

Effects of Mobile Payment Based on Multi-interface Terminal

By

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ABSTRACT

Communication technologies provide space for consumer's banking transaction and provide the option to access bank's facilities anytime and anywhere. Mobile banking is a subset of electronic banking which underlines not only the determinants of the banking business but, also the special condition of mobile commerce. It is the latest and most innovative service offered by the banks. However, enough study has not been carried out regarding how customers perceive and evaluate electrically delivered mobile banking services. This paper therefore examines the properties of mobile banking and the perceived risk associated with mobile banking. The study also points out some strong and positive effect on customers to accept mobile banking system. Internet banking, digital banking and mobile banking are extension of the technological progression that is now characteristics of the banking sector. Mobile banking involves the access and provision of banking and finance services through mobile devices.

INTRODUCTION

The proliferation and rapid advances in technology-based systems especially, those related to the internet are leading fundamental changes on how companies interact with customers. J. Muir (2003) says Mobile phone usage has spread in a very broad manner both in developing and developed countries. Barnes and Corbitt (2003) says. "with mobile communications already has a prime case for leapfrogging traditional infrastructure, mobile banking (M-Banking) has a great potential for extending the provision of financial services to unbanked people through a technology that is both familiar and widespread". One of the first commercial applications of the mobile commerce was mobile banking (m-banking). The rapid growth of mobile applications has given rise to a new term: m-commerce.

M-commerce is defined as the application of wireless communications networks and devices to the execution of transactions with monetary value — either direct or indirect. Jovan Golic, Vittorio Bagini et al (2002) says: As the number of mobile phone users is growing, purchasing products and services using mobile phones and other mobile devices are also increasing: also the use of Mobile Banking is still in initial stages and more research in this field is needed. Markus Jakobson et al (2001) says Internet banking and mobile banking (m-banking) has become the self service delivery channel that allows banks to provide information and offer services to their customers with more convenience via the web services technology. A key component of many initiatives is the implementation of Customer Relationship Management (CRM) software. Scott Fluner et al (2001) observed that many companies in the financial services sector have been quick to implement Internet capabilities, and electronic service is becoming a viable option for interaction between financial service providers and their customers. Mmattos (2010) says Customer satisfaction and customer retention are increasingly developing into key Success factors in e-banking. Information Societies Technology (IST) 2001 says Technology in particular has been increasingly employed in service organizations to enhance customer service quality and delivery, reduce costs and standardize core service offerings. Mobile banking service allows customers to manage their accounts with ease.

BRIEF HISTORY OF MOBILE BANKING

Originally, mobile payments and other mobile services relied on text messaging to complete transactions. Many startup companies start out with text message services for customers and later move on to mobile apps and contactless payment systems that do not require the user to send or receive a text message.

The first example of mobile payments came in 1997 when Coca Cola introduced a limited number of vending machines where the customer could make a mobile purchase, the customer would send a text to the vending machine to setup payment and the machine would then vend their product. Mobile banking first appeared in 1997 as well through the Merita Bank. It accepted text messages for making bank account transactions.

Later in the year 1999 two of the biggest m-commerce platforms was launched and this saw the national m-payments system that was launched by Smart as Smart Money, a Philippines based commercial platform, apart from this was the launch of the iMode which was the first of its kind internet mobile platform by NTT DoCoMo. This witness the launch of the revenue sharing deal where 91% of the content payment was given to the owner and only 9% of it was kept by DoCoMo.

From there on the use of mobile phones began to increase, mobile communications captured the markets and then it almost quickly began to evolve into mobile marketing that would only enable electronic payments via mobiles. In 2000 mobile parking in Norway was launched, another revolutionary concept that occurred was that in Austria mobile tickets for trains were being offered while in Japan a revolutionary system of trying to sell or advertise the sale of plane tickets was taking place.

The mobile devices manufactured by some of the giants like Motorola. Nokia. Ericsson, Qualcomm along with some of their carriers, like Sprint, ST&T etc have all strived to bring about smart phones that were WAP enabled. This was widely accepted by the youth all over the world who were not very price sensitive at all, and who preferred technology like Bluetooth, faxes, email and smart phone capabilities on their hand held devices.

The mobile payments or mobile banking witnessed a huge changes when the iPhones were introduced. This gave the possibility to add in system or applications that used m-commerce which was not SMS based but more advanced and very e-commerce prominent. This kind of technology used by Smartphone's allowed the integration of mobile interface with the existent m-commerce to bring about mobile payments.

