might be so many customer so that he should wait. Due to this, his time schedule might disorder.

Goal: he needs trustful apps that help him in saving his time to manage his financial information.

SCENARIO

1. At commercial bank Gemechu opened kids account for his two children. At the end of every month go to bank to transfer and deposit some money in separated account for his children future use.
2. Gemechu is member of saving and credit association so that he has to transfer money to this account every month to save some money in his account and to buy at least one share from the association.

To do all these in efficient way, one of his friend advised him to use virtual money through mobile financial services on his own phone any time at anywhere.

Persona_2

****

Name: Lukaku

Age: 39

Educational status: completed undergraduate program in Haremeya University in computer science department and graduated in BSc degree. His master's degree is from Addis Ababa University in MSc in computer engineering and now he is PhD candidate.

Employment status: he was assistant lecturer in Aksum University for four years. He also served as lecturer at Ambo University for last 4 years. Right now, he is working in three different private Universities as a lecturer.

Family status: He is married and have one child.

Location: around Addis Ababa.

Technology usage: he is well awarded about current technologies. Since he is so busy, most of the time he use his personal digital assist (PDA) to brose different websites, social medias (like Facebook), to check email and some time to check his financial information.

Time usage: since he has been working in different Universities located far apart in Addis Ababa city, he has no sufficient time for his PhD study. He is so busy that always he is trying to manage his time properly.

Financial Tasks: being busy he prefer physical bank financial service than mobile financial service. The reason is lack of trust on mobile financial services. He use mobile financial service only to check balance. For other services, he should be appear physically at bank to get the service. Most of the time, at bank, there might be so many customer so that he should wait. Due to that, his time schedule might disorder.

Goal: he needs good designed, flexible, user-friendly and trustful apps that can help him in saving his time to manage his financial information.

SCENARIO

1. Lukaku's mother is retried two years ago. His mother needs his financially support.
2. His sister is attending her education in high school. His sister also needs his support financially. Lukaku has not time to go his mother house to give them money every month. So, he send the money through bank. But his wife recommend him to sending the money to his mother and sister using mobile financial service on his PDA to save his time.

Persona_3

****

Name: Tigist

Age: 33

Educational status: graduated in BSc degree and MSc degree from Mekelle University in business administration.

Employment status: she has her own business (supermarket) which engaged in selling of different type of food items, cosmetics, detergents and gas in cylinder. She run her business for the last five years to make it profitable and to increase its profitability. Even if there are other workers who help her, always she should be there to control and manage her business activities with her workers.

Family status: she is single, not married.

Location: in Addis Ababa.

Technology usage: she is not as such interested in new technology. However, sometimes she use her phone to brose different websites, social medias (like Facebook), to check email and some time to check her financial information.

Time usage: she is working hard on her business so that she has no sufficient time even for herself to take rest. She spent most of her time in managing and controlling her business activities and in planning new strategy to increase her business profit.

Financial Tasks: She is not attracted to mobile financial service due to its design and again since she lack trust on mobile financial services. Therefore, to pay money to those who provide goods and services for her business, she has to go bank or she has to carry physical money to pay them where it is necessary even if it is risk-full.

Goal: she needs attractive design, free of error, user-friendly and trustful apps that can help her to buy and sale goods through mobile financial service and also to manage her financial information.

SCENARIO

1. Tigist has to pay money for goods and service provided to her supermarket.
2. She pay salary for her workers.
3. She also collect money from customers from sold items.

All these transaction is performed using physical money. Some customers ask her buy items using their virtual money and recommend her to use virtual money than physical money to facilitate her business activities.

Use cases

Use case checking balance and transaction statement

Basic Flow of events

1. Log in using MFS App using your PIN CODE
2. Click on balance button
3. Sclore up and down to see latest and previous transaction
4. Log out

Use case of money transfer

Basic Flow of Events

1. Log in to MFS app using your PIN CODE
2. Select service type /click on money transfer button
3. Fill receiver name
4. Fill receiver bank account
5. Fill amount of money to be transferred in Ethiopia Birr
6. Click on Enter button
7. Confirm the transaction
8. Check as the process is completed successfully
9. Log out

Use case of money withdrawals

Basic Flow of Events

1. Log in to the app using your PIN CODE
2. Select service type/click on withdrawal button
3. Fill amount of money to be withdraw
4. Click on Ok button
5. Check as the process completed successfully and take your money from the agent mobile money provider
6. Log out

