

## DEVELOPMENT OF AN ENHANCED SECURED MOBILE COMMERCE MARKETPLACE

Eneh, S. Afam

*Department of Biomedical Engineering, Faculty of Basic Medical Science, Enugu State University of Science and Technology,  
Enugu State, Nigeria*  
[engrfamzy@gmail.com](mailto:engrfamzy@gmail.com)

Udechukwu, C. P

*Department of Electrical Electronics Engineering, Faculty of Engineering, Enugu State University of Science and Technology,  
Enugu State, Nigeria*  
[patbased@yahoo.com](mailto:patbased@yahoo.com)

Mba L david

*Department of Computer Science, Faculty of Natural Science, Enugu State University of Science and Technology,  
Enugu State, Nigeria*  
[David.mbah@esut.edu.ng](mailto:David.mbah@esut.edu.ng)

Odohi fesinachi C

*Department of Computer Science, Faculty of Natural Science, Enugu State University of Science and Technology, Enugu  
State, Nigeria*  
[odohcord@gmail.com](mailto:odohcord@gmail.com)

### Abstract

Wireless Communication has changed the face of communication and information exchange, much as the internet did with the advances made in the mobile technology arena, new opportunities are created. Mobile commerce (m-commerce) is one such opportunity. Each new advance in technology brings with it associated risks. This project focuses on the risks involved with m-commerce for the business industry. This project provides a detailed overview of basic service that any m-commerce application should provide to the business industry. These principles provide the foundation for securing any financial transaction over untrusted Networks. The security of wireless networks has come under attack in the past. This is largely due to the fact that the wireless consortium opted to develop their security technologies in secret, rather than in public domain. This project aims to evaluate the security offered by wireless and access potential attacks in order to further understand risks associated with m-commerce business over wireless. The web pages developed here were designed to handle all these analysis and respond appropriately to the user. The underlying workings of the system were developed using HTML for the web pages. The driving scripts were developed using Microsoft active server pages (ASP) and PHP Scripts. The entire system was implemented on windows 10 operating system platform. Finally, the entire system was designed to perform a full package of M-commerce Business over wireless

Keyword: Wireless Communication, Mobile commerce.

### I Introduction

There is no doubt that mobile technology has changed the face of this world by creating many

opportunities in our society today. Mobile Commerce (M. Commerce) is one of such opportunities created. But every new

advancement made in any technology comes with its risks. High security and single sign on, including minimalism and Manageability still remain the major problems of M. Commerce that needs serious attention. According to Forbes, an average of 30,000 websites are hacked on daily basis. This has resulted in thousands of m. commerce being compromised every year by cyber-attacks. Even though it may not be possible to stop the hackers from hacking m. commerce stores, preventive measures to secure online store and the data of the users will be taken. This project focuses on security of m. commerce.

Mobile commerce reflects the natural progression of technology as users are spending more of their time on mobile devices instead of desktop computer. Of all the shopping channels available to customers, M. commerce is taking the lead. According to [1], Mobile Commerce is forecasted to have the biggest retail sales growth (12.2%) in 2021, beating the traditional e commerce and in-store shopping. Since wireless devices travel with the consumer, the ability to purchase goods and services is always there. Due to the astronomical growth of the internet users, maturation of the internet technologies, realization of the internet's capabilities, the power of electronic commerce, and the promising advancement of wireless communication technologies and devices, mobile commerce has rapidly attained the business fore - front. M-commerce, although not fully mature, has the potential to make it more convenient for customers to spend money and purchase, goods

