FOREIGN EXCHANGE SIGNAL ANALYZER (FXSA) FOR VIETNAMESE EXCHANGE MARKET

By

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Dissertation submitted in partial fulfillment
of the requirements for the
Bachelor of Business Information System (Hons)

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CERTIFICATION OF APPROVAL

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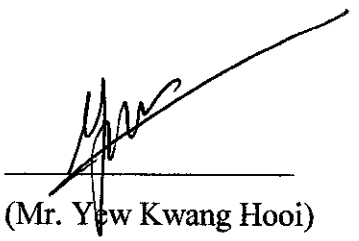
Approved by



(Mr. Yew Kwang Hooi)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
October, 2009

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in references and acknowledgement, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

DO THI MAI CHI

ABSTRACT

In the process of global trade integration, along with the rapid pace of mobile technology, the market players have a high demand for a system that delivers concise and precise market data that they can bring along in their cell phone anytime and anywhere. FXSA is a system that will bring together all needed market data related to the local exchange market from different sources on the Internet, and deliver them to the users via WAP and SMS technology. FXSA saves the effort of market information seeker to retrieve information from different sources by concisely displaying most updated market figures and news and alerting to its customers via SMS. FXSA also enables the market players to create a mobile community via the use of forum with SMS alerts. With those features and the new implementation of 3G technology, FXSA is believed to get high demand for usage.

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ABBREVIATIONS AND NOMENCLATURES

API	Application Programming Interface
CIMD	Computer Interface for Message Distribution
CPI	Consumer Price Index
CLI	Command Line Interface
Forex	Foreign Exchange
FXSA	Foreign Exchange Signal Analyzer
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
USD	U.S. dollar
VND	Vietnam Dong
EUR	Euro
USD/VND	Exchange rate of USD per VND
EUR/USD	Exchange rate of Euro per VND
GSM	Global System for Mobile Communication
MIME	Multipurpose Internet Mail Extensions
MS	Mobile Station
PHP	Hypertext Preprocessor
HTTP	Hypertext Transfer Protocol
HTML	Hypertext Markup Language
SMS	Short Message Service
SMPP	Short Message Peer-To-Peer
TE	Terminal Equipment
UML	Unified Modeling Language
UCP/EMI	Universal Computer Protocol/External Machine Interface
WAP	Wireless Application Protocol
WML	Wireless Markup Language
XML	Extensible Markup Language

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CHAPTER 1
PROJECT BACKGROUND

1. PROBLEM IDENTIFICATION

1.1 Problem Statement

The foreign exchange market participants in Vietnam strongly need an online system that can provide reliable news and figures on the local foreign exchange market, as well as other related investment markets, in the most concise form and in the most convenient way i.e. anytime and anywhere.

1.2 Problem Explanation

For the local enterprises, foreign exchange rates have always been the focus of financial managers, investors, as well as strategy makers, for profit optimization. This is because of the increasing export and import demand for continuous production and service delivery, plus the increasing amount of investments and loans going in and out of the country. These enterprises have also started to realize various risks in carrying trades in foreign currencies since the foreign exchange rates in the market are extremely volatile.

Several factors in the economy can impact the foreign exchange market, such as crude oil and gold prices. Therefore, a person who is interested in foreign exchange market always needs information from different kinds of investment and commodity markets, as well as economic and political updates on the country. The faster and more accurate the information that person can get, the better planned his investment will be.

Currently, the Internet is considered the shortest way to get updated news and figures on the local market. However, information fed by available local Internet services is sometimes troublesome for users due to three (3) reasons:

- First, a person has to access many different websites for different market information that are related, such as gold and USD.
- Second, market news sometimes provide too much information that can confuse and go beyond the needs of a normal information catcher e.g. a small retailer wants to check out the USD/VND spot rate of the previous month.
- Third, a person cannot get all the market information that he needs anytime anywhere unless he or she has an Internet-connected laptop or mobile phone.

2. PROJECT OBJECTIVES

To build a WAP-based application with the following four (4) functions:

- Concise presentation of automatic daily updated market figures, indices, and news, based on variety of trusted sources from the Internet
- Historical database retrieval for market figures and indices in both table and chart forms, based on variety of trusted sources from the Internet
- SMS alerts on updated market information that can be managed by registered users
- Simple forum that enables registered users to have answers to their raised topics messaged to them via SMS alerts

3. SCOPE OF PROJECT

3.1 Main tasks:

- Implementation of WAP server, database server and SMS server
- Dynamic WAP programming by using WML, PHP, XML and MySQL
- User interface design for WAP sites

3.2 Limitations:

All system servers locally hosted.

3.3 Assumptions:

The foreign exchange market in Vietnam has only two (2) foreign currencies: USD and EUR

3.4 Time scope:

After nine (9) months, the study is expected to ultimately deliver a prototype of a WAP-based system for foreign exchange market in Vietnam.

For the first four (4) months, the project will be concentrated on dynamic web programming with PHP and MySQL, along with gathering user requirements and trusted data sources on the Vietnam's foreign exchange market. Also, the analysis techniques for foreign exchange market are studied to know what kind of data is needed and how they should be presented in this system. At the end of these four months, the project objective, scope, methodology and the first system prototype should be delivered.

The remaining five (5) months will be contributed to designing a fully functioning application and testing.

CHAPTER 2
LITERATURE REVIEW

1. FOREIGN EXCHANGE MARKET ANALYSIS TECHNIQUES

There are two (2) basic types of market analysis available to guide the market players: Fundamental analysis and Technical analysis. Most investors and traders adopt tools and techniques from both types of analysis for profitable trades.

1.1 Fundamental Analysis

1.1.1 Definition

Fundamental analysis is a method of forecasting the future foreign exchange rate movements based on economic, political, environmental and other relevant factors and statistics that will affect the basic supply and demand of the related currency. Investors who use this analysis are said to be investing based on market news.

1.1.2 How The Analysis Is Applied To Vietnam

In the Vietnam context, the USD/VND exchange rate moves with flexible control of the government in favor of local enterprises and exporters. Hence, there is less free market effect on the rate of USD/VND. The rate does not move as violently as in other free market. Therefore, fundamental analysis is mostly used when concerning USD/VND rate.

However, only USD/VND is managed. Other exchange rates are floated per US dollar. Therefore, to analyze the movement of such exchange rate market, e.g. EUR/USD, both fundamental and technical analyses should be used.

1.1.3 Weakness Of The Analysis

Fundamental analysis is much based on experience of the analysts and their skills to obtain sufficient market news for timely decisions. In addition, the market tends to anticipate events and discount the currency price in advance. Therefore, it is hard for fundamental analysis to give an accurate and absolute quantitative result.

1.2 Technical Analysis

1.2.1 Definition

Technical analysis is a method of predicting foreign exchange rate movements and future market trends by studying charts of past market prices and volume of trading. It is concerned with what has actually happened, rather than what should happen.

1.2.2 Reasons For Using Technical Analysis

Technical analysis is mostly used for short term predictions and has proved itself to be more effective and applicable than other modeling techniques in open markets. This technique relies on the use of accurate and timely data. Moreover, the basic principles of technical analysis are easier to understand, compare to other analyses.

1.2.3 How Technical Analysis Is Applied

The simplest form of technical analysis is trend line. A trend line is a line connecting consecutive high or low data points in order to identify the direction of the market. Trend lines are used to identify the following characteristics in market trends: direction of the trend, reversal of a trend, continuation of a trend, and support and resistance

Uptrend is a line drawn joining low data points. It is drawn under low points and connects at least three consecutive rising low points. Downtrend is in contrast to uptrend. The more frequently the trend line touches or closely approaches the line and the longer it remains unbroken, the more significant the trend.

According to *An introduction To Technical Analysis* of Reuters, the slope of trend line is $\frac{\Sigma(x-\bar{x}_t)(y-\bar{y}_t)}{\Sigma(x-\bar{x}_t)^2}$.

Date	Rate	Date	Rate
1	766.5	26	797
2	770	27	784
3	769	28	789
4	758	29	789
5	751	30	779
6	749	31	778
7	753.5	32	770
8	777	33	765
9	794	34	765
10	782	35	756
11	764	36	750.5
12	771	37	747
13	773	38	755
14	773	39	751.5
15	761	40	756
16	752	41	746
17	758	42	746
18	750	43	756
19	743	44	762
20	745	45	777
21	747	46	781
22	764	47	777
23	789	48	767
24	780	49	767
25	792	50	760.5

Table 1 – Sample datasets for daily exchange rates

Using the sample datasets in Table 1, the trend line is drawn as follows:

- Calculate Average rate for 50 days:

  Average rate = $(rate_{date1} + rate_{date2} + \ldots + rate_{date50}) / 50 = 766.07$

- Calculate Average number of days:

Average day = (1 + 2 + … + 50) / 50 = 25.5

- Calculate the difference between the Average rate and daily rates:

Date	Rate	Dif1 = Rate – Average rate
1	766.5	0.43
2	770	3.93
3	769	2.93
4	758	-8.07
5	751	-15.07
6	749	-17.07
7	753.5	-12.57
8	777	10.93
9	794	27.93
10	782	15.93
11	764	-2.07
12	771	4.93
13	773	6.93
14	773	6.93
15	761	-5.07
16	752	-14.07
17	758	-8.07
18	750	-16.07
19	743	-23.07
20	745	-21.07
21	747	-19.07
22	764	-2.07
23	789	22.93
24	780	13.93
25	792	25.93
26	797	30.93
27	784	17.93
28	789	22.93
29	789	22.93
30	779	12.93
31	778	11.93
32	770	3.93
33	765	-1.07
34	765	-1.07
35	756	-10.07
36	750.5	-15.57
37	747	-19.07
38	755	-11.07

39	751.5	-14.57
40	756	-10.07
41	746	-20.07
42	746	-20.07
43	756	-10.07
44	762	-4.07
45	777	10.93
46	781	14.93
47	777	10.93
48	767	0.93
49	767	0.93
50	760.5	-5.57

Table 2 – Difference between rate and average rate

- Calculate the difference between the Average day and the day number and sum up the differences:

Date	Dif2 = Date – Average Day	$(Dif2)^2$
1	-24.5	600.25
2	-23.5	552.25
3	-22.5	506.25
4	-21.5	462.25
5	-20.5	420.25
6	-19.5	380.25
7	-18.5	342.25
8	-17.5	306.25
9	-16.5	272.25
10	-15.5	240.25
11	-14.5	210.25
12	-13.5	182.25
13	-12.5	156.25
14	-11.5	132.25
15	-10.5	110.25
16	-9.5	90.25
17	-8.5	72.25
18	-7.5	56.25
19	-6.5	42.25
20	-5.5	30.25
21	-4.5	20.25

22	-3.5	12.25
23	-2.5	6.25
24	-1.5	2.25
25	-0.5	0.25
26	0.5	0.25
27	1.5	2.25
28	2.5	6.25
29	3.5	12.25
30	4.5	20.25
31	5.5	30.25
32	6.5	42.25
33	7.5	56.25
34	8.5	72.25
35	9.5	90.25
36	10.5	110.25
37	11.5	132.25
38	12.5	156.25
39	13.5	182.25
40	14.5	210.25
41	15.5	240.25
42	16.5	272.25
43	17.5	306.25
44	18.5	342.25
45	19.5	380.25
46	20.5	420.25
47	21.5	462.25
48	22.5	506.25
49	23.5	552.25
50	24.5	600.25
	$\sum(\text{Dif2})^2$	**10412.5**

Table 3 – Square of differences between day number and average day

- Multiple the two differences and sum up the multiplication results:

Date	Dif1 * Dif2
1	-10.535
2	-92.355
3	-65.925

4	173.505
5	308.935
6	332.865
7	232.545
8	-191.275
9	-460.845
10	-246.915
11	30.015
12	-66.555
13	-86.625
14	-79.695
15	53.235
16	133.665
17	68.595
18	120.525
19	149.955
20	115.885
21	85.815
22	7.245
23	-57.325
24	-20.895
25	-12.965
26	15.465
27	26.895
28	57.325
29	80.255
30	58.185
31	65.615
32	25.545
33	-8.025
34	-9.095
35	-95.665
36	-163.485
37	-219.305
38	-138.375
39	-196.695
40	-146.015
41	-311.085
42	-331.155
43	-176.225
44	-75.295
45	213.135
46	306.065
47	234.995
48	20.925

49	21.855
50	-136.465
∑(Dif1 * Dif2)	**-459.75**

Table 4 – Multiplication of the two differences

- Calculate the slope of the trend line:

  Slope = $\sum(Dif1 * Dif2) / \sum(Dif2)^2 = -0.04415$

- Calculate the max rates in the 50-day period:

  Max rate = 797

- Get the corresponding date of the Max rate:

  Date = 26

- Calculate the intersection point of the trend line with the horizontal axis:

  Intersect = Max rate – Date * Slope = 798.148

- The equation of the trend line will be:

  (trend-line): Y = Slope * X + Intersect

  = -0.04415 * X + 798.148

- The trend line is drawn in the following Figure 1:

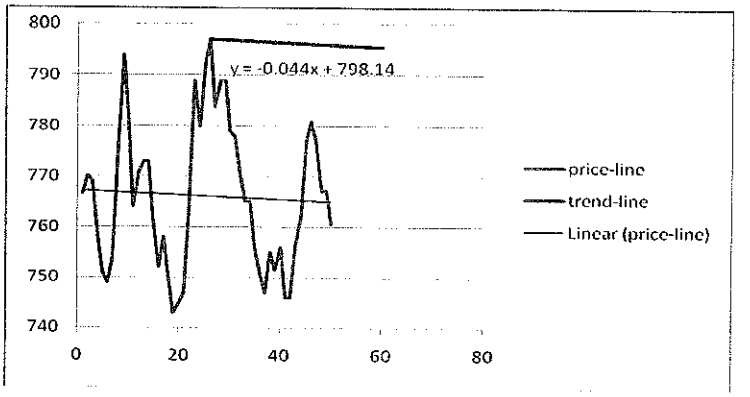


Figure 1 – Example of a trend line in a foreign exchange rate chart

2. WAP DEVELOPMENT WITH WML AND PHP

2.1 WAP Servers And Clients

2.1.1 Definition Of WAP

WAP stands for Wireless Application Protocol, a de facto standard for wireless computing. According to *WAP Development With WML And WMLScript* of SAMS, WAP is a protocol that is similar to HTTP in many ways. WAP devices connect to servers to retrieve and send information in much the same way as web browsers connect to HTTP servers. It was also built on top of established standards, such as IP, URLs, and XML. As seen in Figure 2, the WAP device makes a request from WAP server which returns the requested data to the device for processing,

