**Sending Short Message Service (SMS) via Web Based System**

by

Rahayu Bt Md Yusof

Dissertation submitted in partial fulfillment of
the requirement for the
Bachelor of Technology (Hons)
(Information Technology)

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Universiti Teknologi PETRONAS
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CERTIFICATION OF APPROVAL

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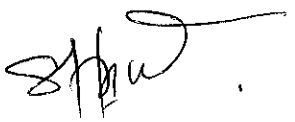
Approved by,



(Miss Syarifah Bahiyah Rahayu bt Syed Mansor)

UNIVERSITI TEKNOLOGI PETRONAS
TRONOH, PERAK
April 2004

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 the references acknowledgements, and that original work contained herein have not been undertaken or done by unspecified sources or persons.

RAHAYU BT MD YUSOF

# ABSTRACT

Today, the handphone has become one of the most important devices in everyone life. People will carry handphone everywhere and most of the handphones nowadays is supporting the SMS application. Firstly, this research paper is about sending the Short Message Service (SMS) via Web Based System. This paper then will discuss on the problem statement that leads to the development of the system which is how does sending the SMS via web based system can enhance the communication in an organization. The objectives of doing this project are to help the employer to contact with their mobile employees more conveniently, to enhance the communication tool for the mobile employees to get updated information on time and to build a web based system which allows SMS to be sent through it. In addition, the target user for this system is for the mobile user in an organization. In order to successfully completing this project, the author has 4 major stages which are planning stage, interface stage, coding stage and lastly the testing stage. In the interface and coding stage, the author embarks the spiral model in each one of the stages. The result of this project is to produce a system which will enhance the communication method in an organization and give benefit to the mobile users.

# ACKNOWLEDGEMENT

Firstly, the author would like to express deepest gratitude to the Lord Almighty for giving the strength, wisdom and patient in order to complete this project as per time given.

The author also would like to indicate that this project would have never completed without the help and support from many people. The author would like to send her deepest gratitude and thanks to Miss Syarifah Bahiyah Rahayu Bt Syed Mansor, Final Year Project Supervisor for all the guidance, support , good patients , advises and motivation which really help and give the author inspiration and strength to complete this project.

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# CHAPTER 1
# INTRODUCTION

## 1.1 BACKGROUND

This area of research is to integrate the web based system and SMS by sending the short messages from the web based system to the handphone that support SMS application and sending back the short messages from the handphone to the web based system.

Today, the handphone has become one of the most important devices in everyone life. People will carry handphone everywhere and most of the handphone nowadays is supporting the SMS application. By using the SMS application, people can keep in touch with each other at a lower rate compared to audio usage.

Target user of this system is for the mobile user that always away from office or organization. What the author means by mobile user is for example; a Project Engineer is always at the site office all the time which is a temporary office that has no proper facilities like computer or fixed line telephone. So if the employer wants to contact with this person, the device which available with them all the time perhaps is the handphone. But the coverage of the handphone's signal is not full all the time. So SMS is one way of communication which will keep the message in the service provider database for the time being when the user is unreachable and will deliver the message as soon as the person has the coverage again. Thus, by having this system, the messages guarantee reaches the user.

## 1.2 PROBLEM STATEMENT

Usually in an organization, the employees hired by employer mostly are mobile employees. Mobile employee is a person that always not in the office or in front of the computer. In addition this person also receive news and announcements later that the employees that in the office most of the time. This problem happens because the mobile employees are unavailable to get the message. Therefore the implementation of this system is to contact them more conveniently via web based system.

Therefore how does sending the SMS via web based system can enhance the communication in an organization?

## 1.3 OBJECTIVES

- To help the employer to contact with their mobile employees more conveniently.
- To enhance the communication tool for the mobile employees to get updated information on time.
- To build a web based system which allows SMS to be sent through it.

# CHAPTER 2
# LITERATURE REVIEW AND/OR THEORY

Mobile technology device is growing day by day. Long time ago in the era 90's, mobile technology is one of the most expensive device. Only business people that really make full use of it tend to buy handphones. But now mobile technology has become one of the most important devices in ones life. This author's point of view is supported by Beaubrun and Pierre, 2001 which saying that wireless personal communications can be considered as the fastest growing segment of telecommunication. In fact, mobile telephones have become an everyday accessory for hundreds of million people.

## 2.1 Mobile employee working environment

Mobile employee is a person that is not in the office or in front of the computer almost all the time. As mentioned in an article taken from News Strait Times, changing locations, whether walking from an office to a conference room or traveling around the world, has always been a part of the business environment.[23] This article showing that most of the employees in the world is a mobile employee.

Mobile employees always get the announcement, notices or messages from the employer later than the employees that in the office or in front of the computer almost all the time. This problem exists as the old communication method use by the employer such as e-mail, memorandum and notice board is no longer effective. According to Prasanna Raman in his article appeared in Computimes, people always saying that it would be convenient if employee could receive urgent e-mails on mobile phone when they are out of the office. [22]

## 2.2 SMS features

According to Reselca E. Grinter, text messaging—texting—utilizes the Short Message Service (SMS) capability built into the Groupe Spéciale Mobile (GSM) wireless standard. Text messages are limited to 160 characters. They can be sent from any mobile phone (or Internet portal) to any other phone on the GSM wireless network irrespective of the sender's and receiver's service providers". [10] From the definition itself, it has clearly stated that the text messages can be sent from the Internet application. The author's project then will send the SMS via a web based application.

## 2.3 Popularity and cost issue of SMS

Mobile technology is enhancing its features everyday. The first attempt of collaboration between text and mobile communication technology is using SMS to deliver messages between the same service provider at a very high price. But after years of research based on the author's observation of the SMS development, SMS now can be sent to any service providers in Malaysia and also overseas. Other new features of mobile technology that available now are Multimedia Message Service (MMS), Wireless Application Protocol (WAP) and General Radio Packet Service (GPRS). This point has been mentioned by Jamal Shahin, Ari Heinonen, Georgios Terzis in their research title "The Future of Mobile Newscasting". In their research, they are more focusing on news delivery using SMS application as it is compatible with GSM phones which at that time; most people are using GSM phones. But in order to get the news update, they have to subscribe and pay at a very high price to be notified. Here the issue of SMS is just being their trend at that time and cost aspect is taking place. [1]

