AN INTERACTIVE MOBILE NEWS REPORTING APPLICATION

MOHAMMED ALI AHMED AL-SHARAFI

FACULTY OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY
UNIVERSITY OF MALAYA
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MOHAMMED ALI AHMED AL-SHARAFI

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ABSTRACT

Working outside the office increases the challenges for mobile workers to perform their jobs efficiently. One of the mobile workers is Mobile Journalist Reporter (MJR) who is the ultimate target of this research. As part of their works, several MJR works outside of the newsroom to attend press conferences, special events, and other activities that require their presence to collect news contents and prepare a report to be sent to the newsroom. Using mobile devices, the Mobile News Reporting (MNR) is an important aspect that needs to be given much attention to enable the news contents to be sent quickly and efficiently. Currently, most of the research directions are focusing on how to improve upon giving updated news to followers' audience using mobile technology. However, there is a limited attention paid for improving the other side of mobile news technology, which is related to journalists' task regarding delivering news content from event site to Newsroom Journalist Editor (NJE) using mobile devices. In addition, there are some news organizations, which still use traditional methods to deliver news contents such as using email, fax, chatting apps, or social networks. These leads to a delay in news contents processing and delivering, duplicated tasks, unorganized data, and human mistakes of files archive. In line with the demands of MJR to adopt the latest technologies and new methods of news contents delivery, there is a need to improve the overall MNR approach. A number of researches were conducted to investigate the process of MNR and to support the future development towards mobile solutions for improving and enhancing MNR challenges. Some of these challenges are: 1) sending news contents photos and videos instantly without control, enough details, and guide from the newsroom; 2) almost no acknowledgement and notification mechanism between MJR and NJE are provided; 3) either available as only web version such as CNN iReport web application or mobile version such as Ana Ara mobile application with same problems in first and second points; and 4) in some approaches, there is no

usability support by citizen journalist reporters. The aim of this study is to improve and enhance news contents delivering method for daily news coverage to increase the productivity and efficiency through proposing and designing a hybrid interactive approach of mobile & web application using Mobile Cloud Computing (MCC) technology and to be evaluated by professional journalists. As a result, the outcome of proposed approach implement the requirements and features needed for new mobile news reporting application known as i-MNReport which can support citizen MJR. The proposed approach subjected to professional journalists' evaluation. The overall assessment accepted the proposed approach with recommendations to add more features that can be considered in future development. Consequently, the proposed approach showed that it increases the productivity and efficiency of mobile news reporting system.

ABSTRAK

Bekerja di luar pejabat telah menambahkan cabaran bagi pekerja yang sering bergerak ini untuk menjalankan tugas mereka dengan cekap. Salah satu jenis pekerjaan ini adalah Wartawan Bergerak (MJR) yang merupakan sasaran bagi kajian ini. Antara pekerjaan mereka antara lain, memerlukan MJR bekerja di luar dari bilik berita untuk menghadiri sidang akhbar, acara-acara khas, dan aktiviti-aktiviti lain yang memerlukan kehadiran mereka bagi mengumpul kandungan berita dan menyediakan laporan untuk dihantar ke ruangan bilik berita. Dengan menggunakan peranti mudah alih, Pelaporan Berita Mobile (MNR) adalah satu aspek penting yang perlu diberi perhatian supaya kandungan berita dapat dihantar dengan cepat dan cekap. Pada masa ini, kebanyakan tumpuan penyelidikan menjurus kepada bagaimana untuk menambahbaik pelaporan berita yang dikemaskini kepada pembaca dengan menggunakan teknologi mudah alih. Namun begitu, hanya perhatian terhad diberikan bagi meningkatkan penggunaan teknologi mudah alih di pihak yang satu lagi, iaitu berkaitan dengan tugas wartawan untuk menyampaikan kandungan berita dari tapak acara untuk editor di bilik berita (NJE) dengan menggunakan peranti mudah alih ini. Di samping itu, masih terdapat beberapa organisasi berita, yang masih lagi menggunakan kaedah tradisional untuk menyampaikan kandungan berita seperti menggunakan e-mel, faks, aplikasi sembang, atau rangkaian sosial. Ini menyumbang kepada kelewatan dalam pemprosesan dan penghantaran berita, tugas yang berulang, data tidak teratur, dan kesilapan manusia dalam melakukan fail arkib. Selaras dengan tuntutan MJR untuk menerima pakai teknologi terkini dan kaedah baru dalam penghantaran kandungan berita, terdapat keperluan untuk meningkatkan pendekatan penggunaan MNR keseluruhannya. Beberapa kajian telah dijalankan untuk melihat proses MNR dan menyokong ke arah pengunaan alatan mudah alih di masa hadapan ke arah penambahbaikan dan peningkatan penyelesaian atas cabaran MNR ini. Antara cabaran-cabaran ini adalah: 1) penghantaran kandungan foto untuk berita dan video secara serta-merta tanpa perlu arahan serta kawalan, dapat menghantar maklumat yang cukup, dan tanpa perlu pemanduan dari bilik berita; 2) hampir tidak ada mekanisme pemberitahuan dan