Use case of bill payment

Basic Flow of Events

1. Log in to the app using your PIN CODE
2. Select service type/ click on bill payment button
3. Fill name of service provider
4. Fill service provider account number
5. Fill amount of money to be paid
6. Click on Enter button
7. Confirm the transaction to be completed
8. Check as the process completed successfully
9. Log out

Use case of changing language

Basic Flow of Events

1. Log in to app using your PIN CODE
2. Select service type/click on change language button
3. Select language type from the given options
4. Fill on the provided space
5. Click on Ok button
6. Check as the process completed successfully
7. Log out

Use case of changing PIN CODE

Basic Flow of Events

1. Long in to app using your PIN CODE
2. Select service type/click on change PINCODE button
3. Fill current PIN CODE on the provided space
4. Fill new PIN CODE on the provide space
5. Confirm the new PIN CODE on the provided space
6. Click on Chang button
7. Check as process completed successfully
8. Log out

Use case of notifications

Basic Flow of Events

1. Lon in to app using your PIN CODE
2. Select service type /click on notification button
3. Read new notifications
4. Log out

Appendix C: Samples of prototype A

Welcome to

Mobile Financial Services

(MFS)

PINCODE

Balance & Statement	Withdrawal
Money Transfer	Bill Payment
Change Language	Change PIN
Notification	Logout

Figure 1: INF ... **re 2: M**

Balance & Statements

****

Your Account Balance is:
xxxxxxxxxx birr

....

Your Transactions:

Date	Amount
2/10/2018	xxxxxxxxxx
3/9/2018	xxxxxxxxxx

Back   Logout

Figure 3: BS

Withdrawals

****

Amount to withdraw

EB

Ok   Cancel

....

Dear xxxx you withdraw xxxx EB.

Your current balance is xxxx.

****

Back   Logout

WDW

Money Transfer (1)

****

Amount of money

[   ] EB

Receiver Account No.

[   ]

[Enter] [Cancel]

****

[Back] [Logout]

Bill Payment (1)

****

Service Provider

[   ]

Service Provider Account No.

[   ]

Amount of Money

[   ] EB

[Enter] [Cancel]

****

[Back] [Logout]

Figure 5: MT

Figure 6: BP

Money Transfer (2)

****

Dear customer Xxxxx EB will be transferred to xxxx. Click Ok button to confirm else Cancel button to reject.

[Ok] [Cancel]

....

Dear xxxx you transfered xxxx EB to xxxx successfully.

Your current balance is xxxx.

****

[Back] [Logout]

Bill Payment (2)

****

Dear customer Xxxx EB will be deducted from your account. Click Ok button to confirm else Cancel button to reject.

[Ok] [Cancel]

....

Dear customer, xxxx EB deducted from your account.

Your current balance is xxxx.

****

[Back] [Logout]