Nowadays, many people at the age of 16 years old and above have handphones as a communication device as the price of the handphone is decreasing as compared to the past 10 years [11]. But most of them are using SMS more that make calls. The increase number of handphone users shows that the handphone has become one of the coolest technology and very important to most of the people. According to Decina M and Trecordi, the number of mobile user is rapidly growing, so the demand for mobile services is becoming stronger and more diversified [2]. The qualitative research

comprised 30 in-home interviews, with 10 respondents in each of 3 age groups – under 16 year olds, 16-17 year olds and 18 years old and above. All respondents had mobile phones, which they used to send and receive text messages. [11]

Popularity of SMS is more than the actual function of a handphone which is making calls. In fact, some may even send more SMS messages than make calls. In May alone, 24 billion SMS messages were sent by over 600 million GSM (global system for mobile communications) users worldwide, says wireless industry representative body GSM Association. It is also projected that over 100 billion SMS messages per month will be zipping across the globe for the next three years. SMS must be the best thing that ever happened since sliced bread mentioned by Matthew Mok. [20]

This is proved that SMS popularity really gives benefit to mobile users as they can get connected conveniently. More than 100 million short messages are sent per month in the US [8]. For Chinese users, even though text inputting is more difficult, text messaging is more popular. The monthly volume in 2002 is 7.5 billion messages [9].

Here is the summarize figure of SMS usage in most of the popular country in the world taken from GSM World-What is SMS [21]:

| **Country** | **SMS messages per month** |
|---|---|
| Germany | 200 million |
| Italy | 150 million |
| Finland | 75 million |
| UK | 70 million |
| Norway | 70 million |
| Sweden | 70 million |
| Portugal | 60 million |
| France | 60 million |
| Spain | 60 million |
| Denmark | 50 million |
| Belgium | 25 million |
| Greece | 15 million |
| **TOTAL** | **1 Billion** |

Table 2.1: The number of SMS sent per month in Europe countries

Even though mobile phone features is not convenient enough as it has small display and poor input method, but SMS is still the best method of communication which gives clear message deliver medium compared to audio usage. This opinion is supported by Huatong Sun which has been summarize as follow: Considering the inherent usability weaknesses of mobile phones such as the small display, poor input methods, moving environments, and noisy surroundings, the success of mobile text messaging is hard to explain. [7]

If you just want to say you are late for an appointment, you can do so by sending a SMS as it is short and concise compared to a brief call which might leads to a longer conversation. This can incurred higher cost. But by having the SMS, the message is delivered clearly to the receiver. According to Siltverberg, M MacKenzie, I.S, and Korhonen P. Predictiny, in some markets the SMS has been in mainstream use for many years. Despite the popularity of SMS, since it was introduced on cell phone, the user interface has not changed significantly. [6] In the News Strait Times article written by Arni Abdul Razak also touched about how and when CELCOM introduced the SMS for post-paid customer to send and receive SMS from their handphone and the enhance version of SMS via e-mail. [16]

Although two thirds of respondents said that the cost was clearly indicated, the same proportion thought that premium rate SMS services were: *"They're too expensive!"* All ages [11]. In the News Strait Times article written by Deborah Loh, in Kuala Lumpur, there are big money to be made in the Short Message Service (SMS) business. The industry easily grossed RM1.2 billion last year based on the estimated six billion messages sent at an average fee of 20 cent per message. [19]

Despite the popularity of the SMS nowadays, there are still people who does not know what is SMS is all about and what are the service offer to the public in general. This is due to the limitation of the service itself which for the older group of users; they only know the usage of the handphone is limited to the audio communication only. Currently the popularity of the SMS is increasing and become valuable to the public. An interview has been conducted by John J. Hagedorn and there is a person who does not know what SMS is all about.

*"I CARRIED a handphone for two years before I knew what a short messaging service (SMS) was. Sad, but true. I didn't discover what my handphone was capable of until someone told me once, "I'll send you an SMS"."*[18]

**2.4 The connection of mobile technology with other system.**

The widespread of mobile technology as the digital cellular telephony is emerging the needs to the mobile telephony services and computer network services. The integration between information services such as database, notification services like e-mail and alarm system and also the telecommunication infrastructure such as GSM and fax is the one of the strategic issues to satisfy mobility needs. This point is mentioned in the journal title "The convergence of telecommunication and computing by Messerchmitt, D.G. [3]. While according to San Murrugesan, Yogesh Deshpande, Stere Hanson and Athula Binige, problems of Web-based systems development can partly be attributed to the nature and rapid growth and evolution of the Web. Also the complexity of Web-based applications has grown significantly - from information dissemination (consisting of simple text and images to image maps, forms, CGI, applets, scripts and style sheets) to online transactions.

Internet Mail to SMS is available in Malaysia now for service provider like MAXIS and CELCOM. User can sent SMS through email for free but this is through the service provider. Sometimes these messages will reach the receiver late as this service is quite new which about 3 years back time. Survey and research make by European Telecommunications Standard Institute has found out that a first example of service is an extension and personalization of Internet e-mail. The mail system usually maintains a user mailbox and when a new arrives; the system reads it and sends a notice to the destination user, using an SMS message. [4] This makes it clearly why the SMS reach the receiver late as the system has to read the message before sending it to the receiver.

The e-mail to SMS is successfully done but only for certain service providers for the time being which make the connection limited for certain group of users only as in Malaysia only MAXIS and CELCOM is providing the service for free. In the research conducted by Virtturio Ghini, Gioranni Par and Paola Solomon, they have discovered that the gateway between the mail and the SMS system has been completely implemented [5]. This is showing that the idea of emerging the Internet application and mobile technology is completed and successfully done as in Malaysia, MAXIS and

CELCOM has embark in the service. Therefore it is possible about the author's theory of sending SMS via web based.

The web based systems have been apply in many sectors like business, commerce, industry, banking and finance, education, government and entertainment sectors, and our personal and working lives. Nevertheless the most important issue here is how the web based system gives impact in a country in term of world population, job opportunity and moral values in the societies. In addition, web based system also provide unique features that make the system which make it different and more convenient compared to the manual system that we are using right now. Many web-based systems exist in this country.

The wide usage of web based system shows that the Internet, Intranet and Extranet services do give impact in everyone lives. For example, long time ago people have to queue just to pay bills at the bank. But nowadays, with the introduction of web based banking system, all this transaction can be done at home by clicking your mouse (through the Internet). "Web Engineering: A New Discipline for Development of Web Based Systems" thesis is supporting the author's opinion. [13]. In the News Strait Times's article written by Hannisah Mohd Gani, she has discovered that sending SMS via the net has become a popular method which the Malaysian people is aware about the services available. [14] The writer also mentioned above the unique features of SMS and the system which able the connection between those too. This integration also leads to e-banking. In the e-banking, people can get the information about current foreign exchange through SMS or even transfer money wireless.