maklum balas antara MJR dan NJE yang disediakan; 3) sama ada boleh didapati sebagai versi web sahaja seperti aplikasi web CNN iReport atau versi mudah alih seperti aplikasi mudah alih Ana Ara dengan masalah yang sama dalam cabaran pertama dan kedua di atas; dan 4) dalam beberapa pendekatan, tidak ada sokongan kebolehgunaan kepada warga wartawan. Tujuan kajian ini adalah untuk memperbaiki dan meningkatkan kaedah penyampaian kandungan berita bagi liputan berita harian bertujuan untuk meningkatkan produktiviti dan kecekapan dengan mencadangkan dan mereka-bentuk pendekatan secara interaktif aplikasi mudah alih hibrid & web menggunakan teknologi Mobile Cloud Computing (MCC) dan dinilai oleh wartawan profesional. Oleh itu, pendekatan yang dicadangkan ini, telah melaksanakan keperluan dan ciri-ciri yang diperlukan dalam pelaporan berita mudah alih, yang dikenali sebagai i-MNReport yang dapat membantu warga MJR. Pendekatan yang dicadangkan dinilai oleh wartawan profesional. Secara keseluruhanya, penilai telah menerima pendekatan yang dicadangkan dengan cadangan tambahan supaya lebih banyak ciri-ciri baru yang boleh dipertimbangkan dalam pembangunan masa depan. Oleh itu, pendekatan yang dicadangkan menunjukkan bahawa ia meningkatkan produktiviti dan kecekapan sistem laporan berita mudah alih.

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DEDICATION

To My Mother, My Father, My Wife, My Children

To My Sisters, My Brothers,

To My Grandmother, My Grandfather, My Aunts

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LIST OF ABBREVIATION

AP	ASSOCIATED PRESS
AFP	AGENCE FRANCE PRESSE
API	APPLICATION PROGRAM INTERFACE
BERNAMA	NATIONAL NEWS AGENCY MALAYSIA
CBS	COLUMBIA BROADCAST SYSTEM
CNN	CABLE NEWS NETWORK
CSS	CASCADING STYLE SHEET
DDP	DISTRIBUTED DATA PROTOCOL
GCM	GOOGLE CLOUD MESSAGING
GPS	GLOBAL POSITIONING SYSTEM
GUI	GRAPHICAL USER INTERFACE
HTML5	HYPERTEXT MARKUP LANGUAGE VERSION 5
HTTP	HYPERTEXT TRANSFER PROTOCOL
i-MNReport	MOBILE NEWS REPORT APP
IOT	INTERNET OF THE THINGS
MCC	MOBILE CLOUD COMPUTING
MJR	MOBILE JOURNALIST REPORTER
MMS	MULTIMEDIA MESSAGE SERVICE
MNR	MOBILE NEWS REPORTING
MongoDB	MONGO DATABASE
NJE	NEWSROOM JOURNALIST EDITOR
NJS	NEWSROOM JOURNALIST SUPERVISOR
REST	REPRESENTATION STATE TRANSFORM
SABA	YEMEN NEWS AGENCY (SABA)
SDLC	SOFTWARE DEVELOPMENT LIFE CYCLE
SMS	SHORT MESSAGE SERVICE
UML	UNIFIED MODELING LANGUAGE
VIP	VERY IMPORTANT PERSON
XMPP	EXTENSIBLE MESSAGING PRESENCE PROTOCOL
WBBBT	WHITE BOX AND BLACK BOX TESTING
UT	UNIT TESTING
UCBT	USE CASE – BASED TESTING

SIT	SYSTEM INTEGRATION TESTING
UAT	USER ACCEPTANCE TESTING

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CHAPTER 1: INTRODUCTION

1.1 Overview

Working outside the office is required in some working field careers as the job responsibility increases the challenges in the job place. Mobile workers such as Infrastructure Engineers, Doctors, Nurses, Oil & Gas Extraction Engineers, and Journalists need special techniques and tools to help them send a progress report or update information from work site (Er, 2007). Among these mobile workers, journalists are who will be our target for this research. Journalists are the persons who are in charge for collecting and publishing news material to the audience.

Figure 1.1: Mobile Workers

(Source: KramaGot, (n.d.)

Consequently, the mobile technology revolution nowadays opens opportunities to help mobile workers increase their efficiency for enhancing their work. Therefore, mobile devices have become the part of our life in daily practices with various events. Different as well as multiple mobile applications for personal communications (e.g. Facebook and

WhatsApp), which are essencially based on working environment have been developed to facilitate our daily practices in the different aspects of life. Furthermore, it enhances the communication among people and workers worldwide. Nowadays, mobile devices enable the processing of communication and information through audios, videos, images, texts, and animations (Westlund, 2012).

As has been mentioned earlier, some journalists are required to work outside newsroom to attend press conferences, particular events, and other activities that need journalism attendance as a part of their work. The importance of journalism attendance is to collect news contents and prepare a report to be delivered into the newsroom for the editing purpose and then broadcasting it based on subscription terms into different media channels such as newspapers, TV Channels, SMS messages and so on.