and services. M-commerce is an e-commerce with wireless access. E-Commerce is the subset of M-commerce. E-commerce (electronic commerce) can be defined as the mutual exchange of perceived or monetary value by electronic means over open accessible networks. This basically means communication over the internet for some or all of the transaction processes [2].M- Commerce (M-commerce) can be defined as any transaction with added value for the user, which is carried out by means of mobile/wireless device or infrastructure [2].Mobile-finance (m-finance) is a subset of M-commerce that offers a range of banking share dealing and insurance services [2]. With the coming of advanced and sophisticated services, mobile communications combined with e-commerce proportions are heightening the attractiveness of M-commerce. In [3], the author argues that although SMS messages are encrypted over the air link, it is highly accessible for attacks from the network provider side due to its store and forward technology. He also states that injection of malicious and false SMS messages is possible through poorly protected SMS gateways. This indicates that authentication, authorization, confidentiality and integrity of the SMS communications are at risk.Different network operators implement various specifications in differing ways due to the high cost involved in securing these networks. Some networks operators even have some proprietary applications running on their networks to try and

limit the cost involved in applying the GSM standards. These factors imply that one can blindly trust the security offered by GSM and its accompanying applications. Therefore, an alternative solution is required, and this project investigates the possibilities and proposes a secure solution that is cost effective and applicable to the African environment.

## **II Literature review**

Author [4] presented a framework which identifies the value-adding features of m-commerce. They made a distinction between the value that is offered by the wireless internet technology itself-wireless value- and the value emerging from the actual mobile use of a device-mobile value.[5] propose M-commerce presents a new channel and medium for commerce. For M-commerce to become a viable means of doing commerce and to gain widespread adoption, it is important that vendors understand and focus on the “values” of m-commerce, from the customers perspectives; that is, what are customers overall assessments of m-commerce, and what do customers expect from M-commerce,[6] and [7]classify m-commerce applications into 8 broad categories namely m-banking, m-entertainment, mobile information services, m-marketing, m-shopping, m-ticketing, m-health and telemetric services. [7] identify a number of these unique features namely ubiquity, immediacy, instant connectivity, localization, data portability, proactive functionality and simple authentication procedure.From the literature above, many

researcher have developed different framework of both electronic commerce and mobile commerce but hackers still attack peoples account, hence, this paper tends to develop an enhanced secured mobile commerce marketplace.

## **III Analysis of the Existing System**

A detailed investigation and analysis of the system was carried out as to help give the researcher an in depth knowledge of the present system, and be able to know the problems presented in this system. The researcher critically analyzed the existing system with a view to discovering the barriers. Roundtable participants recognized that several existing barriers will have to be overcome if m-commerce is to emerge as a viable option for the country’s entire population. These barriers include the following:

- i. Concerns about security.
- ii. Lack of awareness.
- iii. Lack of simple, standardized payment mechanism.
- iv. Imbalance between service providers and network operator

## **Proposed System Flowchart**

System flowchart describes the data flow for a data processing system. It provides a logical diagram of how the system operates. It represents the flow of documents, the operations performed in data processing system. It also reflects the relationship between inputs, processing and outputs.

Figure 1: Shows the systems flowchart for proposed system.

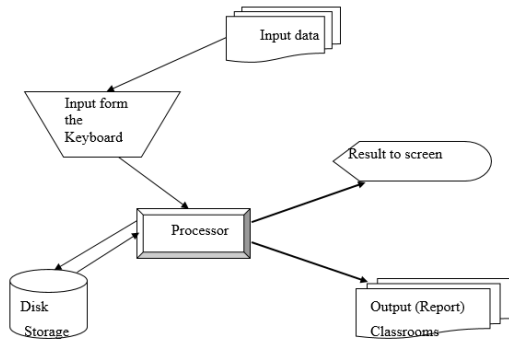


Figure 1 System Flowcharts for the Proposed System

#### IV Proposed system Program Flowchart

A program flowchart represents, in detail, the various steps to be performed within the system for transforming the input into output. The various steps are logical arithmetic operations, etc. It serves as the basis for discussions and communication between the system analysis and the programmers. Program flowcharts (Figure 2) are quite helpful to programmers in organizing their programming efforts.