**2.5 The benefit of using mobile technology.**

Furthermore, the usage of SMS is convenient because it does not involve noisy, disruption and attenuation of coverage in order get the SMS. User also can read the message calmly. As refer to V Prathaban and Ayu Aziz, when the usage of handphone is limited to audio usage, people tend to worry about disruption and attenuation of coverage as this might disturb the conversation. Most mobile phone users are used to

dialing up and talking with the person at the other end, even if the call is just to say that one will be late for an appointment. In addition, a brief call to inform your secretary that a meeting has been postponed, or to tell your wife that you will be picking up the kids after work, will cost a minimum of 30 cent. Fortunately, there is a cheaper alternative called the SMS. SMS is a sensible way of communicating as long as the message to be relayed is short. Whatever it is, the message is clear - SMS is here to stay - well, as long as there is a cheaper alternative to WAP and voice phone calls.[17] As the result, the popularity of the SMS is making the service people choice as a method to contact people more convenient.

**2.6 The architecture of the system.**

There is a system that can send SMS via web based system but the number of message sends is limited to only eight per day. This system allows SMS to be sent to all service providers available in Malaysia and overseas.

A sent SMS is stored at an SMS Center until the receiver's phone receives it. The receiver cannot identify the sender because only web system telephone number is included in the message itself. But the registered users name will be included in the system as notification.

This is the system architecture of based on SMS.ac system [12]:

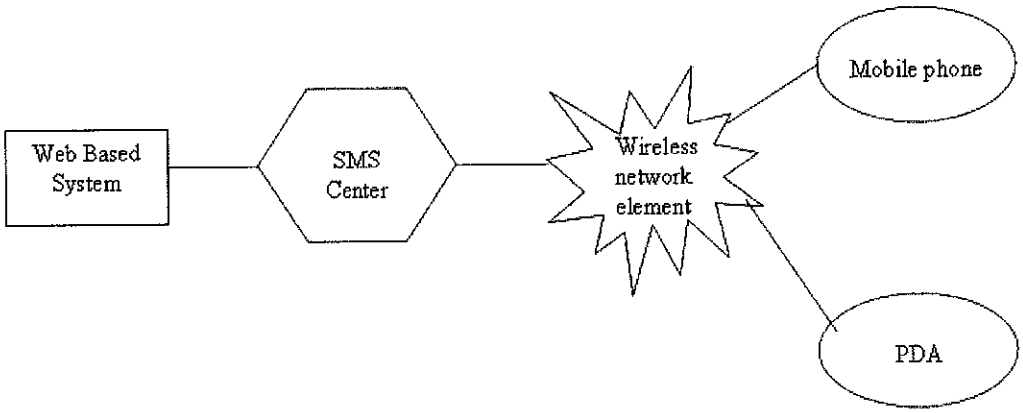


Figure 2.1: Basic architecture of SMS.ac

Since SMS is a store and forward service, the short messages are sent via the SMS Center and not directly from sender to recipient. The SMS Center acts as a relay station for short messages, by first storing and later forwarding them to the right destination. Each network that supports SMS has one or more SMS Centers to handle and manage short messages. SMS center is not a simple application for reading short messages, but a complete dispatching center. It is structured as an input-dispatcher-output engine. Messages can arrive from a GSM phone or module, from e-mail when SMS Center can act as a SMTP server or as a POP3 client. It also can arrive from web which it can act as a web server, from other SMS Centers in the LAN. These messages are processed and rerouted to an output queue. This output queue permits to send the messages via GSM, via web which depends on the different protocols, via e-mail when SMS Center can act as a SMTP client or as a MAPI client, where the messages are copied to the outbox of the preferred mail application.

Regardless to the service, registered users will get varies advertisement from the provider. The advertisements are quite disturbance to the privacy of the users even though the users have agreed to the term of supplies when register for the service. Besides, the receiver cannot reply back to the system as the system is a medium to send messages to represent the sender.

The figure below is the summarization of the communication flow as a whole [15]. There is a connection of web browser and mobile phone. It is possible to integrate the web based system and mobile technology especially SMS.

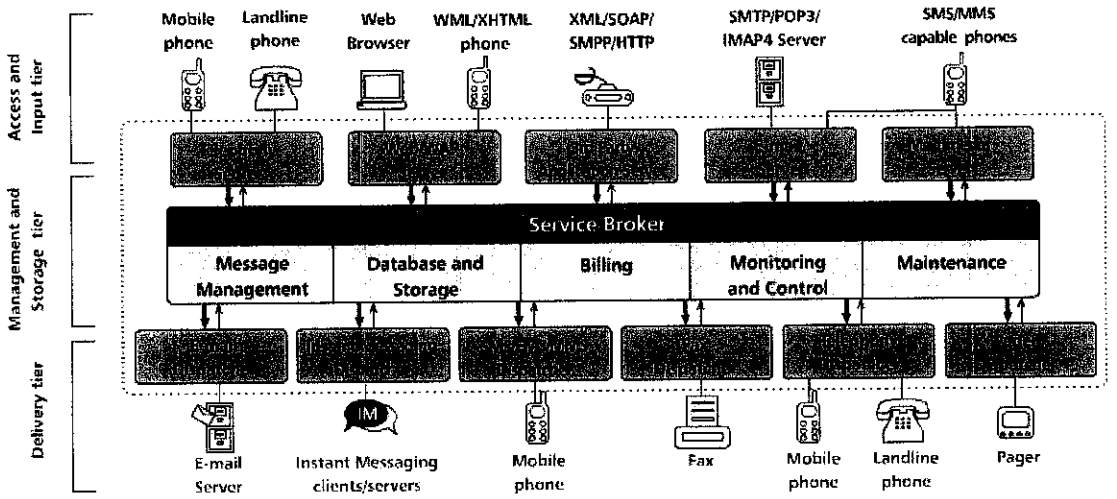


Figure 2.2: The communication arena as a whole.

Here is the description of the figure above:

1. **Access and Input tier**

   The Access and Input tier provides 'log on' entrance into the system. Integration with third party systems - be it partial or complete - is done through interfaces defined in this tier for example POP3, IMAP4, SMTP, SMPP, SMS, MMS or XML / HTTP-Post for application level integration. All servers are fully monitored and load balanced.

2. **Management and Storage tier**

   The Management and Storage tier is the heart and brains of the system. It includes the database such as Oracle for example and storage vault like EMC2 where all messages going through the system are locked away, message queue management and deployment, 24x7 monitoring services which supported SNMP traps, maintenance and administration functions and finally, the billing engine. The whole tier is carefully shielded and well protected by for example Checkpoint Firewall and Cylink VPN shield.