Figure 1.2: CNN Newsroom

(Source: David, 2011)

According to Bahri (Bahri, 2014b) the current method for delivering news report is conducted it by assigning a journalist for particular activity or event. Then, he/she has to be briefly informed manually through a call, SMS, or e-mail. The briefing includes

"what activity or event he/she has to attend," "where is it located" and "what time event starts." When a journalist gets the event information, he/she attend the event to prepare a news report at the end of the event session. This report is sent into the newsroom for editing and reviewing. The delivering methods which are always used either by e-mail if the report has a multimedia file or fax if the report is only textual. However, in most cases a journalist has to return to the newsroom for the purpose of delivering, editing, and reviewing news report to prepare it for publication. Despite this scenario, the current method for managing and organizing the news report is less efficient than what is needed or required.

Figure 1.3: Press Conference for Sport News

(Source: Jesse, 2011)

Such news report is required to collect news multimedia contents (Photo – Audio – Video) which will need several requirements to help obtain the information with evidence. From these requirements, equipment such as camera and recorder should be available to a journalist to take a photograph or record speech from a VIP person who will answer journalists' questions. After news contents are collected, the journalist has to send a report to the newsroom for editing and reviewing to make it ready for publication. This process requires a mechanism to organize receiving the news report

contents with an alerting function for newsroom journalists to let them pay attention that there is an update to a news report from a remote reporter. Quinn (2012) reported that Ilico Elia, head of mobile and emerging media at Thomson Reuters, said: "Mobile Phones allow journalists to swap their heavy camera equipment for a smaller device."

On the one hand, among mobile applications, news and journalism field have to gain consideration to enhance approaches to get updated news. These approaches make people instantly aware regarding recent news in the world (Chen, Hong, & Chen, 2009; Popovici, Stangaciu, & Magheti, 2010; Wang & Wang, 2013). On the other hand, developing an application to help journalist delivering news report has been considered as well (Advice, 2014; White, 2012) but with limited functionalities and features. Some of these limitations are delivering a mobile news report, sorting multimedia files automatically and generating assignment or task (Westlund, 2014). These limitations would be helpful in terms of time and cost if they are considered.

1.2 Research Motivation

Getting news report contents on time is an important aspect and critical issue especially with national and international news agencies, which provide news context and articles to the governmental and non-governmental newspapers and media organizations for publishing. The reporters and journalists of particular news organization usually spread in all provinces and states of the country. Their role is to gather and cover all kind of news (political, sports, entertainment) to produce a news report for the audience.

A process of delivering news contents report such as textual description, photo, video, and/or audio from anywhere at any time is still a critical area of research (Westlund, 2012). However, in some media organizations, the traditional method for gathering

news and create assignment is still used. For example, some organizations still use pen and paper or typed paper for assignment creation and pass it to their journalists. Also, they supply their journalists with a basic recorder when attending an event to record feedback speech of VIP. Journalists need to get the audio file from the recorder. Then send the audio file by email to the newsroom to listen to the speech and write down the key points on the blank paper. After that, it sends to an editor for typing and editing to be prepared for publishing. Thus, there is wasting in terms of time and cost caused by the traditional method. In addition, it takes time to extract files from the equipment and journalists that have to get back into the newsroom to deliver and archive the contents in some journalism organization.

Nowadays, the media organizations start to deal with freelancers to receive news reports from such perspective, especially from the sites and places, which news organization does not have a Mobile Journalist Reporter (MJR). Meanwhile, there are certain conflict issues that need to be presented to the audience. Therefore, there is a need to provide such approach that could support the contributions from freelancers to directly newsroom using a mobile device.

Journalism nature requires a journalist to deliver news report contents that include texts, photos, videos, and audios to the newsroom in his/her organization as fast as possible. The fast delivering is important especially with news agencies' journalists such as CNN, Aljazeera Media Network, Associated Press News Agency, Reuters News Agency, National News Agency Malaysia (BERNAMA), Yemen News Agency (SABA), and many other agencies. Therefore, to deliver such contents, the journalist still uses either fax, e-mail, social networks, or chatting apps to deliver the news report. Consequently, the news report that will be delivered by fax will need additional time to re-write, edit,

and review the contents. While the method of using email with attached multimedia files will need to download these files and store them on data center servers of the organization. Hence, both of the methods are time consuming and both of them lead to less efficiency and more redundancy in work.

Considering the current mobile technologies, mobile devices and tablets are some of the portable devices that can be used by journalists to receive news assignments from the newsroom. They can collect news contents from anywhere at any time using devices hardware resources like camera and recorder to deliver these contents into organized database servers. Since those devices have limited data storage, the cloud would be the best complement proposed solution to overcome the high volume of data needed to be stored.