Currently banks are now taking a look at possibilities that they' can use on their mobile phones paving the way to make payment electronically via online mobile payment. where they can not only access their accounts but also transact money, make payment. purchase stock etc. This is a different model cut together and is commonly known as mobile banking. Consumers can also make mobile purchases now, and this is though secure payment structures that is now available through their mobile phones.

CONCEPTS OF MOBILE BANKING

Mobile phones delivered voice data, they are used as a vehicle to deliver banking services. Most phones however, also provide text-messaging capabilities, and a growing number are Web-enabled. That makes the mobile phone an ideal medium through which banks can deliver a wide variety of services. Banks classify these services based on how information flows.

A pull transaction is one in which a mobile phone user actively requests a service or information from the bank. For example, inquiring about an account balance is a pull transaction. So is transferring funds, paying a bill or requesting a transaction history. Because banks must respond or take some action based on the user request. Pull transactions are considered two-way exchanges.

A push transaction, on the other hand, is one in which the bank sends information based on a set of rules. A minimum balance alert is a good example of a push transaction. The customer

defines the rule “Tell me when my balance gets below ₦200” and the bank generates an automatic message any time that rule applies. Similar alerts can be sent whenever there is a debit transaction or a bill payment. As these examples illustrate, push transactions are generally one way from the bank to the customer.

The chart below summarizes these various types of mobile banking services.

	Push	Pull
Transaction		<ul style="list-style-type: none">▪ Fund transfer▪ Bill payment▪ Share transfer▪ Check order
Inquiry	<ul style="list-style-type: none">Minimum balance alert▪ Credit /debit alert▪ Bill payment alert	<ul style="list-style-type: none">▪ Account balance inquiry▪ Account statement inquiry▪ Check status inquiry▪ Transaction history

MOBILE BANKING TECHNOLOGIES

There are four fundamental approaches to mobile banking. The first to rely on technologies that are standard features on almost all mobile phone.

Interactive Voice Response (IVR): If you’ve ever called your credit card issuer and meandered through a maze of prompts - “For English, press I; for account information. press 2” - then you’re familiar with interactive voice response. In mobile banking, it works like this:

- i. Banks advertise a set of numbers to their customers.
- ii. Customers dial an IVR number on their mobile phones.
- iii. They are greeted by a stored electronic message followed by a menu of options.
- iv. Customers select an option by pressing the corresponding number on their key pads.
- v. A text-to-speech program reads out the desired information.

IVR is the least sophisticated and the least “mobile” of all the solutions. Infact it does not require a mobile phone at all. It also only allows for inquiry-based transactions, so customers can’t use it for more advanced services.

Short Message Service (SMS)

In some circles, mobile banking and SMS banking are synonymous. The iconic activity of cell phone use SMS works in either a push mode or a pull mode. In pull mode, the bank send a one-way text message to alert a mobile subscriber send a text message to alert a mobile subscriber of a certain account situation or to promote a new bank service. In push mode the mobile subscriber sends a text message with a predefined request code to specific number. The bank then responds with a reply SMS containing the specific information.

Advanced Mobile Banking Technologies

The next generation of mobile banking is the most similar to the Internet banking paradigm. It requires an application--either a browser or a standalone application -- and a more advanced Smartphone to run it. Smartphone’s are more like real PCs. with an identifiable operating system and advanced functionality, such as enhanced data processing and connectivity. There are two approaches to setting up this type of mobile banking.

Wireless Application Protocol (WAP)

WAP is the technology architecture that makes accessing Internet pages possible from a mobile phone, because it includes the concepts of browsers, servers, URLs and gateways. WAP provides a user experience that echoes Internet banking conducted on a home computer.

Standalone Mobile Application

Some banks are now providing a downloadable client that mobile subscribers can LISC to access bank services. These mobile applications offer a reliable channel and enable users to

conduct even complex transactions. They also allow banks to customize the interface and brand it accordingly.

Although this solution likely represents the future of mobile banking, there are some issues. First, users are forced to download, install and learn a proprietary application. Not only that, the application must be customized to each mobile phone on which it will reside. Greatly increasing development costs. And just like the mobile browsers used in WAP banking, these standalone applications are vulnerable to attacks, have limited availability and can only accommodate customer-initiated communication.