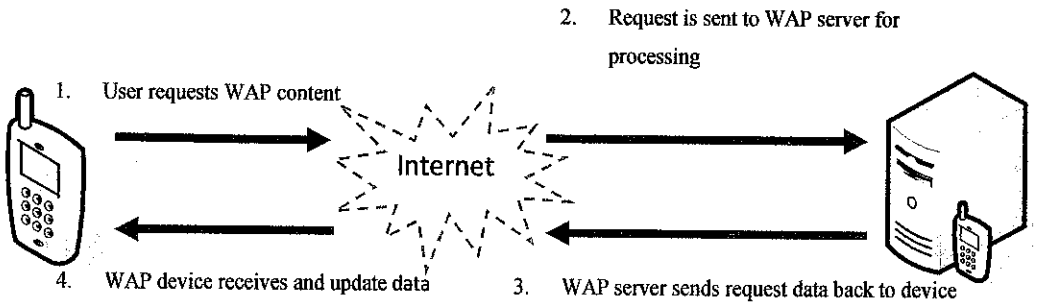


Figure 2 – WAP devices request and receive data from WAP servers

If the WAP devices do not support HTTP, there should be a WAP gateway between the WAP device and HTTP server. It acts as an interpreter between them. The WAP gateway handles all data forwarding and filtering or conversion so that the device gets back just WAP, not HTTP at all. However, nowadays most often the HTTP servers can be configured to serve WAP content and the WAP gateway seems unnecessary.

WAP devices can connect to both WAP and HTTP servers. However, WAP content can only be served by the WAP server. WAP was designed to accommodate the unique limitations of wireless computing:

- Devices with limited processing power and memory
- Small displays
- Limited data input and user interaction capabilities
- Limited bandwidth and connection speeds
- Frequent unstable connections

2.1.2 WAP Servers

An HTTP server cannot render WML pages unless it is configured to add particular MIME extensions for WML. MIME stands for Multipurpose Internet Mail Extension, which is a piece of header information that was originally used in email to allow for proper formatting of non-ASCII messages over the Internet.

WAP requires its own MIME types to recognize various file content. By adding the following MIME types to the web server, different devices will be able to properly interpret and therefore display WAP content:

File extension	Content Type	MIME Type
Wml	WML source code	Text/vnd.wap.wml
Wmls	WMLScript source code	Text/vnd.wap.wmlscript
Wbmp	Wireless Bitmaps	Image/vnd.wap.wbmp
Wmlc	Compiled WML	Application/vnd.wap.wmlc
Wmlsc	Compiled WMLScript	Application/vnd.wap.wmlscriptc

Table 5 – File Types and Corresponding MIME Type

2.1.3 WAP Clients

WAP clients are devices such as phones and other wireless devices that own two (2) common characteristics:

- A micro-browser, namely WAE (Wireless Application Environment) User Agent, which renders the content for display and manages interactions with users.
- A WTA (Wireless Telephony Applications) User Agent, which receives compiled WTA files from WTA server and executes them
- A WAP stack which allows the phone to connect to WAP gateway using the WAP protocol

WAP is designed to be very device independent. Yet, the big difference is between performing and performing as intended. Different devices implement different features in different ways, and that makes very inconsistent development environment. Therefore, when it comes to testing a WAP application, most developers use WAP phone emulators or simulators. Emulators are designed to imitate the specific behavior and functionality of mobile devices. It can be used simply to browse WAP sites on desktop computer.

2.2 Dynamic WAP Programming With WML And PHP

2.2.1 Definition Of WML

WML stands for Wireless Markup Language used to describe the structure of documents to be delivered to wireless devices. WML is designed to address the display, bandwidth, and memory limitations of mobile and wireless devices. Since it can be run on many devices, WML assumes very little about the device running the application and provides much less control over output formats than HTML.WML supports five (5) key areas:

- Images, text presentation and layout: line breaks, text formatting, and alignment are all supported by WML. WML also supports Wireless Bitmap image format and image alignment on the screen.
- User inputs: WML supports choice lists, multilevel choice lists, text entry, and task controls.

- Card and deck organization: User interactions are divided into cards, and navigation occurs between cards. Decks are related sets of cards which constitute a single file.
- Navigation: WAP supports the standard Internet URL naming scheme and anchored links, allowing navigation between cards in a deck, between decks, or between other resources on the network.
- State and context management: WAP allows for variables to be passed between WML files. Instead of sending complete strings, variables can be sent and substituted at runtime. The user agent can cache both variables and WML files, minimizing cache hits and server requests. It is also possible to pass variables between different cards in the same deck to minimize network usage.

When WML content is delivered to the handset, it arrives in a compiled bytecode format. This will result in some compression as the markup tags are tokenized. However, it is unnecessary to compile the WML pages beforehand since the WAP gateway will be responsible for that.

2.2.2 Definition of PHP

PHP stands for Hypertext Preprocessor. It is a server-side scripting language mainly designed for creating dynamic Web pages. Much of its syntax is borrowed from C, Java and Perl.

PHP is a powerful open-source technology. Moreover, it is platform independent. PHP implementations exist for all major UNIX, Linux and Windows operating systems. It also supports a large number of databases, including MySQL, and can be used as a module to Apache web server.

When user navigates to a PHP page in a web browser, the request is sent to the web server which will then directs the request to the PHP interpreter. The interpreter processes the page, communicates with file systems, databases, and email servers when needed and may finally deliver a web page to the web server to return to the browser. These interactions can be seen in Figure 3.

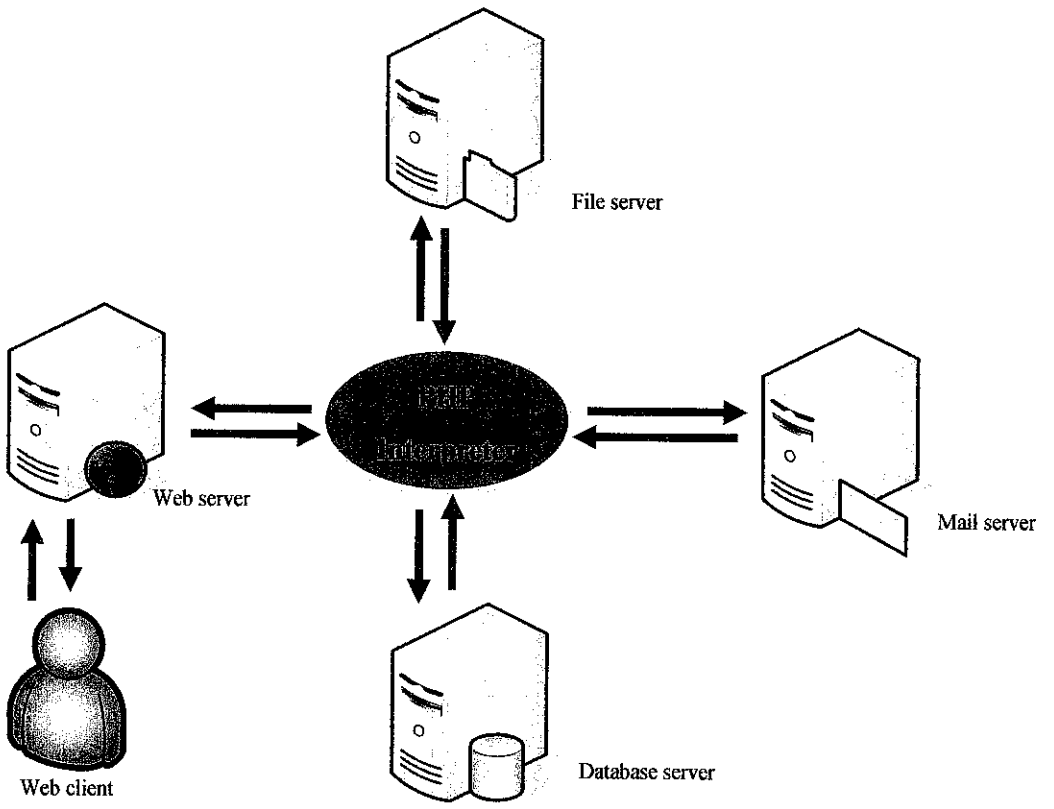


Figure 3 – PHP interpreter processing with multiple servers

PHP is not only HTML-embedded language. From version 4.3.0 to 5.2.8, PHP supports new SAPI type (Server Application Programming Interface) named CLI, which stands for Command Line Interface. The SAPI type's main focus is on developing shell applications with PHP. This allows PHP application to run not only in web environment but also in desktop environment. PHP CLI is available on all popular operating systems. The "php.exe" executable file is used to edit and run PHP files for these purposes. With this feature, PHP scripts can be used in CRON to allow specific tasks to be done as scheduled.

2.2.3 Comparison of PHP and ASP

ASP stands for Active Server Pages. ASP runs on Windows platform, while PHP is totally platform independent. Portability is an important feature of PHP that enables itself to work with any combination of software, operating system, web server and

database server. Moreover, PHP codes can be compiled to detect errors in the code, while there is no compiler available with ASP.

3. SMS MESSAGING TECHNOLOGY

3.1 GSM Network Architecture

The realization of SMS implies the inclusion of several additional elements in the network architecture (GSM, GPRS, or UMTS). Figure 4 shows the architecture of an SMS-enabled GSM network.

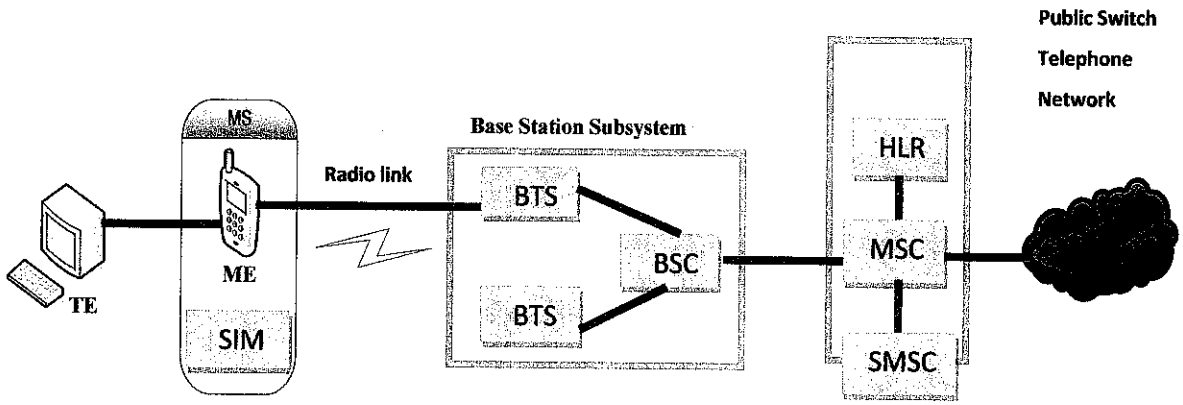


Figure 4 – SMS-enabled GSM network architecture

Note for Figure 4:

TE: Terminal Equipment, a device such as personal digital assistant or personal computer connected to ME

ME: Mobile Equipment contains radio transceiver, display and digital signal processors

SIM: Subscriber Identity Module allows the network to identify the user

BTS: Base Transceiver Station contains the radio transmitters for communicating with Mobile Stations (MS)

BSC: Base Station Controller manages the radio resources for one or more BTSs

HLR: Home Location Register database contains all administrative information about each registered user

MSC: Mobile Switching Center performs functions such as registration, authentication, user location update etc.
SMSC: SMS Center manages the delivery and submissions of messages and commands to and from SMEs in a store and forward fashion

3.1.1 Definition Of SME

SME stands for Short Message Entity. An SME can be a software application in a mobile phone, a telex equipment or remote Internet server etc. A mobile phone has to be configured to operate properly in a mobile network. It is typically pre-configured by the manufacturer.

An External SME (ESME) is a server that interconnects to the SMS center directly or via a gateway. ESME represents a WAP proxy/server, an Email gateway or a voice mail server.

3.1.2 Definition Of SMS

SMS stands for Short Message Service. This technology was created in Europe, by GSM (Global system for Mobile Communications) pioneers. It enables sending and receiving messages between mobile phones. The GSM included this technology right at the beginning. Then, the wireless technology CDMA and TDMA adopted it.

The data held by an SMS message is limited to about 140 bytes of data, which means 160 characters for 7-bit encoding and 70 characters for 16-bit Unicode UCS2 encoding. SMS works with all languages supported by Unicode.

An SMS message can also carry binary data such as pictures, music and animations. An advantage of SMS is that it is supported by all GSM mobile phones, unlike modern mobile technologies such as WAP and Java.

3.1.3 Definition Of SMSC

SMSC stands for SMS Center. It handles the SMS operations. When an SMS message is sent from a mobile phone, it will reach the SMSC first. Then, SMSC forwards the message to the destination. A phone network typically comprises many SMSCs connected together. This is called inter-operating SMS messaging. As seen in Figure 4 is the process of sending SMS message through inter-operating network: After SME sends a message to SMSC, the SMSC acknowledges the submission by sending a report back to SME to indicate the status of the submission. Depending on the routing direction, there are originator SMSC and destination SMSC. The message is routed through several SMSCs until it reached the recipient SME. Then, the recipient will return the delivery report to the SMSC. SMSC has to store the message temporarily until the recipient can get the message, before the validity period set in phones expires. The sender SME may choose to receive the status report from SMSC after sending succeeds.