Hence, this study will continue to develop and optimize the mobile news reporting application by achieving the findings of previous research (Väätäjä & Egglestone, 2012) conducted in Finland. This research proposes an interactive cloud-based approach to receive news assignment, delivering news report contents (text, photo, audio, video) and generate notifications between mobile reporter and newsroom journalist. The capability of the mobile device and tablet allow performing all required tasks such as captured photo, recorded video or audio. The proposed approach uses Mobile Cloud Computing (MCC) technology to achieve mobile news reporting application requirements. These requirements are news assignments that will manage and distribute the events tasks among organizations' journalists. Furthermore, notification function will be adopted in the proposed approach as well as for notifying purposes.

Hence, the improvements of mobile devices functionality and advances in mobile networks give us the motivation to propose such approach model that could enhance the ability to deliver news report in manageable and organized manner. The benefit of this study will improve the methodology of delivering news report contents and the way of communication conducted by mobile reporter to newsroom journalist for increasing the productivity and efficiency.

1.3 Problem Statement

According to the overview and research motivation discussed above, we noticed that the recent researches are focusing on how to improve the ways of getting updated news for followers' audience using mobile technology. However, there is a limited attention to improving the other side of mobile news technology, which is related to journalists' task in terms of delivering news content from event sites by mobile journalists to newsroom using mobile devices. Moreover, there are still some news organizations which use the traditional method to deliver news content such as email, fax, chatting apps, and social networks. This leads to duplicating tasks, unorganized data, and human mistakes of files archive. Furthermore, there is a high demand from the field of journalism to adopt this kind of development to facilitate delivering news contents rapidly on time. In addition, the current apps are only in passive interactive and do not support the requirements needed as proved in some researches such as Heli Väätäjä, Teija Vaini, Esa Sirkkunen, and Kari Salo Model (2011), Heli Vaataja & Paul Egglestone Model (2012) and Al Arabiya Channel – Ana Ara App (2015).

Moreover, a process of delivering news contents report such as textual description, photos, videos, and or audios from anywhere and at any time along with mobile news assignment are still a critical area of research. "*Mobile assignments delivered to mobile*

journalists' smartphones are one potential future development step" (Väätäjä & Egglestone, 2012).

Therefore, achieving mobile news report requires a mobile news assignment and organized data structure. To organize the delivering news contents and control the news assignment via mobile devices, such approach and mechanism need to be designed to bridge the gap between news assignment and news contents delivered by identifying the requirements needed from the field of journalists.

Consequently, this study has been devoted to cover the need mentioned above and to enhance and develop the right use of mobile technology in the world of journalism. Besides, the study contributes with an interactive proposed approach to meet needs of MJR and NJE and to validate its feasibility and acceptance.

1.4 Research Objectives

The leading objective of this research is to improve and enhance news contents delivery by proposing a new approach for daily news coverage. The study is hopefully expected to increase the productivity and efficiency by achieving the following sub-objectives:

- To investigate and evaluate the current news contents delivery method for daily news covering looking into the aspects of productivity and efficiency particularly in mobile news reporting, identifying the needs and requirements for improving the usability of Mobile News Reporting (MNR) app.
- To propose and design a hybrid interactive approach of mobile news reporting application using Mobile Cloud Computing (MCC) technology.
- To develop a hybrid (mobile & web) application for the proposed designed approach of Mobile News Reporting requirements.
- To evaluate the proposed hybrid mobile application by professional journalists.

1.5 Research Significance

The importance of this research lies in its interrelation with the previous works, which were conducted to find perceptions, needs, challenges, and preferences of mobile assignments of delivering news content reports including multimedia files (Väätäjä & Egglestone, 2012; Väätäjä, Vainio, Sirkkunen, & Salo, 2011). Therefore, out of the researcher endeavor into the vast amout of literature, a new approach has been proposed based on mobile cloud computing technology. Moreover, this research came up with a frame of Big Data and 'Internet of the Things' (IOT) technologies to organize and structure the news contents, which will be received from either freelancers or staff. As for big data, the contents would be received based on specifically structured database to be analyzed and reveal news patterns and trends. While IOT contributed in gaining the data available from anywhere and at any time for MJR and NJE.

As a matter of fact, journalism field needs an approach to increase efficiency for delivering news contents from anywhere and at any time. Thus, it is hopefully expected that this research will develop an approach, which can enhance the journalists' tasks as they are working on using mobile.

By developing the proposed approach, journalism organization can move from traditional method to new technological method to collect news contents and deliver them into organization datacenters without redundant works. This movement will increase the productivity and collaboration between other departments inside journalism organization. For example, if such journalism organization would like to publish video via their channel to YouTube or another video platform about a particular activity, it will be easier for them to get the raw video from a mobile journalist from the event field

to the newsroom. Hence, the newsroom will edit it if it needs any editing and directly upload it into their YouTube Channel.

In the application, news department in any journalism organization will be able to manage event scheduling for each journalist who will be able to deliver his/her report attached with multimedia files with a feature to get a notification for updating.

Therefore, the proposed approach is expected to contribute in optimizing mobile news reporting application based on identified requirements and by adopting MCC technology and interactive method. In addition, a real experiment with professional journalists and reporters would be conducted to obtain their evaluation. Moreover, notification mechanism between mobile & newsroom journalists will be adopted. These features will increase the accuracy of news context as well as the quality of production.