3. **Delivery tier**

The Delivery tier ensures that all messages leaving the system are passed by the Message Management Server to the applicable Dispatcher for fail safe delivery. Each Dispatcher is responsible for transforming the generic multimedia message to the specific format of the recipient device, delivering the message, handling local resend and retry logic, and reporting the exact status of delivery back to the database for the user to view.

# CHAPTER 3
# METHODOLOGY/PROJECT WORK

The author has identified the best method that involves in developing the system. Basically, the process involve is a portion of System Development Life Cycle (SDLC) but has been adjusted according to the needs and progress of the project.

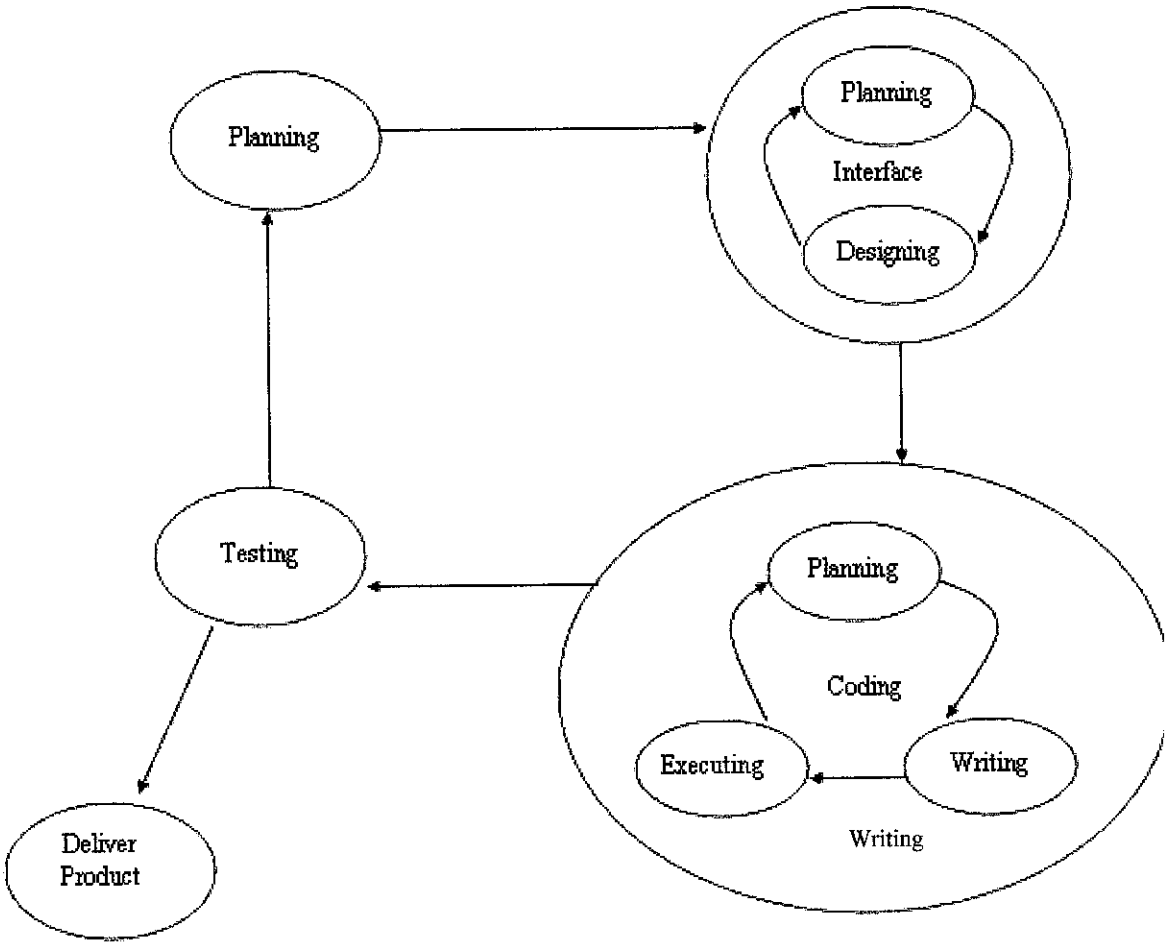


Figure 3.1: System development process involved.

3.1 Planning stage

- Identify the scope of the project.
- Identify the problem statement that leads to the development of the project.
- Identify the objective of developing the project.
- Estimate the duration of time in completing the project (identify whether the project relevant to the time given)

3.2 Interface stage

3.2.1 Planning stage

- Conduct some survey on the existence system to identify the weakness and improvement needed.
- Sketch the interface guided on the existing system.

3.2.2 Designing stage

- Design the interface (based on the sketch)

3.3 Coding stage

3.3.1 Planning stage

- Comparing which programming language that suitable in developing the project.
- Learn how to write using the programming language selected.

3.3.2 Designing stage

- Writing the script and apply it on the interface.

3.3.3 Executing stage

- Conduct testing when portion of coding completed (example: when coding been inserted in a box of the interface)

3.4 Testing stage

- Conduct thorough testing after the project completed.

In order to develop the project, the author needs hardware and software to complete the project. Here is the list of hardware and software used to develop the project:

Hardware:

- Intel Mobile Celeron processor 1.1 GHz
- Bright 14.1" active matrix TFT display
- 20 GB hard disk drive
- 256 MB of 64-bit SDRAM memory
- 24x-10x variable speed CDRW
- Two stereo speakers and 16 bit stereo audio supporting Sound Blaster Pro
- Universal serial bus (USB) port
- V.90 56Kbs modem
- 10-100 BT Ethernet card
- Data Cable Nokia 8210

Software:

- Windows XP, Professional Edition
- Microsoft Office XP, Premium Edition
- Internet Explorer 6
- MS Outlook (communications)
- Nokia PC Connectivity SDK 3.0
- ActiveXperts Software-SMS and Pager toolkit
- Microsoft Visual Basic 6.0

# CHAPTER 4
# RESULTS AND DISCUSSION

This use case diagram is used to illustrate the actors and processes involved in the system.