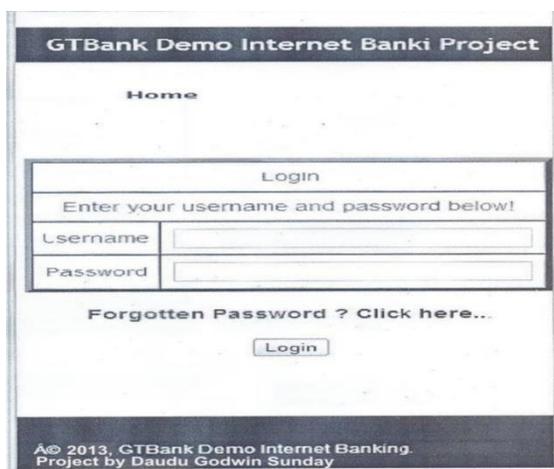
DESIGN OF THE SYSTEM

The system design is an offshoot of the numerous findings in the research phase and it requires a good sense of conceptualization, innovation, creativity and imagination of the designer especially in the design process. It is a stage complementing the analysis stage. The system design is a process whereby definite specifications of a system are produced.

INPUT DESIGN

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put data into a usable form for processing data entry. The activity of putting data into the computer for processing can be achieved by having people keying the data direct into the system. The design of input focuses on controlling the amount of input required, controlling errors, avoiding delay, avoiding extra steps and keeping the process simple. The error raising method is also included in the software, which helps to raise error message while wrong entry of input is done.

Customer must have a valid User Id and password to login to the system. After the valid user logs in he is shown the list of accounts he has with the bank. On selecting the desired account, he is taken to a page which shows the present balance in that particular account number, user can request details of the last 'n' number of transactions he has performed. User can make a funds transfer to another account in the same bank. User is provided with a transaction password which is different from the login password.



OUTPUT DESIGN

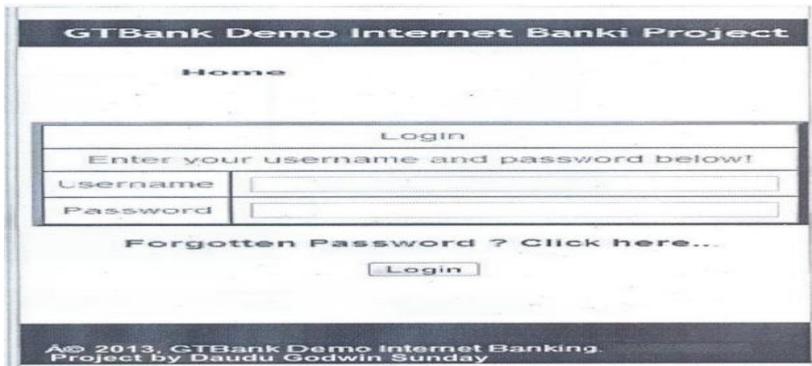
Computer output is the most important and direct information source to the user. Output is the information delivered to users through the information system. Some data did not require any process before they can become output. They are stored and retrieved as output while some require extensive processing before they can serve as output. It is the information displayed on the screen that will determine the user friendliness of the system. In quality of its output which can be in hardcopy or softcopy i.e. screen display.

Output design is a process that involves designing necessary outputs in the form of reports that should be given to the users according to the requirements.

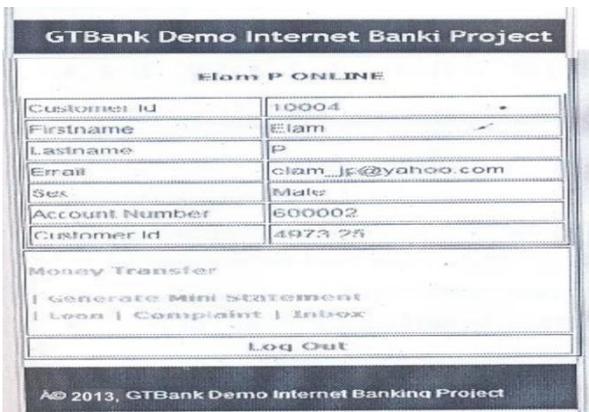
User can transfer funds from his account to any other account with this bank. If the transaction is successful a notification appears to the customer, in case it is unsuccessful, a proper message

is given to the customer as to why it failed. User can request For cheque book/change of address/stop payment of cheques. User can view his monthly as well as annual statements.