1.6 Research Scope

The research scope of the study followed a specific boundary, which allowed us to achieve the research objectives. The focus of the current study can briefly be listed in the following:

1- The proposed approach uses mobile cloud computing (MCC) technology for connecting a client application with server application along with Google Cloud Messaging (GCM).
2- The proposed approach uses hybrid (Mobile & Web) application technique. Android is the targeted platform for mobile news reporting application in this research.
3- The proposed approach targets the field of journalism to cover the daily normal news reporting using a mobile device for delivering news materials.

4- The proposed approach focuses on mobile creation process of news assignment, real-time notifications, instance communication, acknowledgment, and supporting citizen journalist reporter.

1.7 Dissertation Organization

This dissertation has been divided into six chapters. Chapter One presents an introduction and general overview about the dissertation. Next, in Chapter Two, the news development in general has been elaborated and, then, narrowed to mobile news reporting. Consequently, in Chapter Three, the methodology and analysis procedures used and conducted have been presented and discussed. Then, the proposed approach of i-MNReport application GUI design and implementation were written and presented in Chapter Four. After that, Chapter Five discusses the proposed approach evaluation, encomposes the data analysis derived from the questionnaire. Finally, Chapter Six concludes the dissertation and provides a brief summary of all the dissertation chapters ending with suggestions for future work.

1.8 Summary

In this chapter, we began with an overview of the research topic and provided more explanation about the problem statement and what is the propose solution that will be applied and the research objectives have been presented as research guide that provide convinced reasons for conducting this study. Then, the research significance and scope have been discussed. Finally, the dissertation organisation of the research has been presented at the end of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In this chapter, we review brief news background to examine the news history, idea of news and news lifecycle along with its structure. Then, adopted technologies in the news investigate what kind of technologies used during technology revolution in the news industry concluded by the current technology, which is mobile technology. After that, we narrow our review into our target platform mobile news technology. In this section, we review previous researches which were conducted to serve both news consumers (readers) and producers (journalists) to identify which gained much attention of researchers to develop news service. Last, but not least, we reviewed mobile news reporting service and its applications in previous researches, which is our focus in this research to discuss what the current issues are.

2.2 Brief News Background

The news had been defined as "*Information about recent events or happenings, especially as reported by newspapers, periodicals, radio, or television."* (Farrell & Cupito, 2010). Alternatively, it is defined as *"A presentation of such information, as in a newspaper or on a newscast"* (News, 2003). Journalists require covering many events daily to notify the audience what is happening on this particular day. This kind of task requires a mechanism to organize the collecting style of event story and publish it to the audience. Publishing news material should be in arranged manner and emphasize that the source is reliable to attract the audience to read the news story and to get more details about it. Therefore, there was an idea to establish news agency, which is responsible for collecting news material providing it to its subscribed newspapers, television broadcasters, magazines, radio stations, and other news agencies

organizations. Accordingly, three international popular news agencies founded in the first quarter of a nineteenth century. The first is Agence France Presse - APF which was established in 1835. The second was Reuters which was set-up in 1851. Both of these agencies are located in France. Relatively, the third agency is Associated Press – AP, which was established in 1848 and it is situated in USA (France-Presse, 2014; husari, 2012; Reuters, 2014). When these three international news agencies grew and proved their success in the press industry, it was necessary for each country to establish its governmental news agency. The news agency role is to cover the national news to share news material and collaborate along with international news agencies. This kind of collaboration produces reliable news source that could be shared and exchanged in the worldwide news media.

2.3 News Composition

During our review and tracking of literature studies in news development, we found that the basement of news composition depends on five elements. These elements are individuals and organizations, news contents, supporting technology, newsroom, and media. Figure 2.1 depicts the news composition matrix and the following sections define each element.

Figure 2.1: News Composition Matrix

- **Individuals and Organizations** are the both producers and consumers of news contents. Producers are the journalists and reporters either individuals or staff in organizations who compose and create the news articles supporting by news contents. The news contents obtained from a reporter who submits these contents to the newsroom. The consumer is the audience, readers, customers of news articles which is created by producers of the news source. However, producers and consumers can be individuals or organizations, and they can use supporting technology to produce and consume news through web technology or mobile technology.
- **News contents** are the core element of news composition obtained by news producers from a news event. The news contents are texts, photos, audios and videos that can be presented to news consumers.
- **Supporting Technologies** are the technologies which support news gathering, news delivering, news editing and news publishing. However, the main supporting technologies are the Internet, Web Technology, Mobile Technology. For instance, mobile device and its platforms could be used for news gathering by developing a particular app to support this activity. While Internet used for a communication platform to assist in news delivering and publishing. Therefore, supporting technology is used to benefit both news producers and consumers.
- **Newsroom** is the place of news editing and reviewing based on the news contents received from a reporter. The newsroom is responsible for any news article published in media. Therefore, they assign and communicate with reporters to help newsroom for news gathering and clarification of the news source.
- **Media** is the medium of news article published from news organization to its audience via a different variety of media channels. Media in general includes

News agencies, TVs, Radios, Newspapers, Magazines, Web pages, SMS Services, Mobile Apps and Social Networks like Facebook, Twitter, and Instagram. Media is responsible for publishing news contents in its variety of mediums to news consumers.