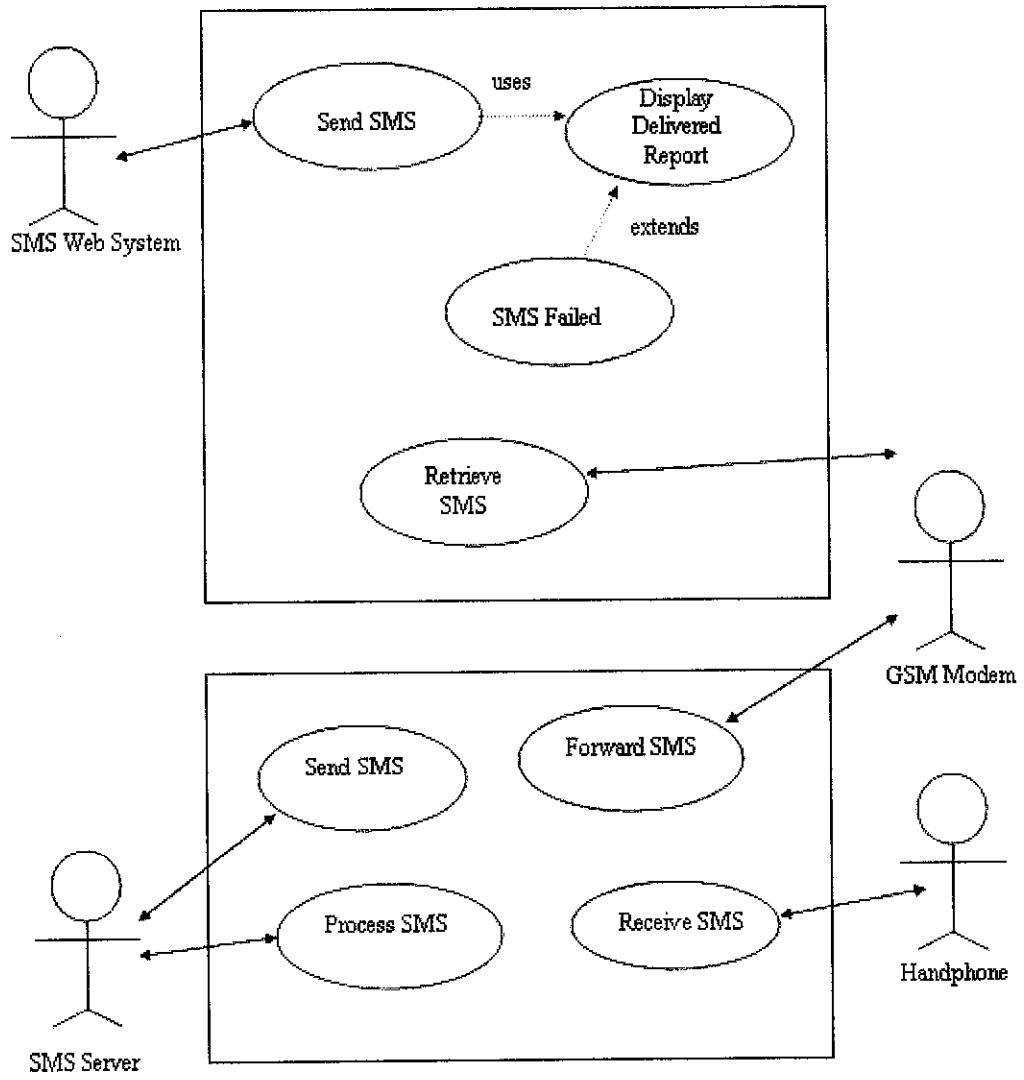


Figure 4.1: Sending SMS via Web System Use Case Model Diagram

| ACTOR | | USE CASE |
|---|---|---|
| SMS Web System | *initiates* | Send SMS |
| GSM Modem | *initiates* | Retrieve SMS<br>Forward SMS |
| SMS Server | *initiates* | Process SMS<br>Send SMS |
| Handphone | *initiates* | Receive SMS |

Table 4.1: Listing of Actors and Use Case for Sending SMS via Web System

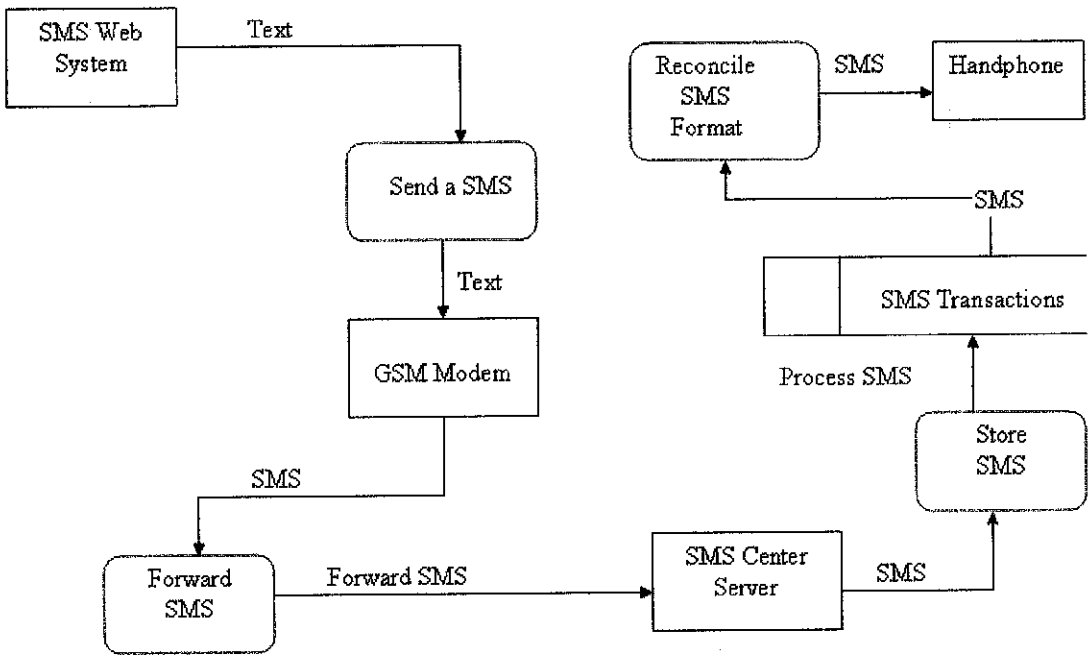


Figure 4.2: Sending SMS via Web System Data Flow Diagram

The figure above is the Data Flow Diagram of the system. The database mainly involved at the SMS Center Server which the various SMS will be stored and processed before the system deliverer the SMS to the receiver's destination.