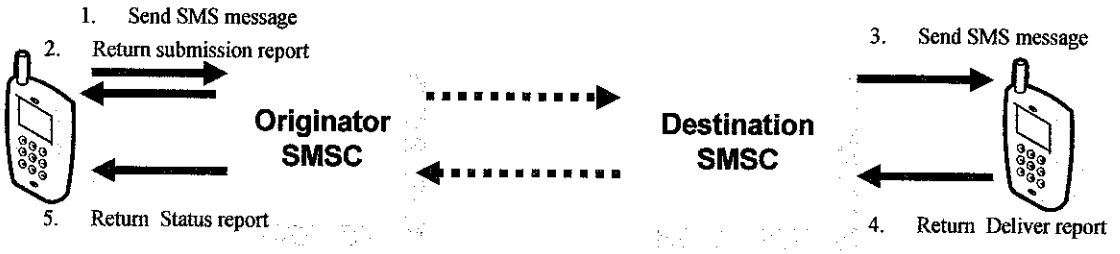


Figure 5 – Inter-operator SMS network process

An SMSC address is an ordinary phone number in the international format. A mobile phone should have a menu option that can be used to configure the SMSC address. Normally, the SMSC address is preset in the SIM card by the wireless network operator. The network operator has to purchase its first generation SMSC as part of network commissioning plan. The initial SMSC may simply be a voice mail platform module or a stand-alone SMSC. As long as there is SMSC and SME, SMS technology can be implemented.

3.1.4 MS-TE Connection

MS and TE can be connected with a serial cable, an infrared link or via Bluetooth. Communications between the MS and the TE can be carried out in three (3) different modes:

- Block mode: a binary communications protocol
- Text mode: a character-based protocol suitable for high-level software applications. This protocol is based on AT commands
- Protocol Data Unit: a character-based protocol with hexadecimal-encoded binary transfer of commands between the MS and the TE

3.2 SMS-based Applications

Since MS can be connected to TE for sending and receiving SMS with TE playing the role of the "master" and MS as a "slave", not only mobile handset but also any kind of desktop and web application can manipulate the SMS operation.

In general, there are two (2) ways to send and receives SMS via a computer:

- Connect the computer to a mobile phone or GSM/GPRS modem and use AT command. GSM modem requires a SIM card in order to make it connected to the GSM network. The advantage of this method is inexpensiveness since the service provider will charge an SMS sent from the application just as the way it charges normal SMS messaging on mobile phone. However, this method is quite slow since only about 10 messages can be sent per minute.
- Connect the computer to the SMSC or SMS gateway of a wireless carrier or SMS service provider and send SMS by using the interface supported by the gateway or protocol of the SMSC. This can be done over the Internet. It is called IP SMS, which uses SMS protocols: SMPP, CIMD2, or UCP/EMI. Despite considerable charge by the service provider, about 10,000 messages can be transmitted per minute.

CHAPTER 3
PROJECT METHODOLOGY

1. PROTOTYPING METHODOLOGY

Software prototyping is used as a software development method for this project. Prototyping is one of the methods used for rapid software development. The process of prototype development is as follows:

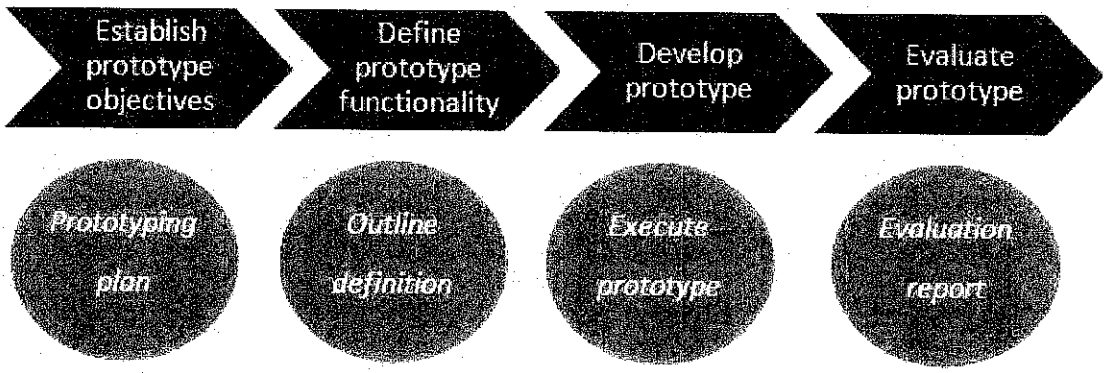


Figure 6 – The process of prototyping methodology for software engineering
Source: Sommerville, *Software Engineering* 8th Edition, 2007

At first state, the objectives of prototyping are explicitly defined. An initial version of a software system is generated to demonstrate concepts, try out design options and, generally, to find out more problem and its possible solutions. The first prototype may not meet all objectives.

At second stage, functionalities of the system will be defined out of the first prototype. Some requirements specified at first stage may be relaxed for better focus

on the major functionalities of the system, for example security and memory utilization problem.

From the third stage through the final one, a complete prototype system is developed. The prototype is then evaluated by using different testing methods, especially user acceptance testing.

In summary, the project deliverables should be as in the table shown below:

Prototyping Stage	Prototyping Deliverables	Produced Report
PROTOTYPING PLAN	Problem Statement	PRELIMINARY REPORTING
	Scope and Objectives	
	Project Background	
	Project Methodology	
	Project Milestones	
	Tools and Techniques	
OUTLINE DEFINITION	Requirement Collection Requirement Analysis	PROGRESS REPORTING AND INTERIM REPORTING
	Conceptual Design Models: • Use Case Diagram • Activity Diagram • Entity Relationship Diagram (ERD)	
	Develop Prototype version 1.0 (Low-fidelity prototype)	
DEVELOP PROTOTYPE	Develop Prototype version 1.1++	FINAL REPORTING
	Develop and Test Menu Screens	
	Develop and Test Data Entry Screens	
	Implement Test Database	
	Develop and Test Functions	
	Evaluate Prototype	
	Implement Refinements	

Table 6 – Project deliverables of FXSA

2. PROJECT ACTIVITIES AND KEY MILESTONES

During the project time, researching time will cover the largest part of the project. Updated news, Internet resources, library books, as well as professional journals, will

be used as main references. In addition, recommendations and other supports from the project supervisor will also be helpful for the study.

Questionnaires will also be prepared to survey the financial experts' points of views on the development of the project. Interviews will also be carried out for all types of users, focusing on the University of Foreign Trade lecturers, Vietnamese banks' financial managers and experts. Statistics will be used for the survey's analysis.

Please see the Gantt chart below for the project key milestones.

No.	Detail/Week	1	2	3	4	5	6	7		8	9	10	11	12	13	14
1	Selection of Project Topic								M							
2	Preliminary Research Work								I							
3	Submission of Preliminary Report								D							
4	Seminar 1 – Preliminary Reporting								S							
5	Research and Project Work								E							
6	Submission of Progress Report								M							
7	Seminar 2 – Progress Reporting								E							
8	Project Work continuation								S							
9	Submission of Interim Report Final Draft								T							
10	Oral Presentation								E							
									R							
									B							
									R							
									E							
									A							
									K							

Table 7 – Gantt chart for Project Milestones

3. TOOLS AND TECHNIQUES

- Hardware: Compaq Presario C020 and Sony Ericsson w580i
- Operating system: Microsoft Windows Vista
- Local web server: Apache
- Local database server: MySQL
- Local SMS server: Ozeki Message Server 6.1.0.17
- Open-source API: Google Chart API
- Major programming languages: SQL, WML and PHP

CHAPTER 4
RESULTS AND DISCUSSION

1. PRELIMINARY ANALYSIS

1.1 Review Of Existing Systems In Vietnam

Currently, in Vietnam, there is no WAP-based system delivering foreign exchange market data and information with SMS alerts. However, some web sites have offered service of chart drawing and analysis for local stocks. A typical example is Bloomberg.vn (Reference: http://bloomberg.vn/) as seen in Figure 7. This website also provides information on updated exchange rates.

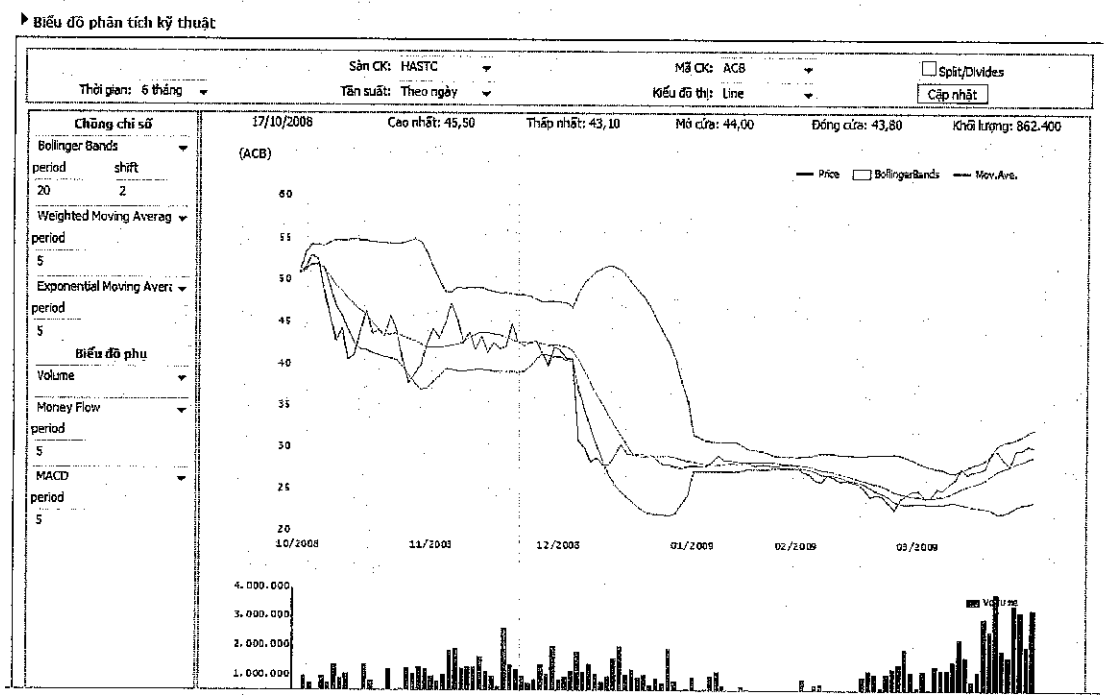


Figure 7 – Screenshot of Bloomberg.vn charting tool

Standard Chartered Bank in Vietnam offers SMS Alerts on foreign exchange rates and bank account information. The schedule of the alerts is specified in the Table 7 below. However, only exchange rates are alerted. Other market figures are not updated to users.

Alert Types

AVAILABLE DATE FOR EACH TYPE OF ALERT

Account Balance		x	x	x	x	x	
Forex rate	x	x	x	x	x		
Time Deposit Maturity		x	x	x	x	x	
Time Deposit Rollover		x	x	x	x	x	
Birthday Alert	x	x	x	x	x	x	x
Standing Order Instruction Failed		x	x	x	x	x	

Account Balance	x	
Forex rate		x
Time Deposit Maturity	x	
Time Deposit Rollover	x	
Birthday Alert	x	x
Standing Order Instruction Failed	x	

Table 8 – SMS alert schedule table offered by Standard Charter Bank Vietnam

Another example is the website of General Statistic Office of Vietnam (Reference: http://www.gso.gov.vn/). This website shows monthly statistical analysis and charts for macroeconomic signals such as price index, imports, exports etc. However, historical data can only be downloaded in PDF type, and no SMS alert is offered.

1.2 SWOT Analysis

After reviewing similar existing systems, the SWOT analysis was made to identify the advantages of building this system:

STRENGTHS	*WEAKNESSES*
• Meet large demands for updated and condensed information on exchange market • Meet large demands of mobile users who have little time to obtain market information from many different sources • Create convenience for users by displaying information in minimum number of clicks	• Require time to gain customer familiarity and trust • Require users to have mobile phones
OPPORTUNITIES	*THREATS*
• Increasing number of investors and people who are interested in the Vietnam market • Increasing number of mobile phone owners in Vietnam • New implementation of 3G Technology which open a land for mobile services	• Security threats are increasing with a variety of hacking techniques

Table 9 – SWOT Analysis of FXSA

2. USER ANALYSIS

2.1 User Classification

In order to carry out user analysis, an interview questionnaire was prepared and distributed to all potential users for FXSA. Please refer to Appendix A for Interview Questionnaire and Appendix B for Questionnaire Answer Sheet.

Targeted users of FXSA are classified into three (3) levels: Financial System Experts, Normal Workers and Students in the field of foreign trade. All users are from and currently reside in Vietnam. All interviewed users are interested in the local foreign exchange market.