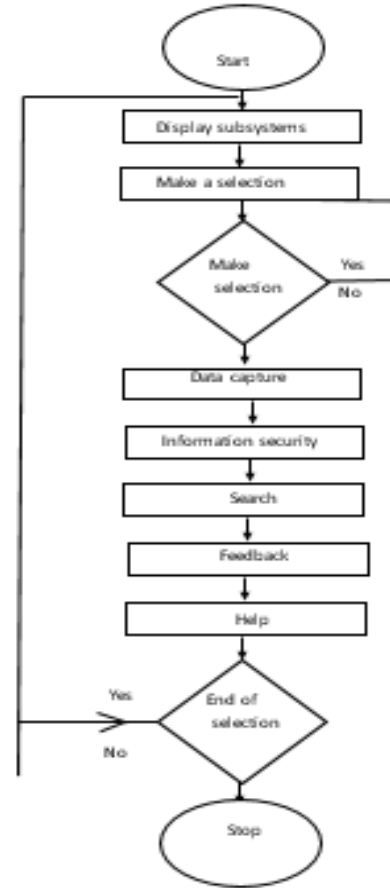


Figure 2 Proposed system Program Flowchart.

#### V System Design

Based on the user requirements and the detailed analysis of a new system, the new system must be designed. This is the phase of system designing. It is the most crucial phase in the development of a system. **System design** is the process of designing the elements of a system such as the architecture, modules and components, the different interfaces of those components and the data that goes through that system. The purpose of the System Design process is to provide sufficient detailed data and

information about the system and its system elements to enable the implementation consistent with architectural entities as defined in models and views of the system architecture

**a. Input Analysis And Design**

Input Design is the process of converting a user-oriented description of the input into a computer-based system. This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

The input forms are designs generally based on the necessary data that needs to be entered into the system. The data are captured through the keyboard and stored on a magnetic disk in an access database. The input forms designed in the new system includes online purchase form and feedback form, (Figures 3 and 4).

**b. Online Purchase Form**

Online purchase form (figure 3) contains the following information such as customer’s name, E-mail address, unit price and phone number of the customer that request the products.

Order	<input type="text"/>
Customer Name	<input type="text"/>
Delivery Address	<input type="text"/>
Phone	<input type="text"/>
E-mail	<input type="text"/>
Product Description	MTN Line
Unit price	400
Quantity	<input type="text"/>
Total Amount	<input type="text"/>
Date Ordered	<input type="text"/>
Payment Method	Visa Card
Bank	<input type="text"/>
Deposit Slip/Master Card No	<input type="text"/>

**Figure 3 Online purchase form**

**c. FEED BACK FORM**

This form contains most of the information on customer’s feedback report. Below is the form design. Figure 3: Shows the feedback form design

First Name	<input type="text"/>
Last Name	<input type="text"/>
E-mail	<input type="text"/>
Company Name	<input type="text"/>
Business phone	<input type="text"/>
Enter specific Question of Request	<input type="text"/>
<input type="button" value="Submit"/> <input type="button" value="Home"/>	

**Figure 4Feedback form**

**d. Output Analysis And Design**

The output from the new program is designed in such a way that it conveys meaningful information to the management. The customer’s product order is delivered to the management. The design of the outputs is done using web page report formats and grid controls.

The system is designed to generate outputs on the following;

- a. Product delivery report.
- b. Product and services
- c. Feed backs.
- d. Income report
- e. Query

<b>Bank</b>	Zenith	Union Bank	GTB
<b>Payment Method</b>	Visa Card	Bank Draft	Cash Deposit
<b>Date Order</b>	11/6/2009	3/4/2009	3/7/2009
<b>Total Order</b>	20000	250	35000
<b>Qty</b>	50	1	100
<b>Unit price</b>	400	250	350
<b>Product Description</b>	MTN Line	Glo Line	400 Air Time
<b>Email</b>	hen@yahoo.com		eric@yahoo.com
<b>Phone</b>	08045321345	08054312312	08034524318
<b>Delivery Address</b>	4 Eke St. Uwani	7 Kaduna St.	2 Ogui Rd. Enugu
<b>Customer Name</b>	Henry Amadi	Faith Ugwu.	Joseph Eric

**e. Product Order Report Subsystem**

**Table 1 product order report form.**

Product order report system (Table 1) contains the following; payment method, card number and status.