Below is the author's system architecture that based on the communication arena as a guideline:

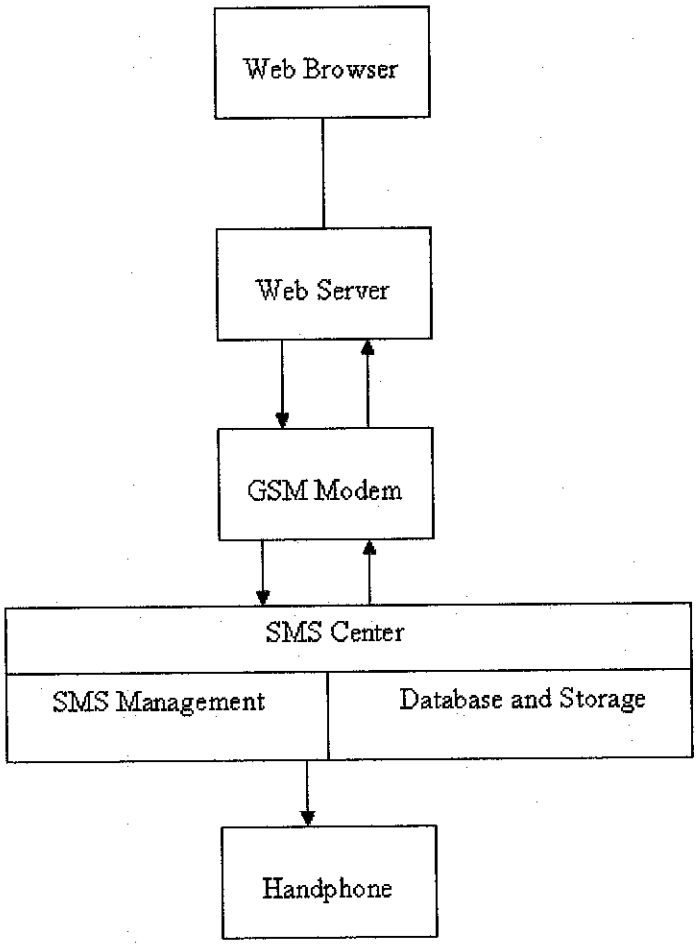


Figure 4.3: The author's system architecture

This is a brief description about the system architecture:

1. In the access and input tier, the author will define the interface using web based system which has balanced uploaded in a Web server.
2. The SMS will go through GSM Modem.
3. Then the SMS will be forwarded to the SMS Center Server.
4. Lastly the SMS reaches the receiver's destination.

This SMS Web System is just a prototype which will reflect the actual system architecture. But due to limited budget and time, the author has replaced the complicated and expensive components with the affordable ones. This prototype consists of several components:

- A computer embedded with Nokia PC Connectivity SDK 3.0 and ActiveXperts Software-SMS and Pager Toolkit.
- Nokia 8310 handphone connected with IRda cable
- SMS Center Server
- Nokia 3315 handphone.