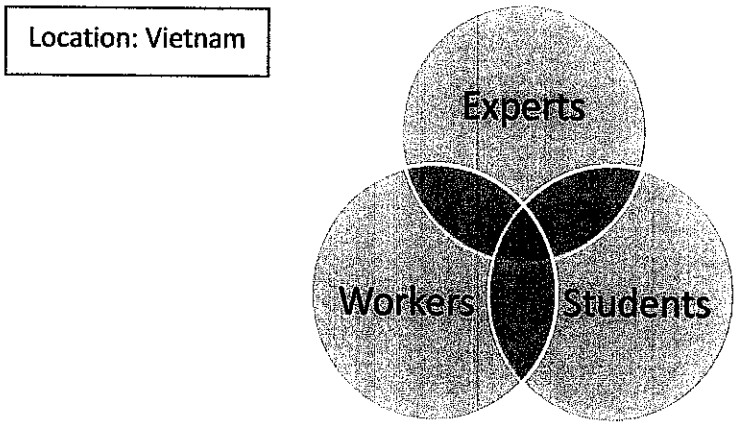


Figure 8 – User classification of FXSA

In order to analyze potential users, interview questionnaires were distributed to over fifty (50) people that the author knows. However, the answer sheets received shows that only 13 persons are interested in this field. The information of these interviewees is as follows:

Initials	Full name	Postion	Place of work	Phone	Email	Level
KD	*Nguyen Thi Kim Dung*	*Deputy director*	Department for Economic Institution studies - Central Institute for Economic Management (CIEM)	(84-4)08044451	Kdung@ciem.org.vn	Experts
TPN	Pham Ngoc Hoang Thanh	Corporate Finance Project Manager	Openasia Consulting	+84 91381 2622	thanh_phamngochoang@yahoo.com	
AC	Nguyen Vu Anh Chau	Senior 3 Consultant	Ernst & Young Vietnam Ltd.	84-90-844-2681	Chau.Anh.Nguyen@vn.ey.com	
LHM	Le Hong May	Engineer	Vietnam Post and Telecom (VNPT-HCM)			Workers
DHT	Do Huu Tuyet	Administration manager	Ministry of Education Vietnam - HCMC	+84 91 809 3388		
DQN	Dao Quang Ngoc	IT audit staff	Ernst & Young Vietnam Ltd.	+84 93 2355 999	Ngoc.Quang.Dao@vn.ey.com	
HTN	Nguyen Tu Huyen	Consultant	Business Risk Advsory Services - Ernst & Young Vietnam Ltd.	+84 9 3663 3080	Huyen.Tu.Nguyen@vn.ey.com	
BVG	Vuong Gia Bao	Final Year Student	Foreign Trade University	+84 93 5299 205	bao.vuonggia@gmail.com	Students
LNVT	La Ngoc Viet Thuong	Final Year Student	Foreign Trade University	+84 90 7840 519	namrom87@yahoo.com	
DN	Nguyen My Duy	Final Year Student	Foreign Trade University		myduy_n@yahoo.com.vn	
KC	Hoang Thi Khanh Chi	Final Year Student	Foreign Trade University		khanhchi.hoangthi@gmail.com	
		Final Year Student	Foreign Trade University			
AN	Nguyen An	Planning Assistant	CALOFIC Co.		annguyen842@gmail.com	
ND	Huynh Ngoc Dung	Final Year Student	Foreign Trade University		backicon1212@yahoo.com	

Table 10 – List of thirteen (13) interviewees

2.2 User Recognition of Exchange Risks

Most users (92%) realize the increasing riskiness of carrying out foreign trade in Vietnam although the forex rates are currently managed by the Central Bank. Only one user thinks it is not risky. However, this user initial is 'HTN', who is a normal worker (Please refer Table 10 for the user information). All interviewed experts and the foreign trade university's student answered it was risky. Furthermore, all users (100%) realize the importance of watching out for the foreign exchange fluctuation in Vietnam.

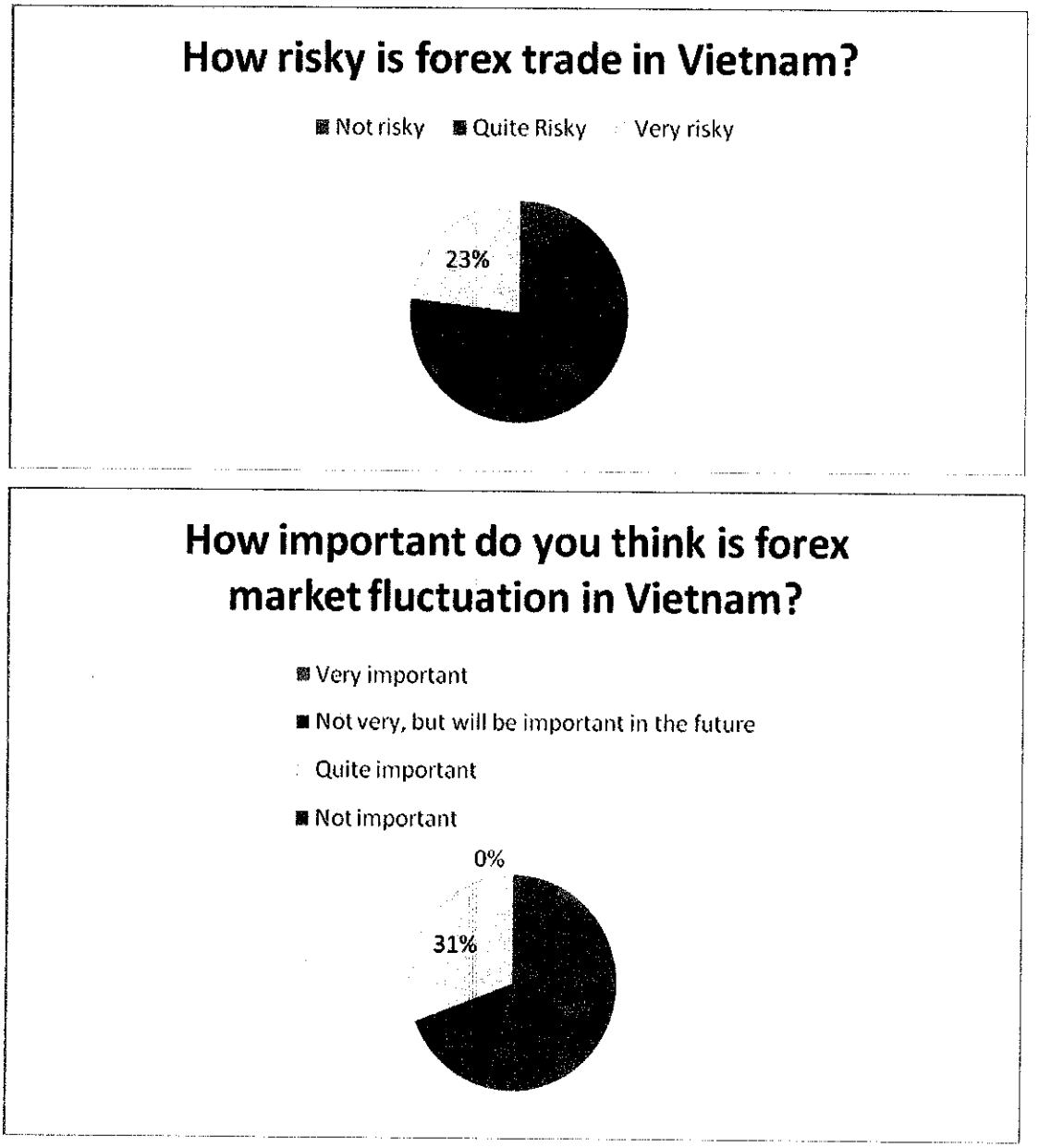


Figure 9 – Pie charts illustrating user recognition of the forex market in Vietnam

2.3 User Preferences

2.3.1 For the means of information on exchange market

Most users prefer to use newspaper as means of information on foreign exchange market. None uses the service provided by Web portals such Yahoo.com; and very few (36%) use the bank's website for this information. Some other people even only trust their friends for this information.

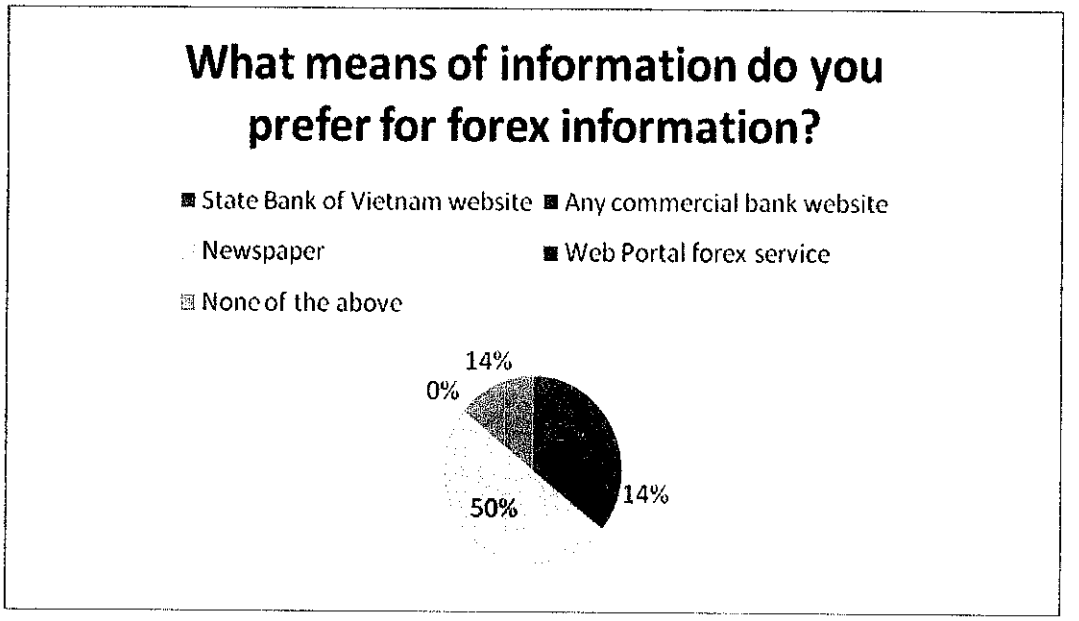


Figure 10 – Pie charts illustrating user preference for means of information for forex

2.3.2 For the additional function for similar existing system

Most users (50%) prefer to have a function of historical database retrieval for this system. This system simply provides users with the ease of extracting all historical data (exchange rates, price index, exports) depending on their needs.

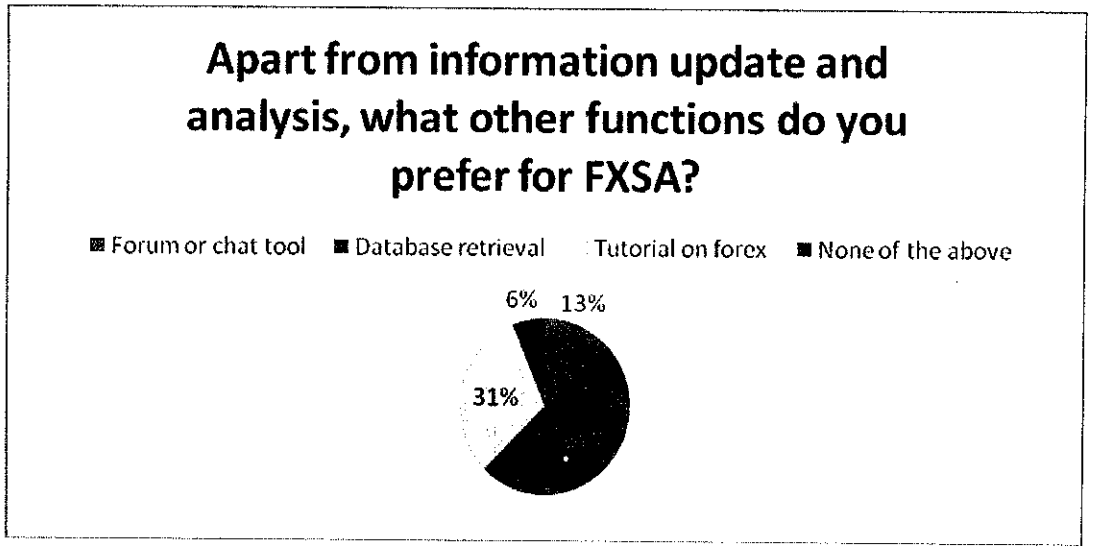


Figure 11 – Pie charts illustrating user preference for added functions for FXSA

3. REQUIREMENT COLLECTION

Requirements collection aims at identifying a general picture of the application domain and of the solution to be developed, by interviewing the relevant "players". At the end of this activity, the functions to be supported by the application and the main nonfunctional requirements and constraints must be known.

3.1 Functional Requirements

Essential functions of FXSA are listed in the table below to identify functional requirements:

*1 **Login***

The system shall allow the registered user to log in to it to use functions

The system shall assign the registered user a unique identification number

The system shall encrypt login password

*2 **Market figures update and retrieval***

The system shall allow the user to view updated exchange rates, market indices and prices

The system shall allow the user to select the data period to receive historical figures in chart and table forms

The system shall extract data from trusted sources

*3 **Market news update***

The system shall allow the user to view most updated news

The system shall allow the user to select different news sources

The system shall extract news from trusted sources

*4 **FX community***

The system shall allow the user to create discussion topic

The system shall allow the user to give answer in any topic

The system shall allow the user to have answers to their topic alerted in SMS

5 SMS Alerts

The system shall allow users to select the category of message to be alerted

The system shall allow users to start and stop the service

The system shall allow daily updates of selected information to be alerted to users

3.2 Nonfunctional Requirements

Nonfunctional requirements of FXSA are listed in the table below to identify requirements unrelated to system functions:

1 Usability

The user interface should enable the ease of learning, the adherence of the interaction objects (menus, links, buttons) to well-known standards, the coherent use of the interaction objects across all the application interfaces and the availability of mechanisms for orienting and assisting the user.

2 Performance

The system should reduce the user effort and time to retrieve necessary data in the least number of clicks.

3 Security

User passwords should be encrypted before saving in user database.

4 Data

The system should use trusted data sources for all data representation and analysis.

4. REQUIREMENT ANALYSIS

Requirement analysis formalizes the collected knowledge about what the application should do, which serves as the input to the application design.