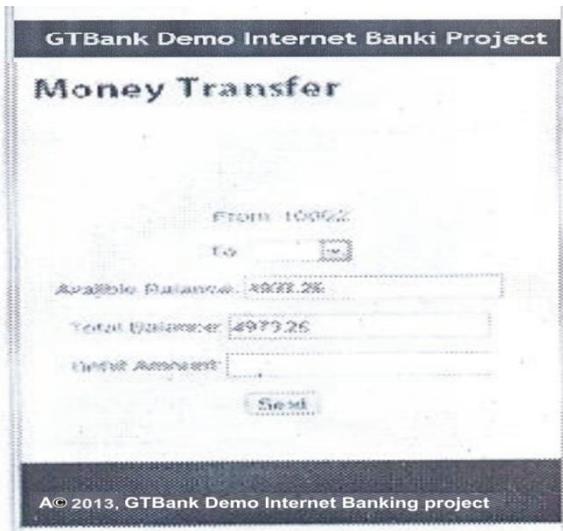
Customer login page



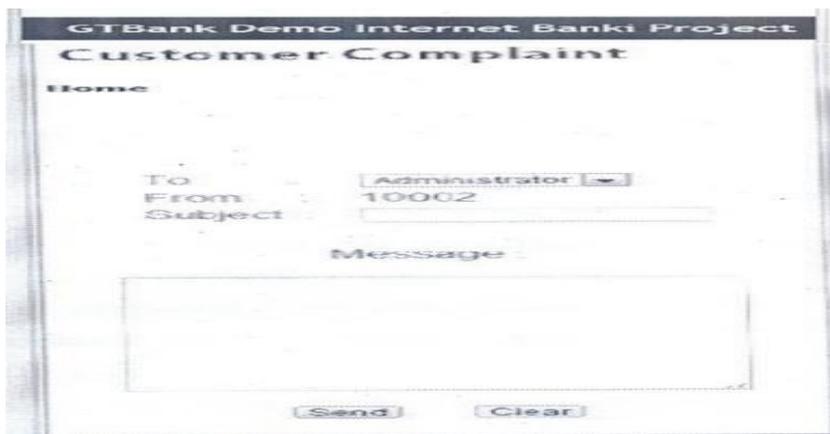
Customer user home



Customer money transfer page

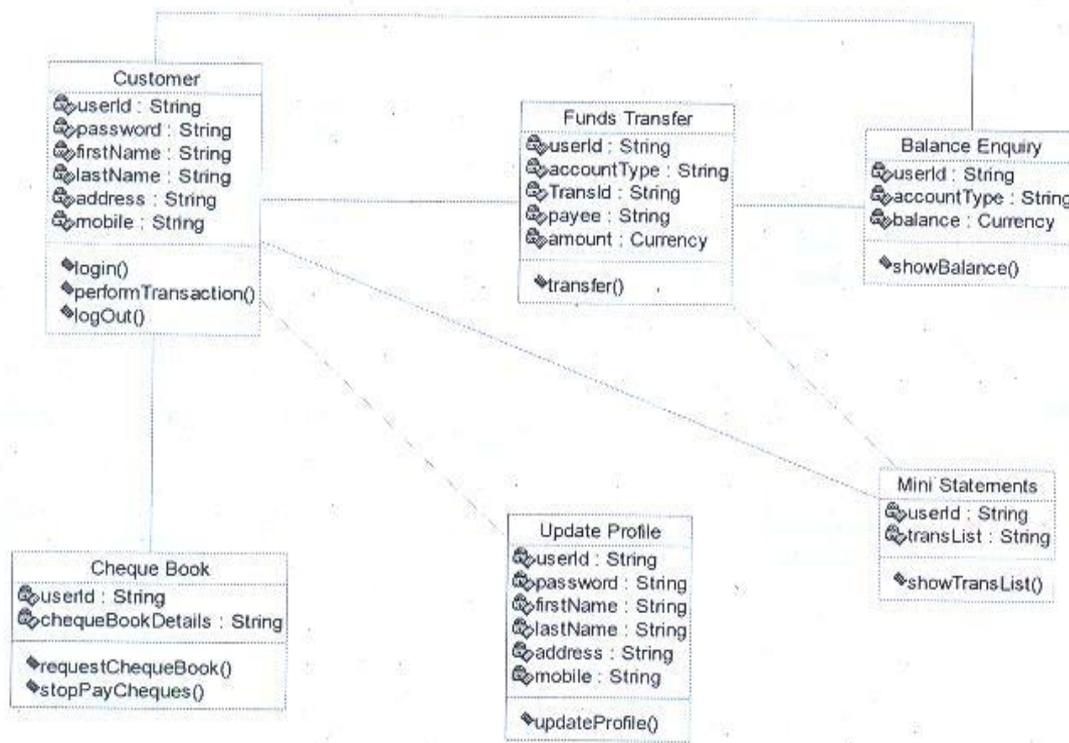


Customer complaint home



DATABASE DESIGN

The detail tables that have been designed to store the necessary information in which the tables contain fields that correspond to columns and rows of data is as shown above.