**f. New Products Subsystem**

New products subsystem (figure 5) contains the following information such as product ID, product description and unit price

Product ID   
 Product description   
 Unit price

**Figure 5 New product form**

**g. Feedback Report Subsystem**

Feedback report subsystems (Table 2 ) contain the following; first name, last name and company name

First Name	Last Name	Email	Company Name	Business phone	Question
Ike	James	james@yahoo.com	Bertex Ltd	08066432121	Want to be your distributor

**h. Income Report Subsystem**

Income report subsystems (Table 3) contain the following; customer name, unit price and total amount.

Order No	Customer Name	Product description	Unit price	Qty	Total Amount	Date ordered
1	Kinsley bAmadi	MTN Line	400	50	20000	11/6/2009 12:00:00 AM
2	joel Ugwu	Glo Line	250	1	250	3/4/2009 12:00:00 AM
3	ugbir Eric	400 Air Time	350	100	35000	5/7/2009 12:00:00 AM

**Figure 3 Income report form.**

**i. Query Subsystem**

Order No    
 Name    
 Phone    
 Status    
 Date from  To  To  Go

**Figure 6 Query form.**

Query subsystems (figure 6) contain the following; name, phone, status and order number.

**Product Delivery Subsystem**

Date   
 By   
 Remark

**Figure 7 Product delivery form**

Product delivery subsystems (figure 7) contain the following; date and remark.

**j. Specification And Database File Design**

SQL database was used in the design and implementation of the new system database.

The files used for this new system are;

FIELD NAME	DATA TYPE	FIELD SIZE
Order No	Integer	2
Customer Name	Nchar	100
Address	Nchar	100
Phone	Nchar	20
Email	Nchar	30
Product Description	Nchar	50
Unit Price	Float	4
Qty	Integer	2
Total Amount	Float	4
Date Ordered	Date/Time	8
Remark	Nchar	50
Payment Method	Nchar	20
Bank	Nchar	70
Card No	Nchar	15
Delivery Date	Date/Time	8
Delivered By	Nchar	40

Table 4 Product order file

**k. Feed Back Table**

FIELD NAME	DATA TYPE	FIELD SIZE
Visitor No	Integer	2
First Name	Nchar	50
Last Name	Nchar	50
Email	Nchar	30
Phone	Nchar	20
Company	Nchar	50
Request	Nchar	200

Table 5 Feedback file.

**l. Products Table**

FIELD NAME	DATA TYPE	FIELD SIZE
ID	Integer	2
Description	Nchar	50
Unit price	Float	4

Table 6 product file

**m. Password Table**

FIELD NAME	DATA TYPE	FIELD SIZE
Access Level	Integer	2
User Name	Nchar	50
Password	Nchar	15

Table 7 Password file.

**n. Top Down Design**

Top down design is a designer process whereby a designer begins from the top most level to break the system down into subsystems. Thereafter he takes each subsystem in turn and breaks it into program modules. Each program module can further be broken down into subroutines, functions and simple programming statements (languages).