4.1 Group Specification

Although the users are classified into the three levels in the user analysis, in FXSA, there are only two (2) groups of users registering FXSA:

- Registered users
- Registered users using SMS Alerts

4.2 Use Case Specification

Based on the functional requirements collected from the users, a set of use cases are developed to identify the process for satisfying the requirements. In this section, UML activity diagrams are used to visually express the workflow for the use cases. The interaction between user groups and use cases is described by means of UML use case diagram.

4.2.1 Activity Diagrams

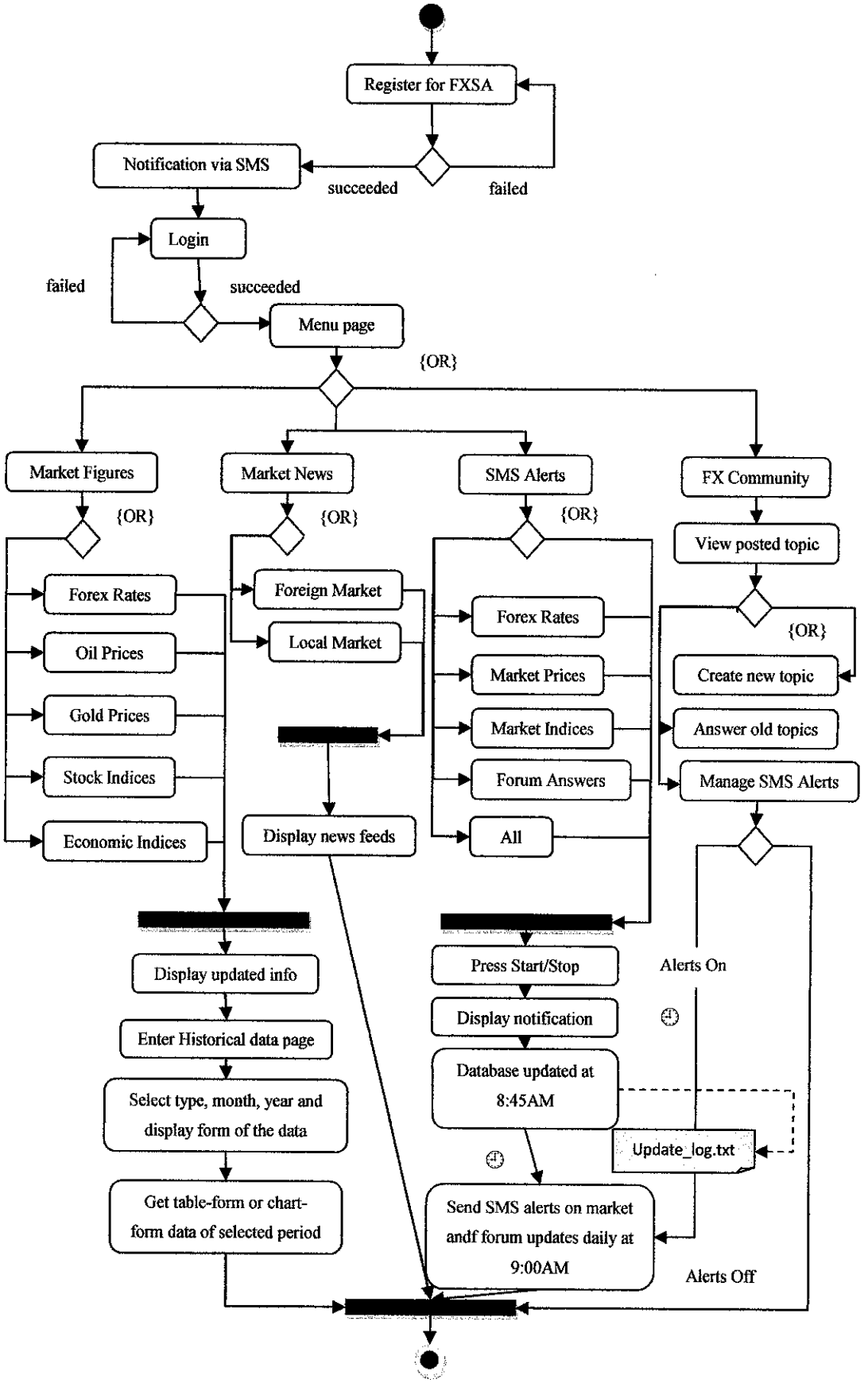


Figure 12 – FXSA Activity Diagram

4.2.2 Use Case Diagram

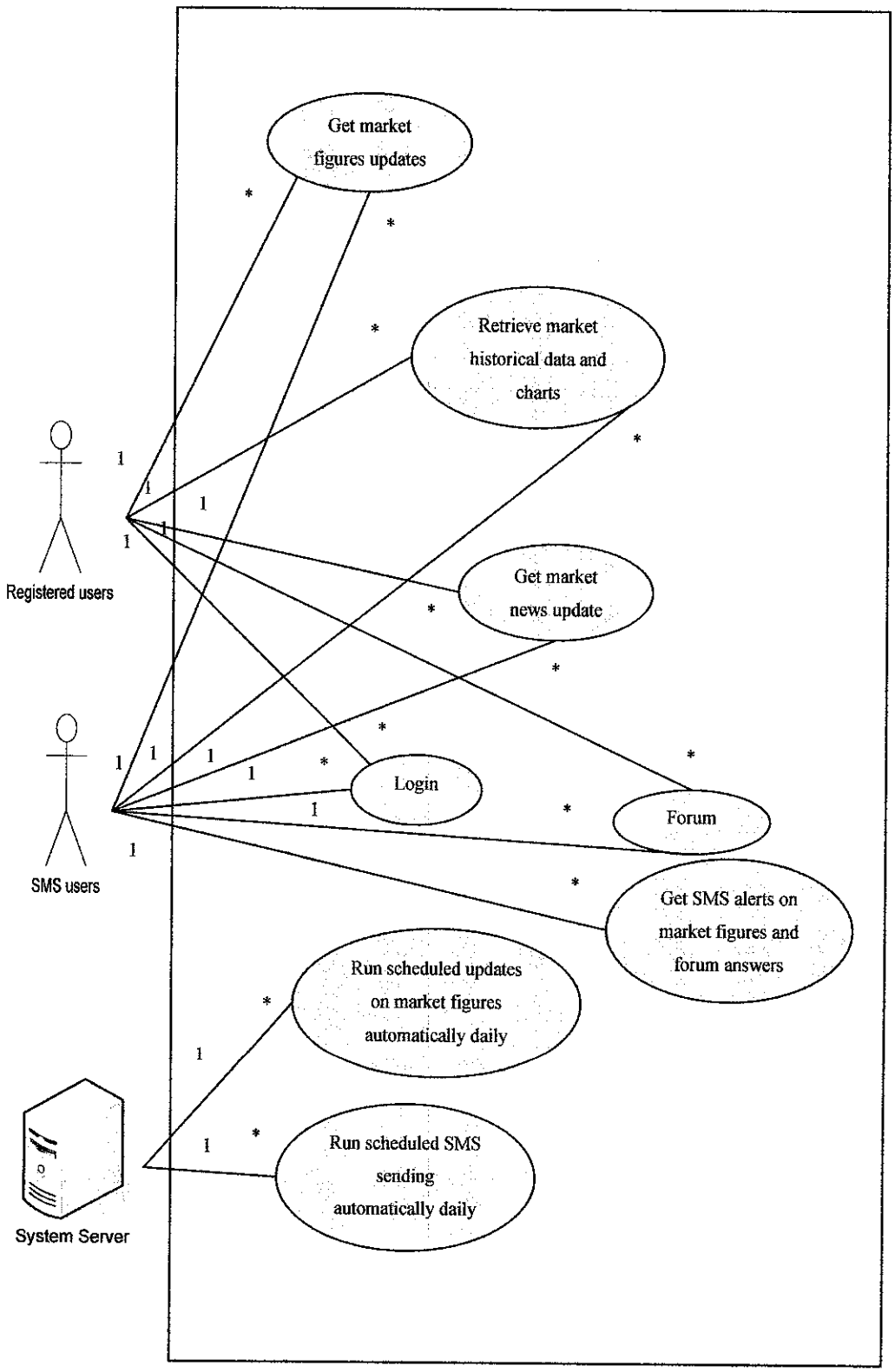


Figure 13– Use Case Diagram of FXSA

4.2.3 Entity Relationship Diagram (ERD)

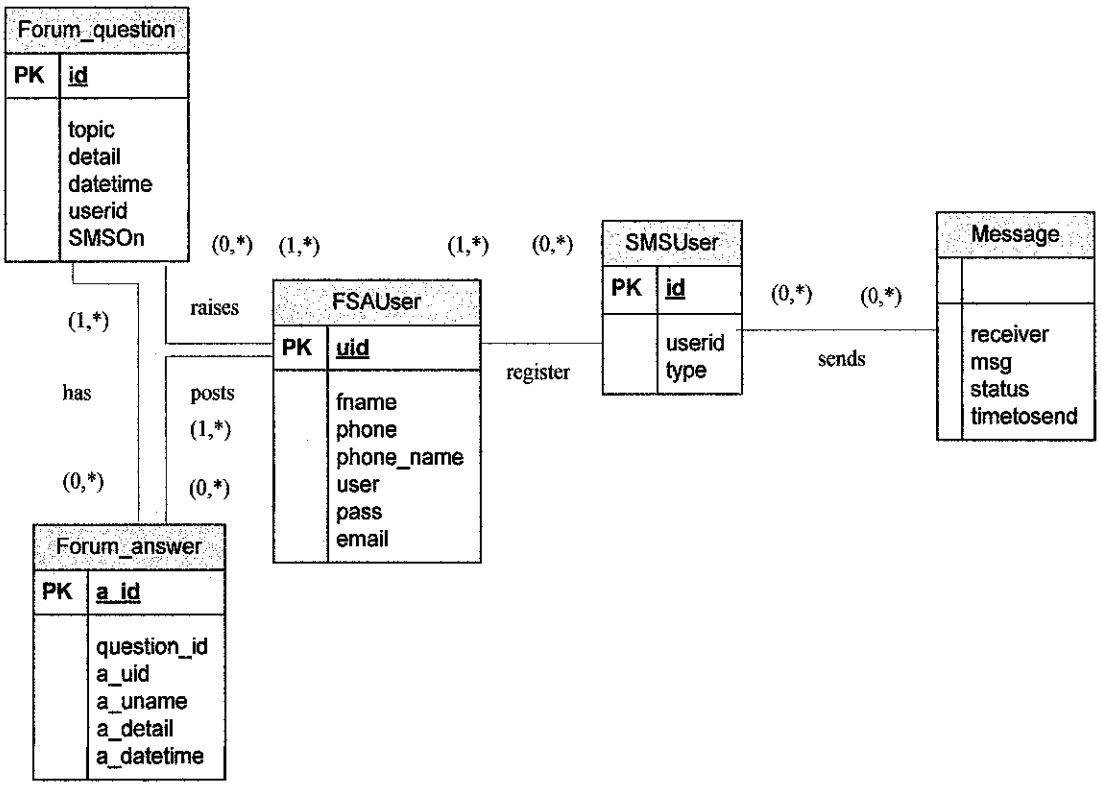


Figure 14 – ERD for FXSA User management

4.3 Input specification

For foreign exchange rates used in FXSA, the rates will be retrieved by a service of database retrieval system, provided by Professor Werner Antweiler, the University of British Columbia's Sauder School of Business. This service is free of charge and available for academic research and teaching. The website is located at http://fx.sauder.ubc.ca/data.html. However, this website only updates the exchange rate a day after the current date. Therefore, as for the exchange rates in 2009, the data will be automatically parsed from Yahoo! Finance daily and updated in the local database. Yahoo! Finance updates exchange rates in real time.

For oil prices, the daily data will be taken from the Energy Information Administration at http://tonto.eia.doe.gov. However, the data in 2009 will also be parsed from Yahoo! Finance daily.

For gold prices, the daily prices will be parsed automatically from an XML feed provided by the Digital Gold Currencies Standard Consortium at http://dgcsc.org.

For stock indices (VN-Index and HNX), the indices are parsed from CSV files loaded automatically daily from a stock statistics information website at www.cophieu68.com.

For the country's economic profiles, including indices such as balance of trade, GDP, CPI, FDI, the data source is from the General Statistics Office of Vietnam at http://www.gso.gov.vn/default_en.aspx?tabid=491

5. SYSTEM PROTOTYPE DESIGN

5.1 System Architecture

The architecture design of FXSA is shown in Figure 15. The system components are described in Table 11 below.