2.3.1 News Structure

The scarcity of resource to get the summary of news structure, importance of stucture to have the full picture of news dynamics in news organization, and the suggestion for future research in MNR to conduct an interview with media managers (Westlund, 2012) which can provide cursory reports on news organization dynamics constituded the main reasons for conducting online interviews. Due to the above mention reasons, we have conducted the interviews via Facebook messenger with BAHRI ESSAM, a News Director (Bahri, 2014a), in Yemen News Agency (SABA) to obtain the story of news structure and their mechanism for news contents delivery and news composition. Here in the following are the details of SABA news structure from the interviews conducted.

2.3.2 Yemen News Agency (SABA) News Structure

To cover news for SABA, journalists and reporters are divided into three main groups. The first group is the staff in SABA's headquarter in Yemen capital city, Sana'a. The second group is the staff in SABA's offices in Yemen various provinces. The third group is the staff in SABA's offices, and reporters located in some very important capital cities and countries. In the following section, we explain the role of each group.

- **SABA is Headquarters Office in Sana'a**

In the headquarter newsroom office, journalists and reporters are divided into three subgroups. The first subgroup is working daily as a full time in government offices such

as Ministries, Departments, and other important organizations in the country to cover any events and activities daily. The second subgroup is working in the headquarters newsroom office, and their primary role is to follow up various events and activities of the authorities and organizations which they have been assigned for previously in the first event to cover their news. In addition, both first and second groups provide SABA's newsroom with the important statements of government officers, future news of new events and activities about these organizations and authorities assigned to them. The future events could be coming projects, achievements anticipated, new rules, trends, and decisions. The third group is working in the headquarter newsroom as well, but their main assignment is to cover a special event or activity for civil community organizations, emergency events, authorities and agencies that do not have specially assigned journalist or reporter.

- **SABA's Offices in Yemen Provinces Group**

The offices of Yemen News Agency (SABA) is located in the Secretariat of the capital cities of all provinces of Yemen including Sana'a International Airport, Aden International Airport, and Socotra International Airport. Journalists and reporters who are working in these offices are responsible for covering all the events and activities happened in these places. After gathering news contents, they deliver the news contents to the headquarter newsroom in Sana'a for editing and publishing in SABA's media.

- **SABA's Offices and Reporters Abroad Yemen Group**

Currently, Yemen News Agency (SABA) has two offices abroad Yemen. Specifically, they are located in Saudi Arabia and Egypt. Besides, there are reporters in several other countries such as China, Arab Gulf States, France, UK, and the USA. Journalists and

reporters inside Yemen have the same role of their colleagues who are working outside the headquarters newsroom.

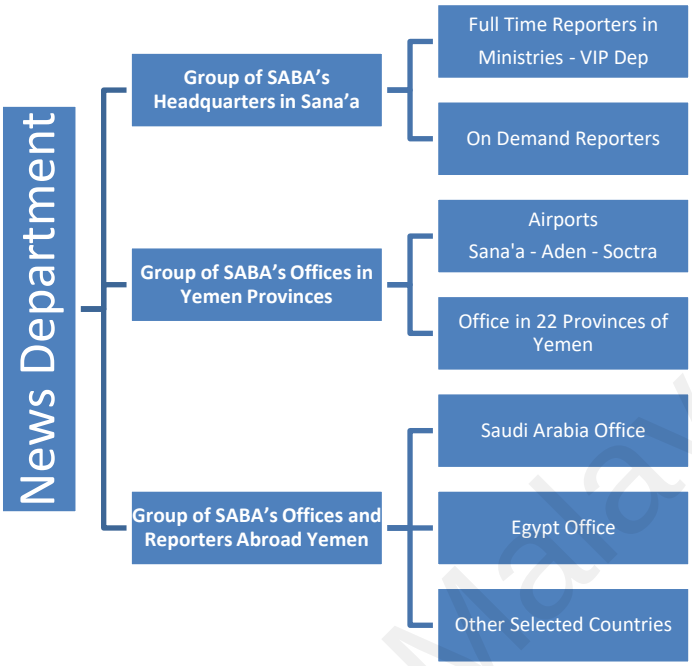

Figure 2.2: Yemen News Agency (SABA) News Department Groups

2.3.2.1 News Coverage in SABA

To cover news for any events, SABA uses two types of coverage, either instant for significant events or scheduled for normal events. However, news coverage is the responsibility of newsroom. The newsroom includes news department, editing department, e-Journalism department and translation division under editing department. The staff of theses departments are working as one team to produce news articles for publishing. The following sections discuss the two types of coverage.