Figure 7: MT2
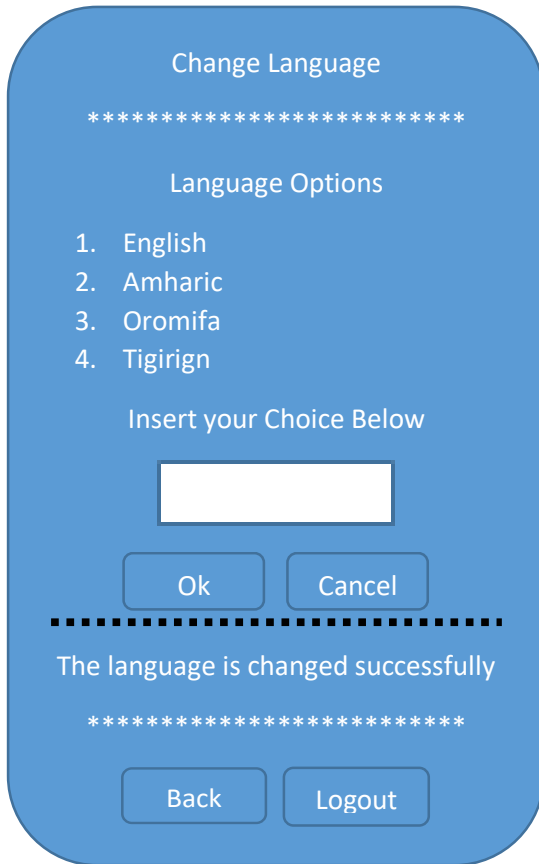
Figure 8: BP

Figure 9: CL
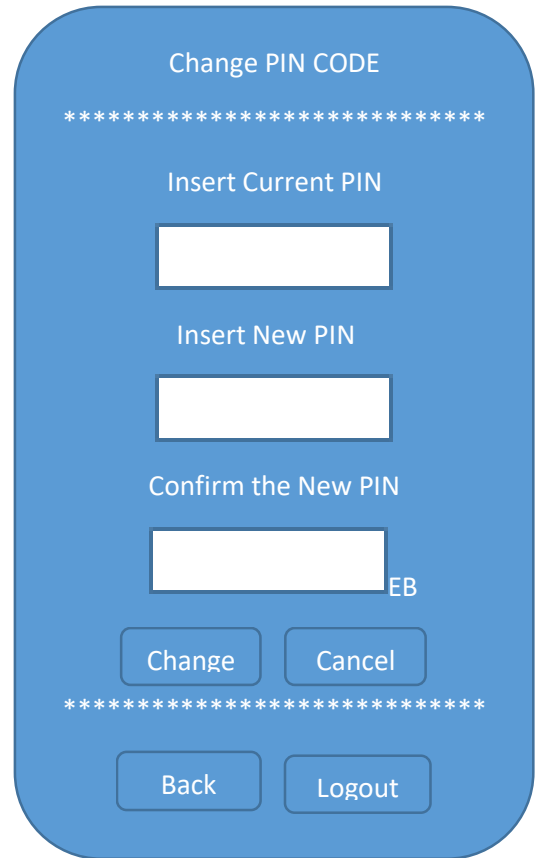
Figure 10: CPC

Appendix D: Samples of prototype B

```
**************************


          *889#


          [ Call ]


**************************
```

Figure 1: INF1

```
**************************


     Welcome to Mobile Financial
  Services (MFS). Press * to navigate
    back any time, select one of the
         following options below:

       1.  To log in
       2.  To exit
          [_____]


            [ Ok ]


**************************
```

Figure 2: INF2

```
**************************



      Dear customer Please

    insert your PIN CODE to login



           [_____]


            [ Ok ]



**************************
```

Figure 3: IN

```
**************************

  Welcome to Mobile Financial
  services (MFS)

       1.  Balance & Statement
       2.  Money Transfer
       3.  Withdrawal
       4.  Bill Payment
       5.  Change Language
       6.  Change PIN
       7.  Notification
       8.  Logout
          [_____]
            [ Ok ]
**************************
```

¡ure 4: M

Balance & Statements (1)

****

My Accounts:

1. Saving Account

2. Current Account

3. xxxxxxxxxx

4. xxxxxxxxxxx

[ ]

Ok

****

Back   **Logout**

Figure 5: BS1

Balance & Statements (2)

****

Dear xxxx your Account Balance is: xxxxxxxxxx EB

• •

Your Transactions:

Date	Amount
2/10/2018	xxxxxxxxxx
3/9/2018	xxxxxxxxxx

• •

Back   **Logout**

Figure 6:BS2

Withdrawals (1)

****

Amount to withdraw

[   ] EB

Ok   **Cancel**

****

Back   **Logout**

Figure 7: WDW1

Withdrawals (2)

****

Enter Agent Number

[   ]

[Ok]   [Cancel]

****

[Back]   [Logout]

Figure 8: WDW2

Withdrawals (3)

****

Enter your PINCODE

[   ]

[Ok]   [Cancel]

****

[Back]   [Logout]

Figure 9: WDW3

Withdrawals (4)

****

Dear xxxx you withdrawal xxxxx EB
successfully. Your current balance
is: xxxx

****

[Home]   [Exit]

Figure 10: WDW4

Money Transfer (1)

****

Your Account No.

[   ]

[Enter]   [Cancel]

****

[Back]   [Logout]

Figure 11: MS1

Money Transfer (2)

****

Receiver First Name

Enter   Cancel

****

Back   Logout

Figure 12: MT2

Money Transfer (3)

****

Receiver Last Name

Enter   Cancel

****

Back   Logout

Figure 13:MT3

Money Transfer (4)

****

Receiver Account No.

Enter   Cancel

****

Back   Logout

Figure 14: MT4

Money Transfer (5)

****

Amount of money

EB

Enter   Cancel

****

Back   Logout

Figure 15: MT5

18

Money Transfer (6)

****

Your PINCODE

[   ]

[Enter]   [Cancel]

****

[Back]   [Logout]

Figure 16: MT6

Money Transfer (7)

****

Select:

1. To confirm
2. To cancel

[   ]

[Enter]   [Cancel]

****

[Back]   [Logout]

Figure 17: MT7

Money Transfer (8)

****

Dear xxxxx you transferred xxxxx EB
to xxxxxx account No. your current
balance is : xxxxx EB

****

[Home]   [Exit]

Figure 18: MT8