SYSTEM IMPLEMENTATION

System implementation is concerned with the coordination control of the activities to put the system into operation. Planning the implementation of a system begins in the design stage. It is the duty of the analyst to plan and test the new facilities to ensure that the new system is functional. For effective functioning of the new system, system specification should be considered mainly.

It also deals with the hardware and the software Requirement for the application. The platform and speed on which the system should be erected are basically important because ii it is not considered; it might affect the application execution.

CHOICE OF PROGRAMMING LANGUAGE.

PHP

In the recent development, PI-IP has grown enough to fulfill the requirements of the clients. The choice of PHP programming language is that the application will be available through the internet. Several web tasks can now be easily performed using PHP that was not possible earlier.

Advantages of PHP

- i. Php programming language is extremely user-friendly in comparison to ASP dot net. classic ASP, C and C++. This is why it is preferred by most of the business houses as it drives more traffic towards their site. This language has an edge over the others as it can surely help programmers in more than one way. In short anyone and everyone can work on this language which is the most important aspect of internet marketing.
- ii. Php programming language is also popular, because it is very resourceful. This means that it is friendly with most of the servers as well as operating systems like Windows, Mac and Linux. Database servers like My SQL work absolutely fine with a PHP base. This makes it a different kind of language with so various supporting functions.

HTML (Hypertext Markup Language)

This is a standard language for creating web pages. It provides tags that make documents look attractive using graphics, fonts and colors to enhance presentation. It is based on tags that mark up text-based documents. They instruct Web browsers how to display content.

CSS (Cascading Style Sheets)

Cascading Style Sheets (CSS) is a simple mechanism for adding style (e.g., fonts, colors, spacing) to Web documents.

The purpose is to separate structure from style, leaving HTML to deal with the former while CSS takes over the latter.

Advantages of CSS

- i. **External Style Sheets can save you a lot of work:** CSS can save you a lot of work when designing a website. Most modern browsers now support CSS so its safe and easy to use.
- ii. **External Style Sheets are stored in CSS files:** CSS allows external style sheet to control the layout and web design of the whole site. The best way is generally to use an external CSS file; it controls mans different elements throughout the entire site instead of defining the same elements again and again in all of the HTML files.

JavaScript

JavaScript is a versatile language. It is used as the Browser Side Scripting language. It can also be used to create menus, validate forms, provide interactive calendars: post the current day's headlines, produce background effects on a Web page, track a visitor's history on your site, and play games, among many other things. That's probably why it's one of the most popular languages on the World Wide Web.

Advantages of JavaScript

- i. JavaScript is an excellent solution to implement when validating input forms on the client side. This means that if a user forgets to enter his name in a firm for instance a JavaScript validation function can popup a message to let him know about the omission.
- ii. Another area where JavaScript excels is in the creation of dynamic effects, because JavaScript runs inside the clients' browser it can be used to change the appearance of

the users' screen after the page has been sent by the server. This allows it to create some very impressive dynamic image effects.

My SQL

My SQL is a fast, easy-to-use RDBMS used for databases on many Web sites. Speed was the developers' main focus from the beginning. In the interest of speed, they made the decision to offer fewer features than their major competitors (for instance, Oracle and Sybase). However, even though My SQL is less full featured than its commercial competitors, it has all the features needed by the large majority of database developers. It's easier to install and use than its commercial competitors.

Advantages of My SQL

My SQL is a popular database with Web developers. Its speed and small size make it ideal for a Web site. Adding to these facts, here are some rundown of some of its advantages:

- i. It's fast. The main goal of the folks who developed My SQL was speed. Consequently, the software was designed from the beginning with speed in mind.
- ii. It can run on many operating systems. My SQL runs on a wide variety of operating systems — Windows, Linux, Mac OS, most varieties of Unix (including Solaris, AiX, and DEC Unix), FreeBSD, OS/2, Irix, and others.
- iii. It supports large databases. My SQL handles databases up to 50 million rows or more. The default file size limit for a table is 4GB, but you can increase this (if your operating system can handle it) to a theoretical limit of 8 million terabytes.