- **Instant Coverage**:

  In this type of news coverage, there is a special comprehensive crew from the newsroom. The crew includes staff from news department, editing department and e-Journalism department along with translation division of editing department. The crew is assigned to cover important events, activities, or

conferences. Such events, for example, were Yemen National Dialog, Poll events, Arabic and international conferences hosted by Yemen and Arabic or International sports leagues held in Yemen. The crew immediately covers the course of events proceedings and they start to edit the news contents and then inform the Editing Director to review it to update and send the news contents from the events of reality place throughout several technological devises, such as PCs and Laptops. As the greatest news agency in Yemen, is mainly focusses on:

1- SABA News subscribers' customers (Newspapers, Radio Stations, TVs, and other News Agencies).
2- SABA Arabic, English, and French websites by uploading edited news contents
3- SABA's SMS news service subscribers' customers.

As for SMS services, the updated ones are either sent by the special application in a laptop or dedicated mobile app installed in staff's mobile which is working only in SMS service division.

- **Scheduled Coverage**:

  This type of coverage is to assign one reporter or journalist from the newsroom to attend an event or activity for coverage and collecting news contents. Then, s/he comes back to the newsroom to deliver news report for editing and reviewing to prepare it for publishing. To publish any news content, a reporter or a journalist in newsroom must submit the edited version to the Editing Director for precise reviewing. Then, Editing Director will publish it if it is edited correctly. Otherwise, Editing Director sends the news article to reporter or

journalist to edit it again and resend it for double checking. The same cycle happens until they get the final version for publishing.

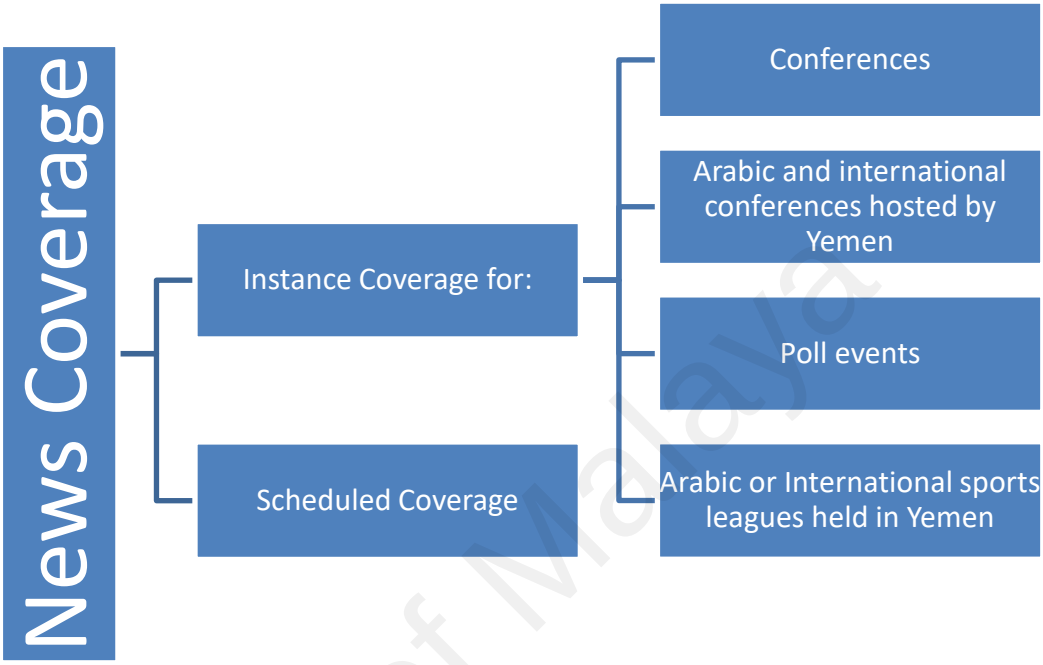

Figure 2.3: Yemen News Agency (SABA) News Coverage Types

Figure 2.4: Lifecycle of Scheduled Coverage in News Organization

2.3.2.2 Effectiveness of Developing MNR App

During the interviews, we assign the question to News Director in SABA regarding the effectiveness of developing mobile news report (MNR) app. The explanation of the participant's answer is as follows:

1- Indeed, MNR will be important, for instant, the coverage of sending brief significant news holding a breaking news title to the newsroom. Furthermore, it is significant to link the future MNR app by the SMS service transmission system, which is connected to SMS servers of mobile communication networks to send a brief description of news for SABA Mobile subscribers' customers. Currently, SABA's journalists are using Hangouts Gmail Messenger to send breaking news from event reality place either from Yemen or abroad. By using Hangouts Gmail Messenger, the breaking news sent to Editing Director to publish is in news publishing media.

2- As for wide coverage, it will not be effective if a journalist or a reporter will use small mobile devices due to the difficulty in writing and its small screen but, in this case, they have use wide screen mobile devices or tablets then to be more helpful and, thus, more effective because wide screens makes it easier for writing. Theses technological devices have more advanced features.

In conclusion, we found that SABA's news structure following the same procedures reported in (Er, 2007; Väätäjä & Egglestone, 2012) research studies. In a sense, news organizations are almost working in the standard structure for getting the news until it is delivered to the audience.