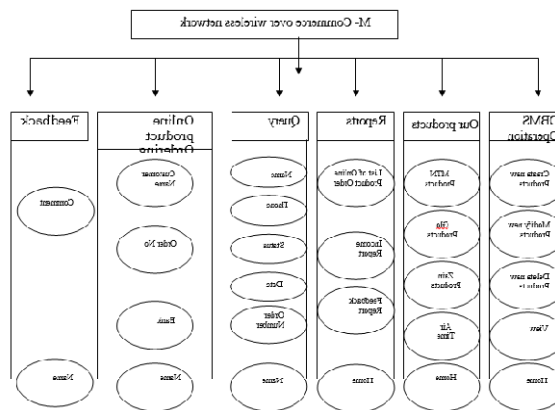


Fig 8 Top down Design

### o. The Wireless Application Protocol (WAP)

Although Wireless Transport Layer Security (WTLS) provides us with wireless application protocol (WAP) security over the wireless network, much the same as SSL (secure socket layer) does in the wired medium, a huge flow exists in some implementations of WAP. This is commonly referred to as the WAP gap. The WAP gap comes from the manner in which the WAP gateway is implemented. The WAP gap highlights the issue of control over the WAP gateway. In certain implementations of the WAP model the WAP gateway is not under the control of the financial institution. In essence, not having control over the physical and logical security of the gateway renders it an untrusted in the end - to - end security of the transaction data. Due to the WAP stack functionality it is not feasible to do away with gateway. It is therefore necessary to establish the extent of the risk and alternatives to of address these risks.

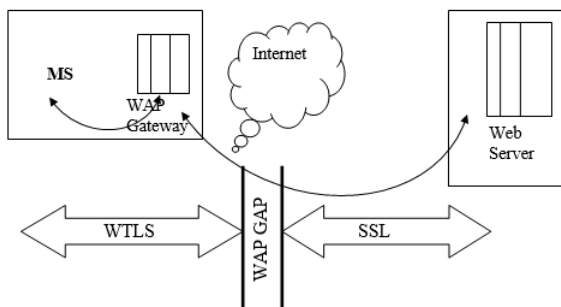


Fig 9 Wireless Application protocol

### V. Justifications For Choice Of Programming Language

Hypertext Preprocessor PHP5 programming language was used in the implementation of the program. This is because of its numerous facilities that enable the program to run online. Its Net frame work, integration with SQL database, its modularity in program, graphical user interface and so on made it more relevant for the implementation of the program

### VII HARDWARE REQUIREMENTS

The software designed needed the following hardware for an effective operation of the newly designed system.

1. Core i3.
2. The Random access memory (RAM) should be at least 4Gb.
3. Enhanced Keyboard.
4. At least 500GB hard disk.
5. E.G.A/V.G.A, a colored monitor.
6. An uninterruptible power supply (UPS) units.
7. LaserJet or Deskjet printer

### VIII Software Requirements

- a) The software requirements includes:-
- b) A window 10
- c) Microsoft SQL Server 2019.
- d) PHP 5



**a. Main Menu System**

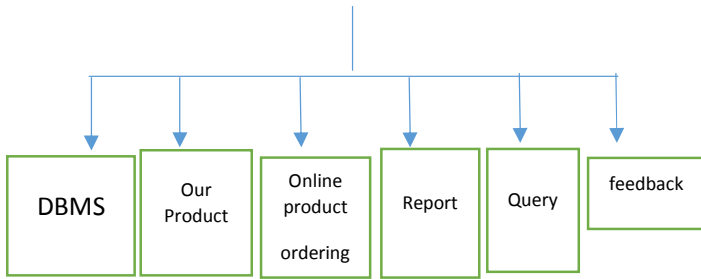


Figure 10 Main menu systems

Main menu system (figure 10) contains the following information; DBMS, our product, online product ordering, report query and feedback.

**b. DBMS Subsystem**

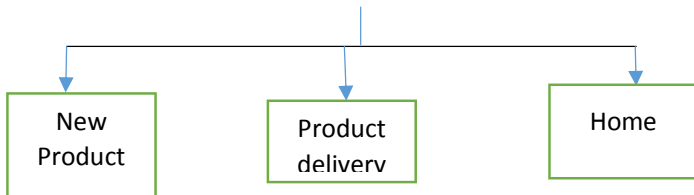


Figure 11 DBMS subsystem

- a) Product ID
- b) Forms
- c) Product Description
- d) Unit Product

**c. Our Product Subsystem**

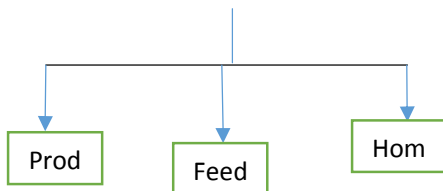


Figure 12 Our products subsystem.