HARDWARE SUPPORT

The system facility used for the development of the program is Compaq Desktop computer with its configuration listed below:

- i. Processor: Intel(R) Pentium (R) CPU P6 100 @2.00GHz
- ii. Memory: 1.00GB
- iii. Hard Disk: 320 GB
- iv. Display: Compaq H236 Monitor

The minimum configuration of the hardware system (computer) required to operate this program effectively is:

- i. Processor: Pentium 4
- ii. Memory: 5 12MB
- iii. Hard Disk: 40 GB
- iv. Display: Minimum of 1287 x 600 dpi
- v. Printer (Optional): LaserJet of DeskJet

The minimum configuration of the hardware system (mobile phone) required to operate this program effectively is:

- i. Processor: Pentium 4
- ii. Memory: 5 12MB
- iii. Hard Disk: 40 GB
- iv. Display: Minimum of 1287 x 600 dpi
- v. Printer (Optional): LaserJet of DeskJet

SOFTWARE SUPPORT

The software used in implementing this program consist of the following:

- i. Database: My SQL
- ii. Application: php
- iii. As the Server Side Scripting language.

- iv. Word Processor.
- v. Mozilla Firefox 3.5.8 Web browser
- vi. Wampserver Version 2.0
- vii. Adobe Dreamweaver CS5

IMPLEMENTATION TECHNIQUES USED IN DETAILS

After the new system has been tested and proved to be effective, the changeover from the old system to the new system is necessary. This can be achieved in many ways but the choice for a computerized system replacing a manual system in parallel Conversion. The former system continues to operate, unchanged. When the new system is installed and both are run for a while Side-by-side the output is then compared item-by-item until till discrepancies are identified and corrected.

The project uses the SSL (Secure Socket Layer) protocol for transferring data. SSL is encryption that creates a secure environment for the information being transferred between customer browser and Bank. The Mobile Banking project uses 12-bit digital certificate from COMODO for encryption of the Secure Sockets Layer (SSL) session. SSL is the industry standard for encrypted communication and ensures that customers interaction with the Bank over the Internet is secure. Secure Socket Layer (SSL) protects data in three key ways:

Authentication ensures that you are communicating with the correct server. This prevents another computer from impersonating Bank.

Encryption scrambles transferred data.

Data integrity verifies that the information sent by customer to Bank wasn't altered during the transfer. The system detects if data as added or deleted after customer sent the message. If any tampering has occurred, the connection is dropped.

SYSTEM DOCUMENTATION

Documentation is a detailed description of a particular system. That is, it is a place of rite up that describes what a system does and how it does it. It has much important usefulness in a mobile banking system. It safeguards and gives maintenance advice for modification, configuration and proper use of a system.

PROGRAM DOCUMENTATION

The implementation of the proposed system includes the detailed documentation and FAQ5 section for users, making the help file available for them. No documentation is complete without familiarizing users with simple system maintenance activities. Since the proposed system is developed in a GUI, usage will be comparatively easy than systems developed in a non-GUI. Success of the system depends on the way in which it is operated and used. Therefore, the quality of documentation given to the operating person affects the successful implementation of the system.

OPERATING THE SYSTEM

To start using the program the customer need to perform the following:

- i. Open the web browser on his/her phone
- ii. Type www.mobibankproject.com in the address bar
- iii. Once the program detects that the visit is from a mobile phone, it will redirect the user to the mobile site.
- iv. Click Login
- v. Supply the username and password to the account

MAINTENANING THE SYSTEM

Maintenance is also very important because it improves the lifespan and efficient of the system. All aspects of the application are expected to be secured. For the application to work effectively, the following are to be carried out.

HARDWARE MAINTENANCE

These include:

- i. All devices should be properly connected to the appropriate power supply.
- ii. Cleaning of the computer environment to prevent dust and dirt from accumulating on the parts of the computer.
- iii. Installation of air conditioner system to cool the system while working thus maintaining the room temperature.
- iv. Using dust cover to prevent dust from entering the internal component

SOFTWARE MAINTENANCE

These are:

- i. Back-up all information on the hard disk and other removable storage medium like the floppy disk, CD etc.
- ii. Deleting redundant files on the system.
- iii. A suitable diagnostic program such as antivirus program should be installed on the system to increase the lifespan of the system.
- iv. The programmer should be contacted in case of problems with the program or
- v. qualified system analysts.

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