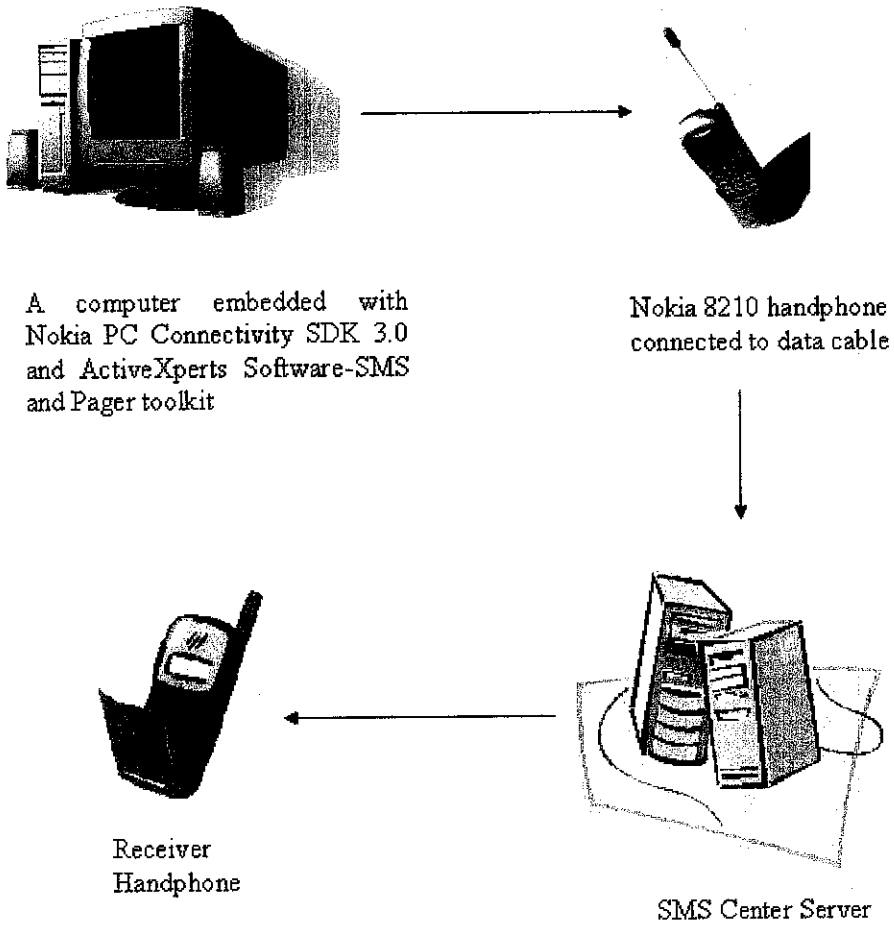


Figure 4.4: The project's components

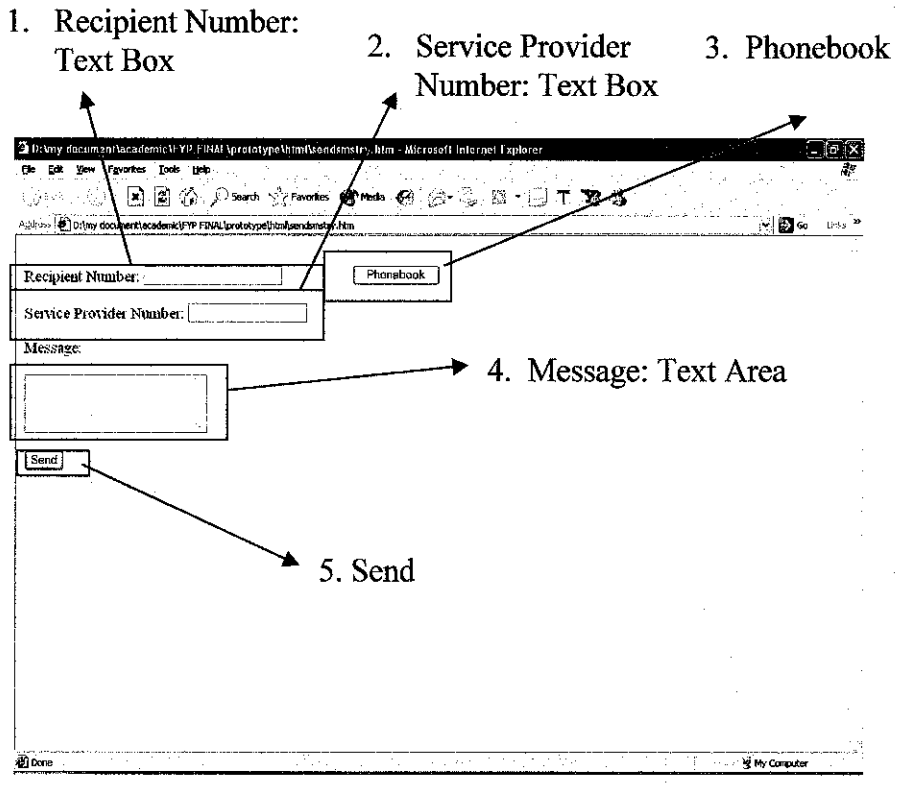


Figure 4.5: The interface of project prototype

This is the interface of the prototype up to the time this report been completed.

1. As according to plan the system will be triggered with a checker to check the handphone number format which is 10 characters per number and for multi users' numbers will be separated by comma. If the sender enters alphabets in the recipient number field, the textbox is disabled.

2. A service provider field is needed as different service provider is using a different SMS Center Server number. The sender has to enter the SMS Center Server number as follow:

| Service Provider | SMS Center Server Number |
|---|---|
| Celcom Malaysia | +60193900000 |
| Digi Malaysia | +60162999000 |
| Maxis Malaysia | +60120000015 |
| TMTOUCH | +60132400000 |

Table 4.2: SMS Center Server Number

3. The phonebook button can connect the system to the Microsoft Excel application which the handphone number database been stored. The reason the author choose Microsoft Excel as the platform is for the sake of the easy maintenance of the database by the sender.

4. The message text field can occupy 160 characters per time. This is text field is a multi line basis. According to plan the system will be triggered with character checker, which is when the sender message is exceeded 160 characters, it will popup a message reminding the sender about the issue.

5. When the sender click the "Send" button, this popup message will appear letting the sender knows that the SMS has been sent.

Sending SMS via web based system is the new element in Malaysia's technology as there is no such system exists. The author's objective of producing the system is to help organization which has mobile employees like Project Engineer to be able to be contacted by the employer easily and more convenient through SMS.

The author has given questionnaire to 30 samples regarding the usage of web based system. The samples are the intern employees that undergo Industrial Training this semester.

4.1 How does the sample find about the web based system?

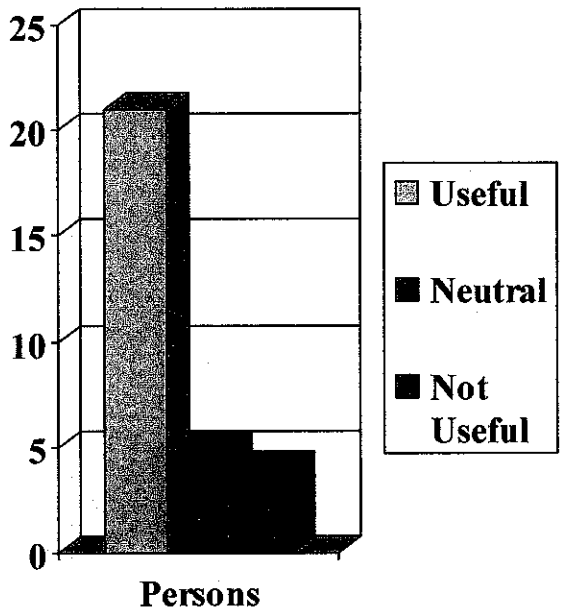


Figure 4.6: How does the sample find about the web based system bar graph

- 21 persons said that the web based system is useful.
- 5 persons are neutral about the web based system.
- 4 persons said that the web based system is not useful.

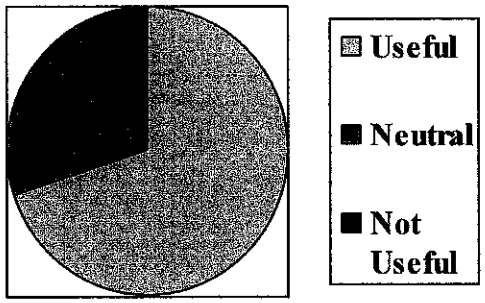


Figure 4.7: How does the sample find about the web based system pie chart

- 21 persons said the web based system is useful as they have been notified effectively with the latest news and announcements faster than the current communication tool available.
- 5 persons are neutral about the web based system because current communication tool available is effective enough.
- 4 persons said that the web based system is not useful as they always leave the handphones is the car or bag. So the latest news and announcements still does not reach them on time.

4.2 Does the sample receive the SMS on time?

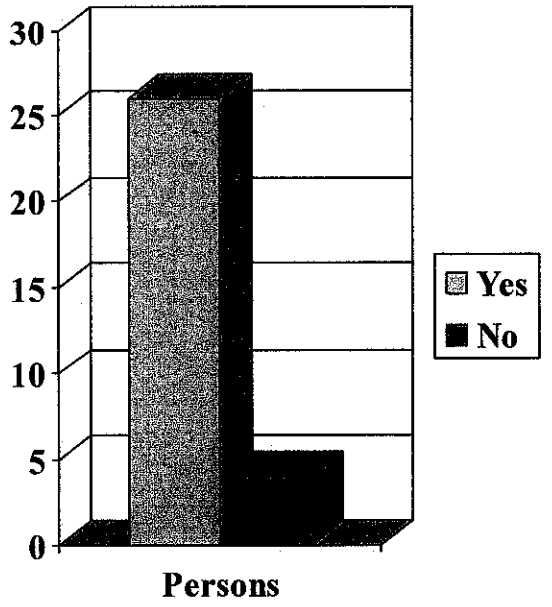


Figure 4.8: Does the sample receive the SMS on time bar graph

- 26 persons said that they receive the SMS on time.
- 4 persons said that they receive the SMS late

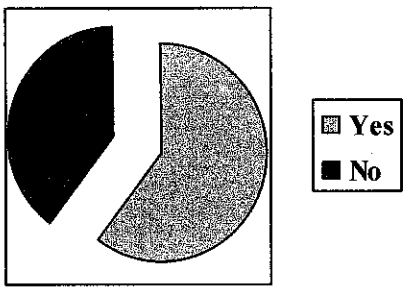


Figure 4.9: Does the sample receive the SMS on time pie chart

- 18 persons or 60% said the system is easy to use.