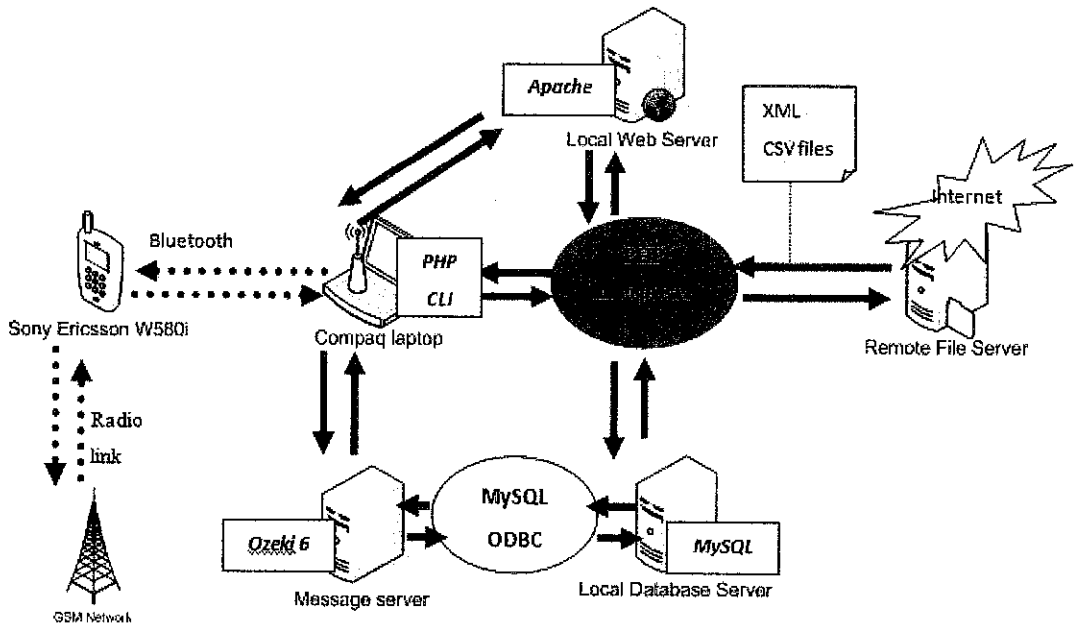


Figure 15 – FXSA system architecture

System Servers	MySQL Database Server 5.1	MySQL is the world's most popular open source database due to its consistent fast performance, high reliability and ease of use. PHP and MySQL can be used together to create effective web application.
	Apache HTTP Web server 2.2	Apache is an open-source HTTP server that can work well with MySQL via a PHP handler. Apache can be configured to serve WAP content and therefore is also a good WAP server.
	Ozeki Message Server 6	Ozeki is an SMS gateway application that enables SMS messaging via the computer. Messages can be sent via a GSM mobile phone attached to the computer or via IP SMS technology. In FXSA prototype, a mobile phone is attached to the computer via Bluetooth to enable SMS sending and receiving. MySQL database are connected to the message server via the MySQL ODBC interface.
Open-source API	Google Chart	Google chart API is an open-source tool that was first used to develop Google Finance and after that released freely to developers. It can create charts of different types dynamically on the fly. The tool allows embedding of the created PNG chart in a web page via the use of an URL. The URL's length is limited to 2048 characters.
WAP Phone Simulator	Openwave V7	This phone simulator provides a way to test applications on a WAP browser. However, it has limitations on memory and

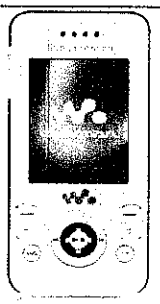
		session tracking. Each loaded page will be given a different session number.
Hardware	Sony Ericsson W580i	 This mobile phone is used to bridge FXSA to the GSM network. It has the following settings for text messaging: Operator: MAXIS Hotlink Service center: +60120000015 Validity period: Network max Phone number: +60175074768
	Compaq Presario CQ20	 Operating system: Windows Vista Home Premium Processor: Intel Core 2 Duo T5800 2.00GHz RAM: 3GB

Table 11 – Description of system components

5.2 System Process

The system prototype shows the system design with all functions aiming at demonstrating the user interface and basic flow of FXSA. The system process is illustrated as below.

When started, a splashing welcome page will be displayed to introduce the FXSA system. This is shown in Screenshot 1. The user can also send feedback on the website to the web administrator.

Users have to register before logging in FXSA to use the services of FXSA. Screenshot 2 shows the Registration Form. Screenshot 3 is the Login Form. After successfully logged in, the user will be led to a menu page of FXSA, showing four (4) main sections of FXSA:

- Market figures
- Market news
- SMS Alerts
- FX Community (forum)

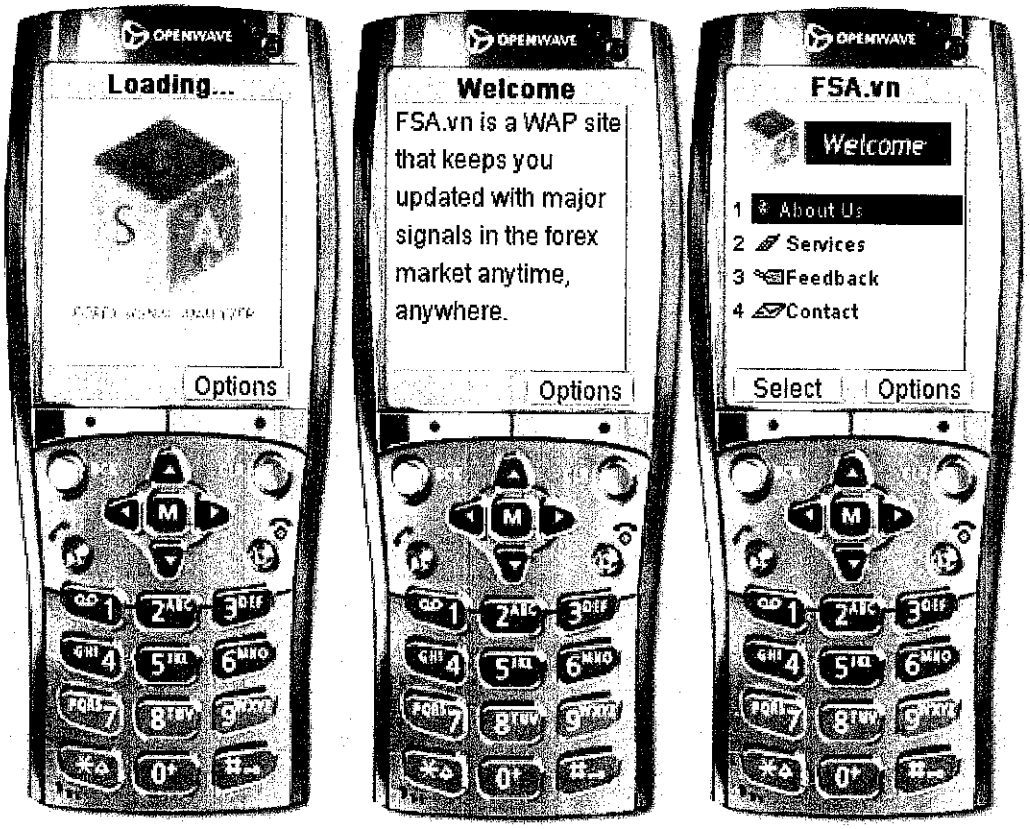
This menu page is shown in Screenshot 4.

If the user uses Market figures service, the user will be able to get daily updated data on exchange rates, crude oil price, gold price, stock indices and economic profile. The user can also retrieve historical data for exchange rates, stock indices and other prices. The retrieval dataset can be presented table or chart form. See Screenshot 5, 6, 7 and 8 for this function. Daily at 8:45AM, a "cron" is scheduled to run for updating all market figures from the Internet to the local database and at 9:00AM, all pending messages held in the database will be sent to the user's phone (if he or she selected to have SMS alerts) based on his or her selected category. The "cron" will execute PHP files in PHP command line interface. See Screenshot 9 for the scheduled task. The mobile phone Sony Ericsson W580i (used as a gateway to GSM network) is connected to the system laptop via Bluetooth to send SMS alerts.

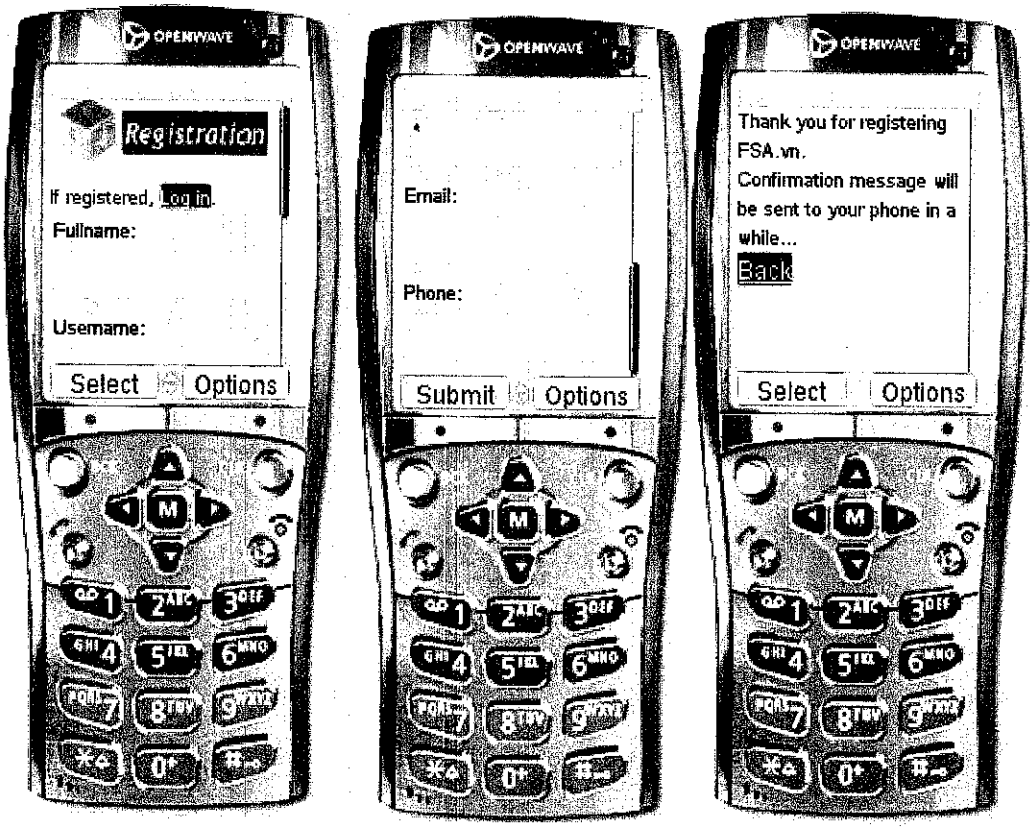
If the user chooses to read Market news, the user will be led to a set of options whereby he or she can select the news sources (both local and international news) to get most updated business and financial news. This is shown in Screenshot 10.

If the user chooses to use SMS Alerts, the user will have to select the category he or she wants to be updated daily via SMS alerts, by pressing 'Start' button. He or she can also select to stop any service. The SMS Alert management function is shown in Screenshot 11. Screenshot 12 shows a sample alert in a user's phone.

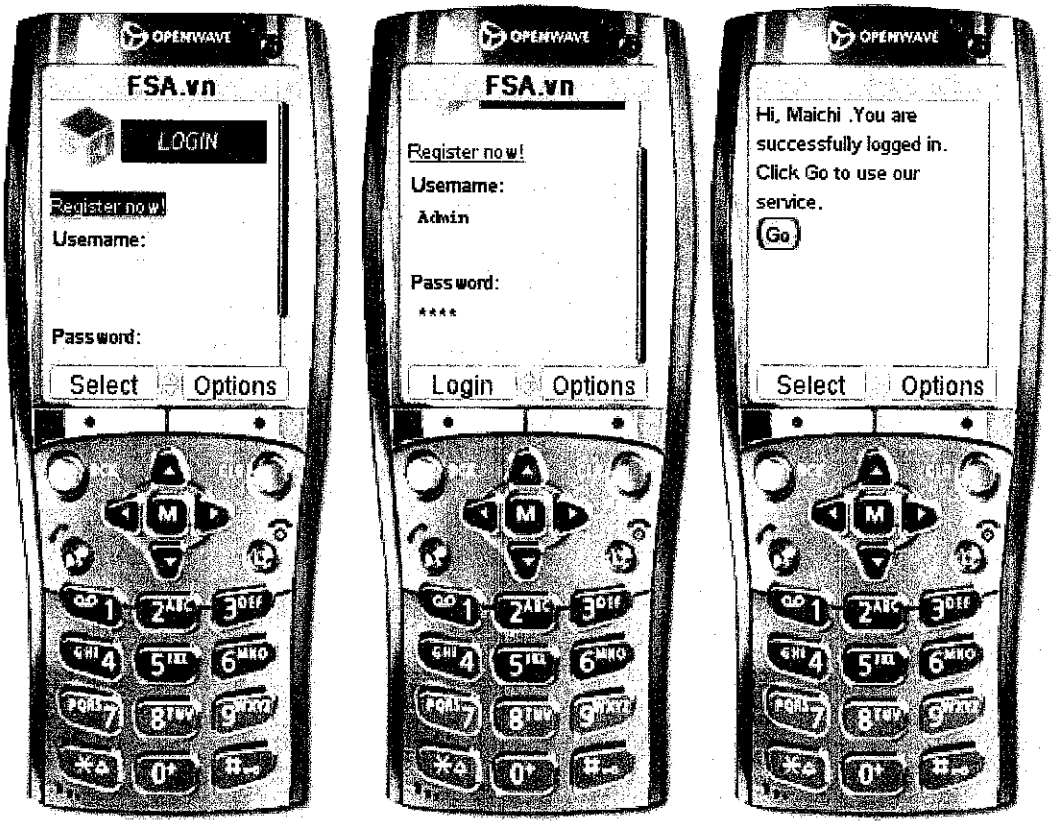
If the user chooses to use FX Community, he or she can post any related topic or gives reply to any existing ones. FX Community functions as a very simple forum for registered users of FXSA. The user can use SMS alerts function to have alerts on any response to his or her raised topic via SMS daily. See Screenshot 13 for the Forum pages. See Screenshot 14 for the SMS Alert management panel for the forum.