Our products subsystem (figure 12) contains the following; feedback, home and product order.

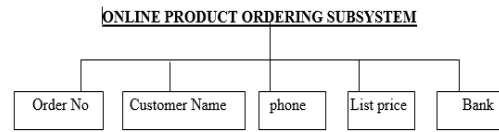


Figure 13 Online product ordering subsystem.

Online products subsystem (13) contains the following; phone, bank and customer name.

**d. REPORTS SUBSYSTEM**

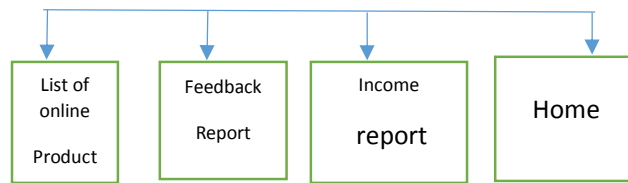


Figure 14 Reports Subsystem.

Reports subsystem (figure 14) contains the following; income report, feedback report, and home

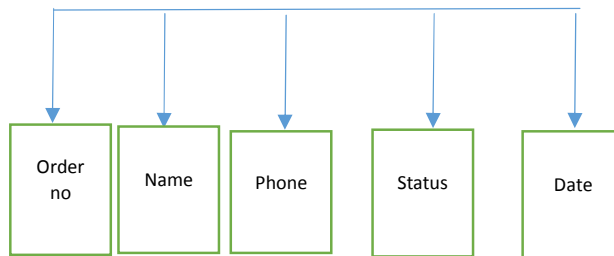


Figure 15 Query Subsystem

Query subsystem (figure 15) contains the following; phone, name, date and status.

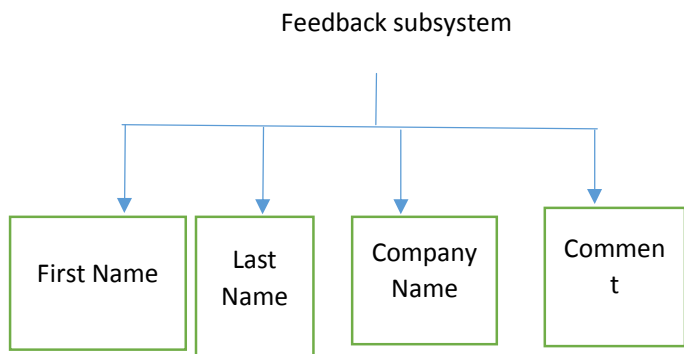


Figure 16 feedback subsystems.

Feedback subsystem (figure 16) contains the following; last name, first name and comment

### IX System Implementation

After having the user acceptance of the new system developed, the implementation phase begins. Implementation is the stage of a project during which theory is turned into practice. During system implementation, all the programs of the system are loaded onto the user's computer