  They managed to run the system themselves.
- 12 persons or 40% said the system is not really easy to use.

  They needed help during first time usage.

4.3 Does the alarm help the sample?

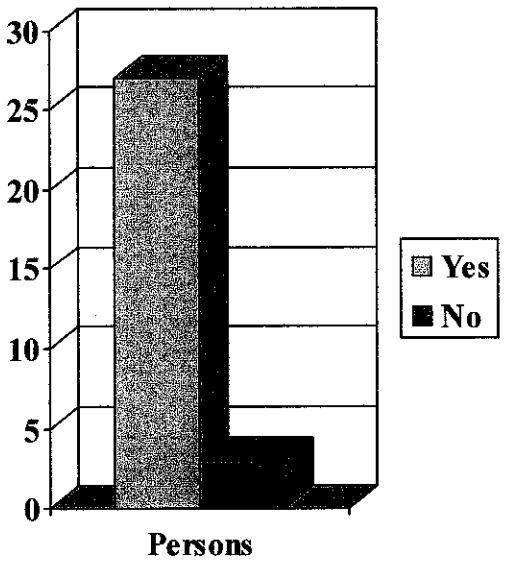


Figure 4.10: Does the alarm help the sample bar graph

- 27 persons said that the alarm is really helping in notifying the new SMS received.
- 3 persons said that the alarm is not helping as they tend to switch off the sound. (irritating)

4.4 Future recommendation given by sample

- Most of the samples has a few similar future recommendation:
  - Enhance the color of the system.
  - Generate a delivery report.
  - Cache for the recipient number (memory).

4.5 Overall rating of the system?

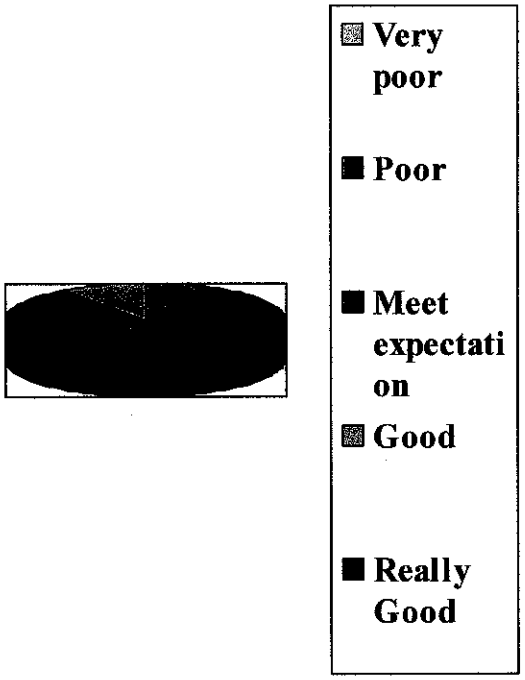


Figure 4.11: Overall rating of the system pie chart

- 0 persons said the overall system is very poor.
- 2 persons said the system is poor.
- 25 persons said the system is meet the expectation.
- 3 persons said the system is good.
- 0 persons said the system is very good.

# CHAPTER 5
# CONCLUSION AND RECOMMENDATION

As a conclusion, handphone has become one of an important device in everyone life. This is proven with 25 out of 30 samples said that the system is meeting their expectation. The usage of handphone is not limited to audio usage only, but the function has been broadened. The handphone nowadays can support SMS application besides the audio usage. This can give benefit to the users as they can read the message calmly and clearer.

SMS has become everyone choice of communication because of several aspects and according to Deborah Loh, Malaysia itself manages to gain profit up to 1.2 billion from the amount of SMS sent through out the year. The SMS popularity and benefit of the usage makes SMS one of the most convenient methods of communication. From the survey conducted by Beaufort International Ltd, people age 16 and above tend to use SMS when they need to tell other about a simple notice or announcement such as they will be late for meeting or they will be on leave. By using SMS, the message is deliver clearly and the receiver can read the message calmly.

In addition, the SMS then can be integrated with other system especially web based system. The emerging of mobile technology with other relevant systems has make humans life become easier. Take for example; by integrating mobile technology with the banking system, people now can transfer their money using SMS which at can save time compared to the old method which people have to queue just to make a money transaction.

The unique SMS features also help the popularity of the SMS. SMS can be sent from anywhere using any mobile phone or even Internet portal. This makes SMS so important for mobile user as that they can be contacted easily via SMS. Besides, by using SMS, people no longer have to worry about disruption and attenuation of coverage disturbance as conversation is through text not audio.

For future enhancement, SMS usage can be upgraded by increasing the length of a SMS at the same price that available now. Today, the price of one SMS length consists of 160 characters is equal to the maximum price of 30 cent per SMS. This is because the data rate packet issue is involved after certain calculations and formulas take in charge which makes the 160 characters are the maximum characters allows per SMS to be send out. But with the advancement of mobile technology, the length can be increased by improving the number of data rate packet or hardware used and people then can write longer.

Furthermore, in the future, the web based system does not have to manage and store message in the SMS Center. By eliminating the SMS Center, the web based system itself been install with a converter device in it to manage and store the message directly to the handphone. By having this method, the message will reach the destination faster and incur cheaper cost that the system we have nowadays.

In addition, for future enhancement, the system can be stored with a database which can control the outgoing SMS from the system. The sent SMS can be kept in the database and sender can trigger the time when the SMS should be sent to the receiver. By having this kind of service, sender can send SMS in advance but the SMS will be delivered according to the time set by the sender. This service can make the SMS system more user-friendly compared to the current system.

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Appendix 1-1: Sending SMS via Web Based System Questionnaire.

1. How do you find the web based system? ☐ Useful

☐ Neutral

☐ Not Useful

Give reasons for the answer:

_____

2. Do you receive the SMS on time? ☐ Yes

☐ No

3. Is the system easy to use? ☐ Yes

☐ No

4. Is the alarm helps? ☐ Yes

☐ No

5. Future Recommendation?

_____

6. Overall rating of the system? (Circle the answer)

1- Very poor
2- Poor
3- Meet expectation
4- Good
5- Really Good