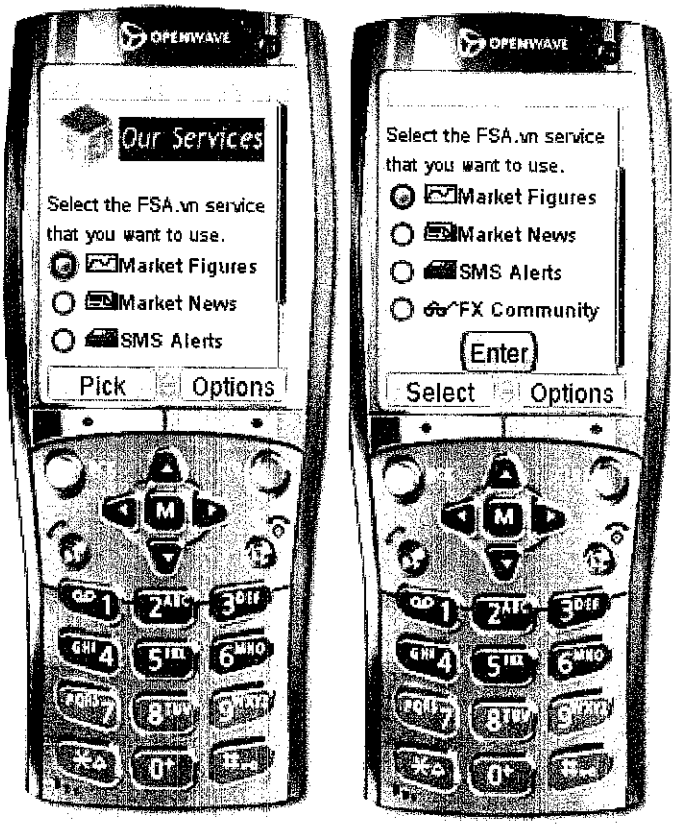
Screenshot 1 – Splash screens of welcome page for FXSA



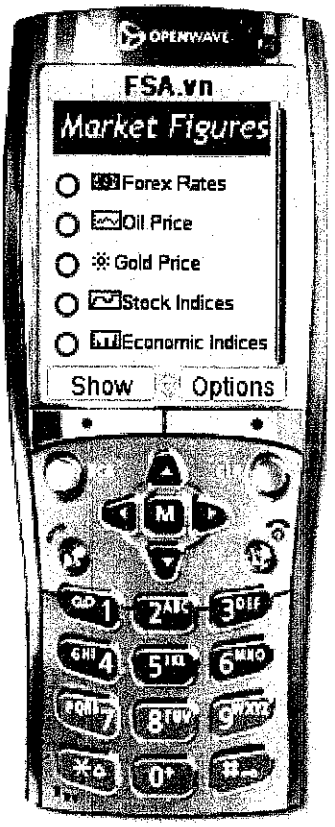
Screenshot 2 – Registration Form and registration success notification of FXSA



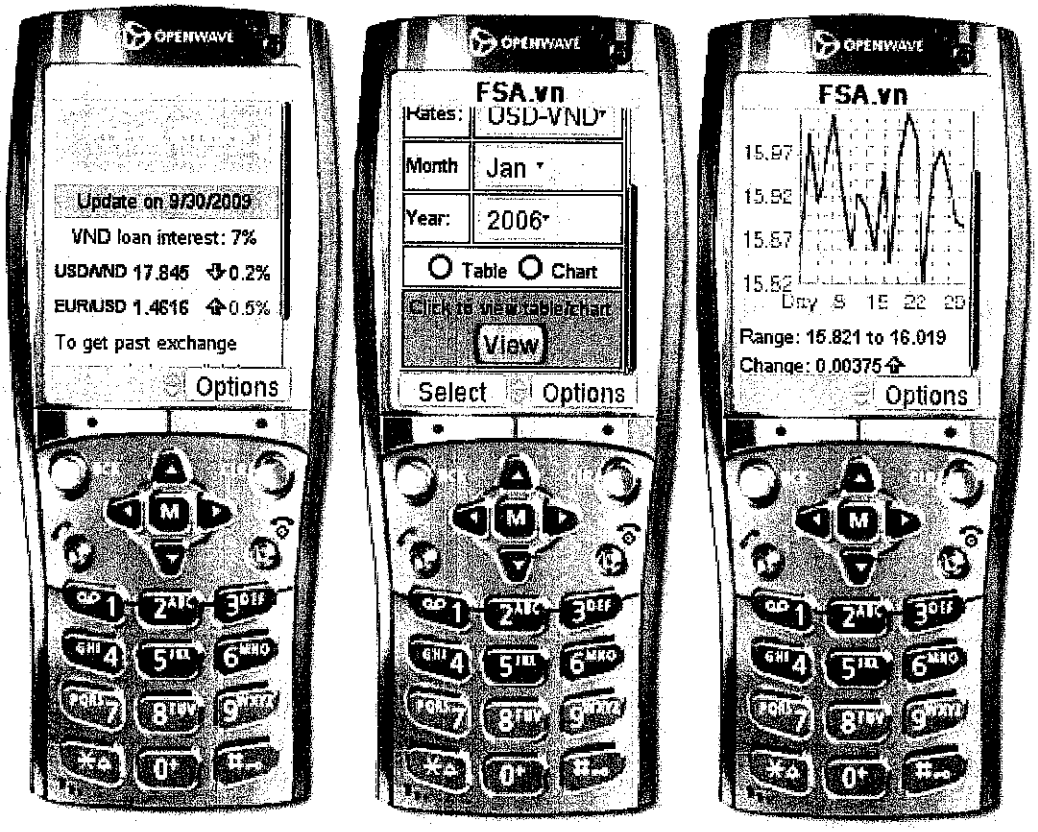
Screenshot 3 – Login Form and Login success notification of FXSA



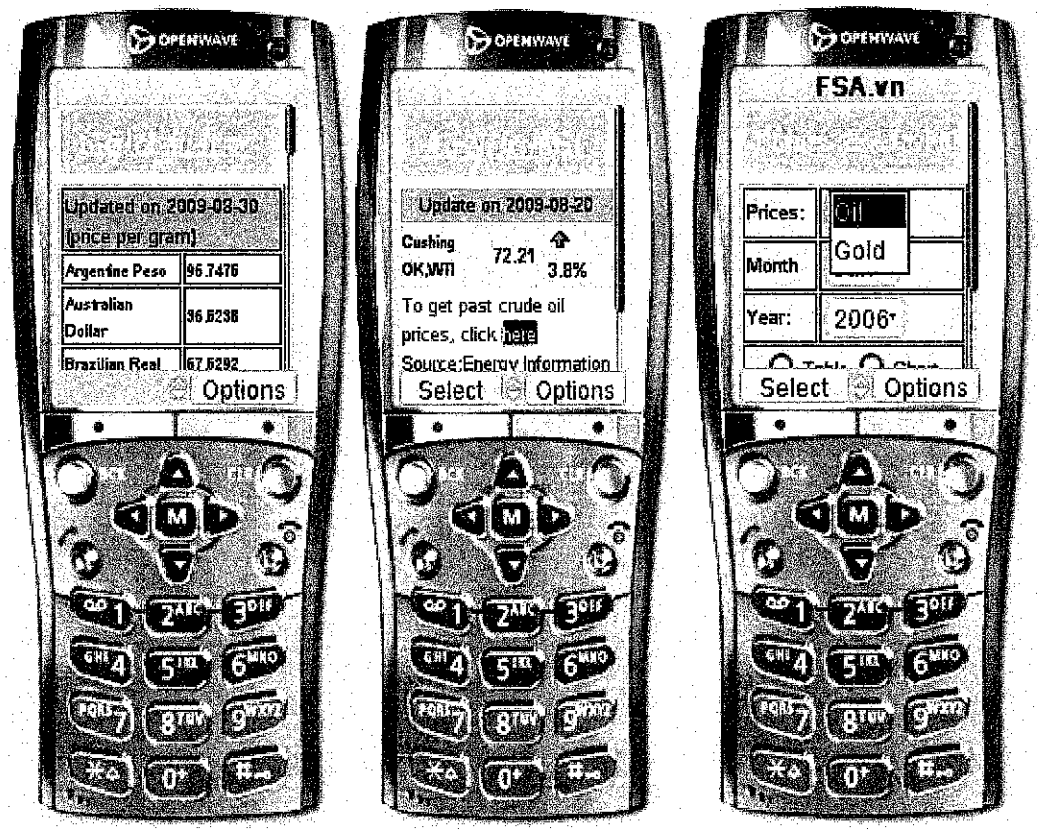
Screenshot 4 –Service menu page of FXSA



Screenshot 5 – FXSA Market figures selection page

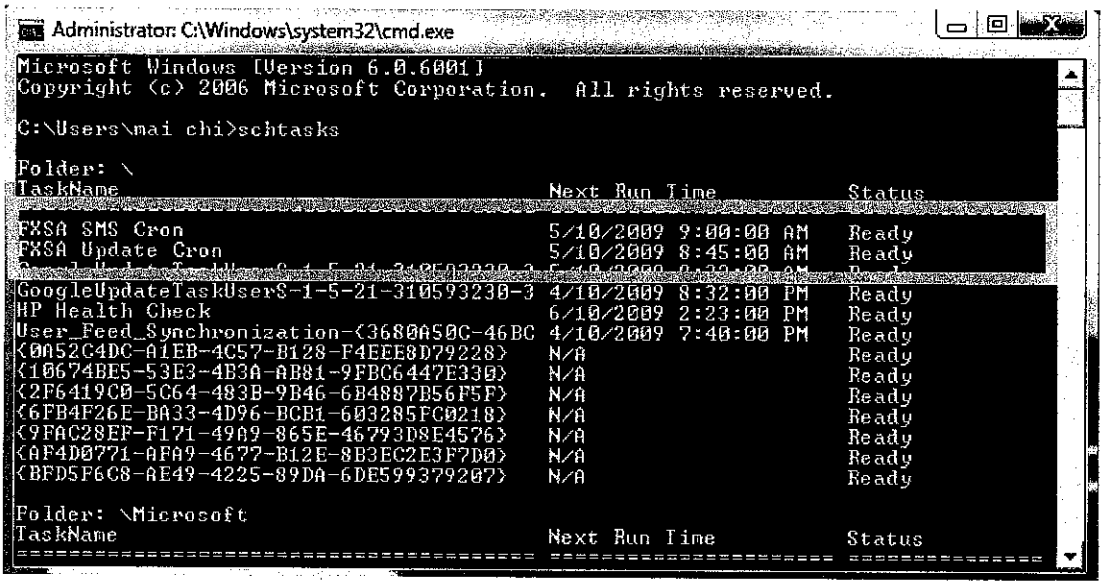


Screenshot 6 – FXSA Market figures on forex updates and retrieval pages



Screenshot 7 – FXSA Market figures on Gold and Oil updates and retrieval pages

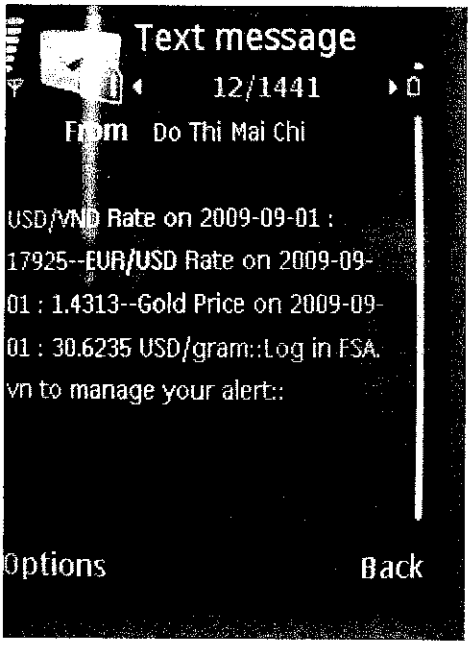
Screenshot 8 – FXSA Market figures on Stock index updates and retrieval pages



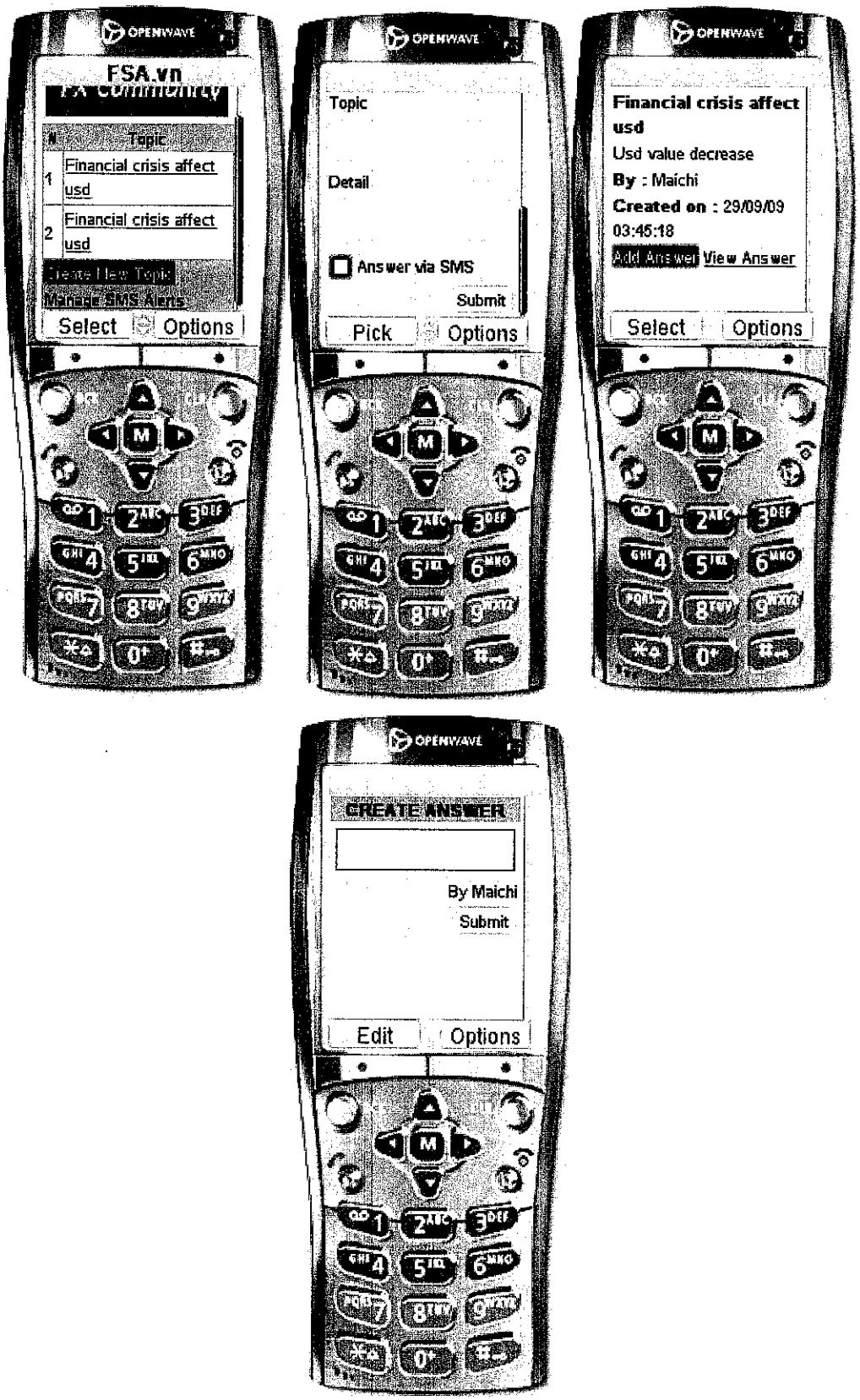
Screenshot 9 – "FXSA Update Cron" is scheduled to run at 8:45 AM and "FXSA SMS Cron" at 9:00 AM every day