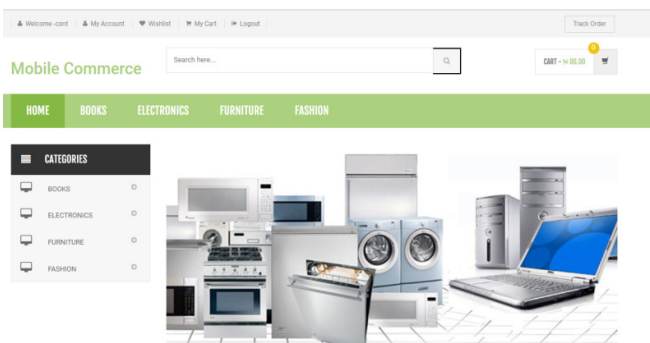


Figure 17 Home Page Of The Proposed M-Commerce System

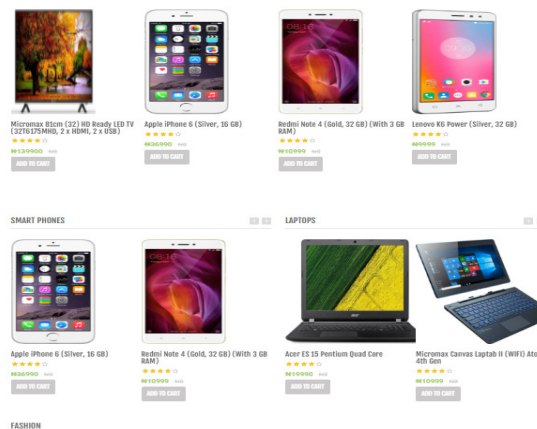


Figure 18 CatLog of the proposed system

figure 17 and 18 show the home page and CatLog of the proposed secure m-commerce business over global system for mobile communications (GSM). Here the user can see the product and will able to navigate to their desire product. For the user to access the website, the user will sign up by clicking the top most menu at the left side of the homepage

### X Software Testing

Prior to the implementation of the new system (bringing it into operations), a test run of the system is done removing all the bugs, if any, it is an important successful system, this is shown in (table 8)

Table 8 software testing.

Test data	Expected test result	Actual test result
DBMS	On clicking DBMS button, the form will displayed.	The result displayed as expected.
Feedback	A click on feedback button, Displayed the form	The system displayed as expected
Online product Ordering	On clicking online product button, form will displayed	The system displayed as expected.
Our products	A click on our products button, displayed the form	The result displayed as expected.
Report	On clicking the report button, The form is displayed.	The system will displayed as expected.
Query	A click on query button, it displayed the form	The result will displayed as expected.

## XI CONCLUSION

Just as the internet has changed the face of commerce forever, so as wireless has changed the face of communication and information delivery forever. Although originally only intended for voice traffic, wireless networks have continued to develop, as have the wireless –associated, or value added services. Today a myriad of value added services are associated with wireless mostly because of the adoption of international standards, which guarantees interoperability. Some of these services include the short message service (SMS), wireless internet Gateway (WIG). Each of these services brings with them a host of possible applications and opportunities. One such opportunity is m-commerce. By using mobile phones over a wireless network, user of these applications can effect a business transaction

from anywhere in the world where there is wireless network coverage. However, with these location independent opportunities comes risk. In order to ensure the integrity of payment instructions, these m-commerce messages must be secured, by some means, while traversing the global networks. In essence, the security required for these transactions are very similar to the security of more traditional internet based e-commerce transactions. We therefore have conclusively proved that we can be drawn from the implementation is that we now have true end – to –end confidentiality of the pin transmitted in the message. This is due to the fact that the WIG server only translated the PIN from the encryption used between the phone and the WIG into a format that can be interpreted by the business institution. The business institution is therefore the only entity that verifies the pin entered by the client on the mobile station.

## REFERENCE

- [1] Elis Wurmser | Aug 4, 2021 M commerce Forecast 2021 the 2<sup>nd</sup> international conference on mobile systems, applications, and service (pp. 49-58). ACM
- [2] ARC Group (2000) Mobile Financial Services: From Concept To Revenues
- [3] Schmidt, M. (2001) Consistent M-commerce Security on Top of GSM-Based Data Protocols-A Security Analysis. University of Siegen, Institute

for Data Communication System. Siegen Germany 2001

[4] Anckar,B&D'Incan,D.(2002) Value creation in mobile commerce: Findings from a consumer survey. Journal of Information Technology & Application 4,1,42-43

[5]Siau,K,Lim,E. and Shen,Z.(2001) Mobile commerce promises,challenges and research agendas,Journal of Database Management,12,3,3-10.

[6]Ayo, C.K, Ekong, U.O., Fatudimu, I.T. &Adebiyi, A.A, (2007), M Commerce implementation in Nigeria: Trendds and issues. Journal of internet banking and commerce, 12(2), 1 -15

[7]Tiwari, R. and Buse, S. (2006). The mobile Commerce Prospectus: a Strategical Analysis of Opportunities in the Banking sector, Hembusy, University Press pp.33.