Screenshot 10 – FXSA Market news and one local market news page

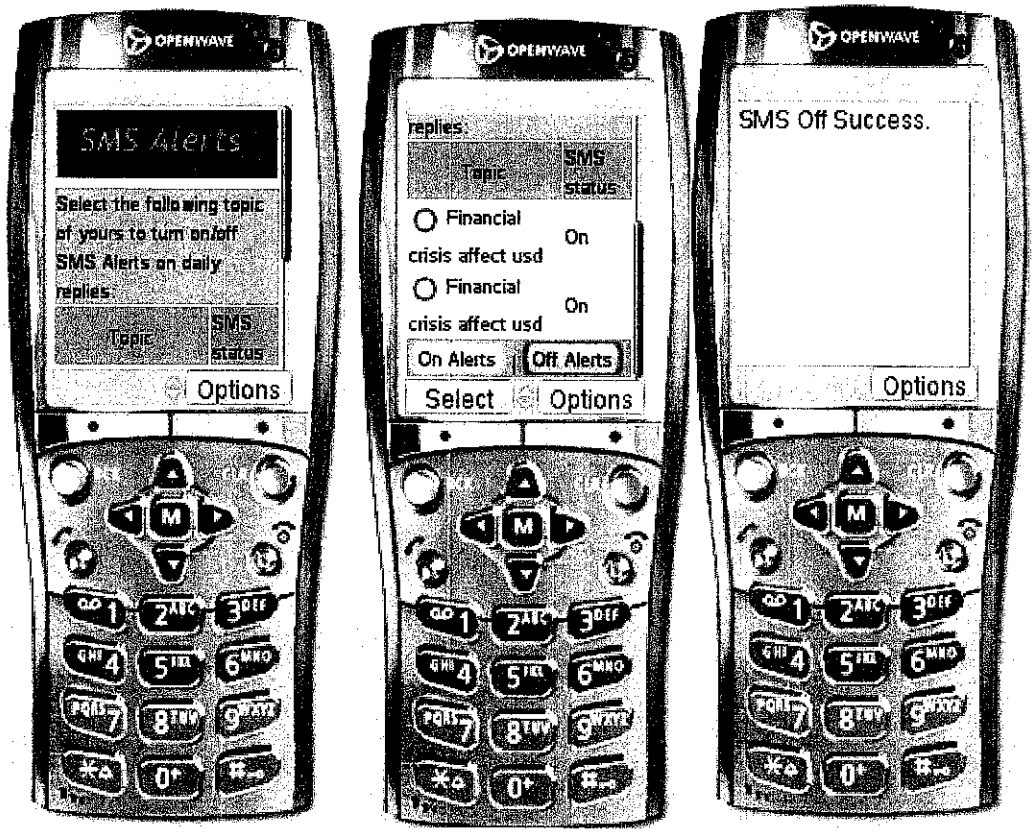
Screenshot 11 – SMS Alerts control panel and the notification when the user selects alerts on all categories



Screenshot 12 – SMS sample alert on user's phone



Screenshot 13 –FXSA Forum main page, topic creation and answer pages



Screenshot 14 –FXSA Forum SMS alerts management

6. SYSTEM SOURCE CODES

Please refer to the CD attached in Appendix C for the source codes.

7. SYSTEM TESTING

To test the system prototype, the author consulted with two financial lecturers in Universiti Teknologi Petronas campus and received agreement from them to be the system users. The two (2) financial lecturers were:

1. *Dr. Azrai Hj Abdullah*
   Room: 21-03-11
   Phone: 05-3687731
   Course: GAB3023 Corporate Finance
2. *Mr. Mohamad Radzi Bin Zainol*
   Room: 21-03-40
   Phone: 05-3687765
   Course: GAB3073 International Financial Management

The two lecturers were asked to try navigating the prototype and use the SMS Alerts function for two days. Both the lecturers showed good feedbacks on using the system and had no difficulty in navigating the sites.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

Up to this point of the project, FXSA has fulfilled the four (4) objectives specified for the project. The current system prototype is capable of:

- Presenting concisely daily market figures, indices, and news, updated automatically from variety of trusted sources from the Internet
- Offering historical database retrieval for the market figures and indices in both table and chart forms
- Offering SMS alerts on updated market information that can be managed by registered users
- Offering a simple forum that enables registered users to discuss on the market with SMS alerts function, which enables answers to the user's topics messaged to them via SMS alerts

The current weakness of the prototype is availability, meaning that the computer and the mobile phone are required to stay connected and available all the time for scheduled updating and alerting to be done. Moreover, the Internet connection is also required to stay stable all the time, especially at updating time, 8:45AM every day, to have updating run successfully.

Another disadvantage is the speed of sending message via mobile phone is lower compared to using a GSM modem. Plus, the number of messages transmitted is limited to 10 messages per minute.

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APPENDIX A - INTERVIEW QUESTIONNAIRE

Year 2009

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This questionnaire contains two (2) sections:

- Section A: All about foreign exchange (10 questions)
- Section B: All about your preferences (5 questions)

Please spend a few minutes of your spare time to answer the following questions.

---START OF QUESTIONNAIRE---

Section A: All about foreign exchange (10 questions)

1. How much are you interested in the foreign exchange market in Vietnam?
   a. Very much
   b. Quite
   c. Not very
   d. It's not my interest

   ANSWER: [ ]

2. How often do you check upon the foreign exchange rates e.g. USD/VND rate?
   a. Every day
   b. Every week
   c. Every month
   d. Not very often

   ANSWER: [ ]

3. What source of information do you usually base on for updates about the foreign exchange rates?

e. None of the above

ANSWER: [ ]

If you choose ***e***, please specify your answer:

4. How risky do you think when carrying a trade in a foreign currency esp. in USD in Vietnam?
   a. Not risky. Because the State Bank of Vietnam is controlling the rates, so it does not fluctuate very much.
   b. Quite risky. Because although the State Bank of Vietnam is controlling the rates, the rates are still moving according to the free market.
   c. Very risky. Because sooner or later, the foreign exchange rates in Vietnam will let float.
   d. None of the above.

ANSWER: [ ]

If you choose ***d***, please specify your answer:

5. Have you ever heard of a foreign exchange analysis system in Vietnam?
   a. Yes
   b. No
   c. Not sure

ANSWER: [ ]

If you have heard of a foreign exchange analysis system in Vietnam, please specify its name or its URL address if it is a website:

Name: **[ ]**

URL: **[http://]**

6. How important do you think the foreign exchange market's fluctuation in Vietnam is during its
   d. Not important

ANSWER: [ ]

For any selection, please specify your reason:

7. How do you think about the way the State Bank of Vietnam adjusts exchange rates?
   a. Very expected. All the reasons for adjustments are clearly specified.
   b. Unexpected. Some reasons for adjustments are not clearly specified.
   c. Expected. But, some reasons for adjustments are not clearly specified.
   d. None of the above.

ANSWER: [ ]

If you choose ***d***, please specify your answer:

8. When do you expect that Vietnam will open free foreign exchange trading market?
   a. In 5 years
   b. In 10 years
   c. In 20 years
   d. Not sure. But, in a very near future
   e. None of the above

ANSWER: [ ]

If you choose ***e***, please specify your answer:

9. Do you think there should be a web-based analysis system, where people can find real-time

d. Not very necessary

ANSWER: [ ]

10. If you think there should be a web-based system for foreign exchange rate analysis, what other function, apart from information updates and analysis, do you expect from such a system to provide you with?
    a. A forum or a chat tool, for signed-in people to discuss about the market
    b. Database retrieval for historical foreign exchange rates
    c. Basic tutorials for foreign exchange market analysis
    d. None of the above

    ANSWER: [ ]

    If you choose ***d***, please specify your answer:

Section B: All about user preferences (5 questions)

1. What is the source of information that you most frequently use for updating market news on the Web?
    a. Internet newspapers
    b. Web portals e.g. Yahoo
    c. Google search
    d. Social community network e.g. Facebook, MySpace...

    ANSWER: [ ]

2. What do you like the most when surfing on the Internet?
    a. It's fast and efficient.
    b. It's interactive.
    c. It's personalized.
    d. It's safe. Because it makes you feel as if no one knows what you are doing.

    ANSWER: [ ]

3. What is your most favorite web layout style for an information-based website?
    a. Simple and organized texts
    b. Illustrative and nice images
    c. Dynamic flash illustrations
    d. Any style. As long as it gives me the information I need.

    ANSWER: [ ]

4. What color mixes do you like the most in a web page?
    a. Black and white

If you choose ***d***, please specify your answer:

5. Click to see the image below. What do you recommend to improve its design?


welcome_page.jpg

Please specify your answer:

Please spend a few more seconds for a short comment on my project:

Comments	**Interviewee information**	**Signature (if possible)**
	Full name: Position: Place of work/study:	Date: --/--/----

Thank you very much for your cooperation.

APPENDIX B – QUESTIONNAIRE ANSWER SHEET

stion	USERS Answer	Experts KD	TPN	AC	Normal workers HTN	DHT	DQN	LHM	Students BVG	LNVT	DN	KC	AN	ND
1	a. Very much					✓			✓		✓			✓
	b. Quite	✓	✓	✓				✓		✓			✓	
	c. Not very				✓		✓					✓		
	d. It's not my interest													
2	a. Every day			✓		✓			✓		✓	✓	✓	✓
	b. Every week	✓	✓				✓	✓		✓				
	c. Every month													
	d. Not very often				✓									
3	a. The Stated Bank of Vietnam website	✓									✓		✓	
	b. Any commercial bank website							✓				✓		
	c. Newspaper articles	✓	✓	✓	✓	✓				er or from				✓
	d. Web portals e.g. Yahoo													
	e. None of the above						✓(check w friends who are FX dealers)		✓(For blackmarket exchange rate, some certain forums)					
4	a. Not risky. Because the State Bank of Vietnam is controlling the rates, so it does not fluctuate very much.				✓									
	b. Quite risky. Because although the State Bank of Vietnam is controlling the rates, the rates are still moving according to the free market.		✓			✓		✓	✓	✓	✓	✓	✓	✓

	c. Very risky. Because sooner or later, the foreign exchange rates in Vietnam will let float.	✓		✓			✓								
	d. None of the above.														
	a. Yes						✓(Reuter.com)	✓(bbc.com)	✓(Eximbank's Currencies Trading Department)			✓(http:// www.vietnam website.net/forex.htm)			
	b. No	✓	✓	✓	✓	✓					✓				
	c. Not sure									✓				✓	✓
	a. Very important now		✓			✓			✓	✓	✓	✓		✓	
	b. Not very important now, but will be in the future	✓			✓										
	c. Quite important			✓			✓	✓							✓
	d. Not important														

		At present Vietnam still is not fully integrated to the global financial market, but will become a part of the market very soon as the country has becomes a full member of WTO.	Since nowadays Vietnam's economy mostly integrated to the World's economy through inter-country business transactions such as import/ export activities, FDI and FII			Because the foreign exchange market in Vietnam is subordinating to foreign exchange market of the world		Because the FoEx market's Vietnam is very small	The flows of money in and out Vietnam, especially investment money and loans in foreign currencies.	Affect directy the purchasing power, prices, cost,.....			As it may have great effect on operational activities of entrepreneurs, especially those trading in import and export sector.	Because forex has a severe impact on the benefit of exporting and importing enterprises, also, it show the fact that how deeply Vietnamese economy integrate into the world economy.
7	a. Very expected. All the reasons for adjustments are clearly specified.							✓						
	b. Unexpected. Some reasons for adjustments are not clearly specified.			✓		✓							✓	
	c. Expected. But, some reasons for adjustments are not clearly specified.	✓	✓		✓		✓		✓	✓	✓	✓		✓
	d. None of the above.													
8	a. In 5 years	✓												✓
	b. In 10 years								✓			✓	✓	
	c. In 20 years				✓						✓			
	d. Not sure. But, in a very near future		✓	✓		✓	✓	✓						
	e. None of the above									or 10 years later)				

	a. I think there **must** be such a system	✓	✓			✓		✓	✓	✓		✓			
	b. I think there **should** be such a system						✓				✓		✓	✓	
	c. I think **maybe only** in the future, such a system is			✓	✓										
	d. Not very necessary														
)	a. A forum or a chat tool, for signed-in people to discuss about the market		✓							✓					
	b. Database retrieval for historical foreign exchange rates	✓	✓		✓		✓		✓		✓	✓	✓		
	c. Basic tutorials for foreign exchange market analysis		✓	✓		✓				✓					✓
	d. None of the above							✓							
								I'm not sure my answer above, I don't understand this field.		having a forum always attracts more viewers than the others					