2.4 Adopted Technology in News

Since news industry begins as a new working field, it starts to adopt a variety of information and communication technologies to assist in collecting, delivering, and receiveing news contents. Such sophisticated technologies contribute to help news producers and consumers including are reporters, newsroom journalists, media channels and audiences respectively. The main technologies that have been used in the news industry are telegraph, computers, Internet, cellular and mobile respectively. The following sections describe each technology briefly and solely.

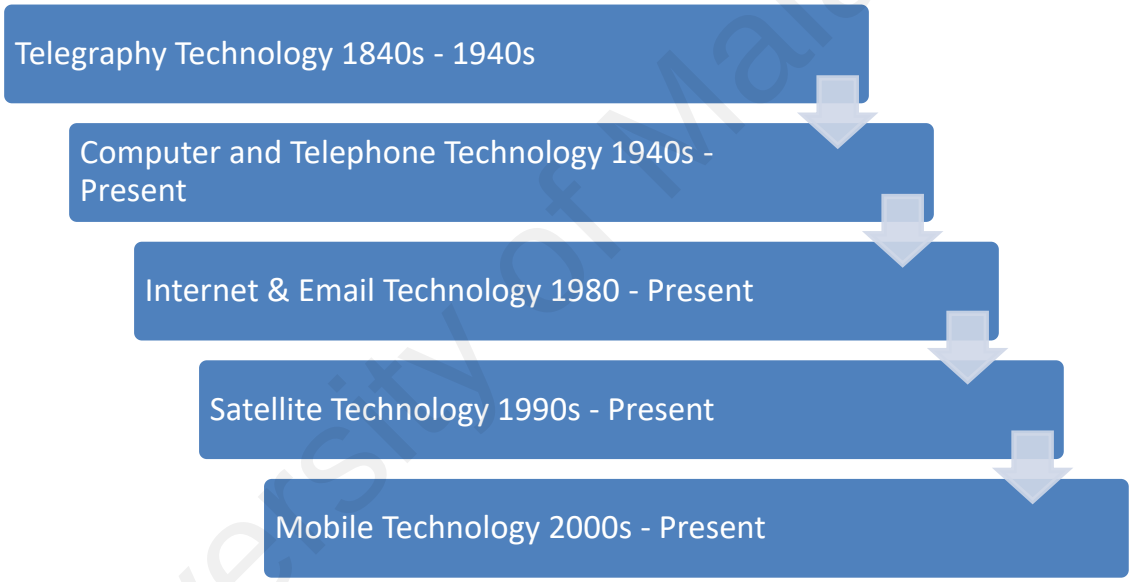

Figure 2.5: History of Technology Used in News Industry

2.4.1 Telegraph Technology

In early days of the news industry, telegraph technology was adopted due to its speed in transmitting textual news contents for a long distance between journalists and news organizations. Schduson (1978) reported in his book "*The telegraph came into use in the 1840s after the penny press had proved itself. The newspapers encouraged the development of the telegraph*". Quinn (2012) acknowledges that "*Telegraph technology was a watershed moment for journalism because it was the first international*

technology with the potential to accelerate the reporting process over large distances." Hence, telegraph technology continuously used to serve in communication between 1840 and 1920 and this is its age of usage (Quinn, 2012).

2.4.2 Computers Technology

In the 1960s, computer technology begins to be used in wide range of industry fields. News industry was one of the fields that have gained many advantages of computer to assist in news collecting, editing, producing, and publishing. Then, supporting systems were developed to support news industry such as news editing systems and photo processing and this was in the 1990s.

2.4.2 Internet Technology

Internet technology comes to add value to computer technology to expand communication approach and to facilitate information broadcasting in the new mechanism by using different Internet applications (e.g. websites and emails). The news industry has gained many advantages from the Internet to support news contents availability for both producers and consumers. For example, producers used email service to send news contents to the newsroom. Moreover, fax technology used to deliver news report to newsroom along with email. Emails were used mostly for multimedia contents while fax was used to send textual contents. Khattak et al. (2012) reported that "*In contrast to conventional printing on paper, delivery by computer and other means seemed to offer several benefits both the producer and consumer.*" Hence, it seems that news industry preferred making news information affordable to the audience as soon as possible. Therefore, Internet journalism was introduced to publish news contents on the web. Relatively, news organizations like newspapers and magazines were among the first patch using the Internet to publish news information. In

1994, thousands of newspapers started using online service (Khattak, Nasir, & Sultan, 2012).

2.4.3 Cellular Technology

Cellular technology contributes in the news industry by using SMS services to send text format of news update to news organization subscribers. As for reporting, SMS and MMS messages were used and adopted as methods for news reporting before the mobile reporting approach has been introduced. The text submission was through SMS service while the photos were submitted via MMS service. All of the contents were submitted into newsroom (Väätäjä et al., 2011). For example, Ozeki NG SMS Gateway is one of the most used architecture for SMS services that could be utilized for news services. Figure 2.6 depicts the system architecture.

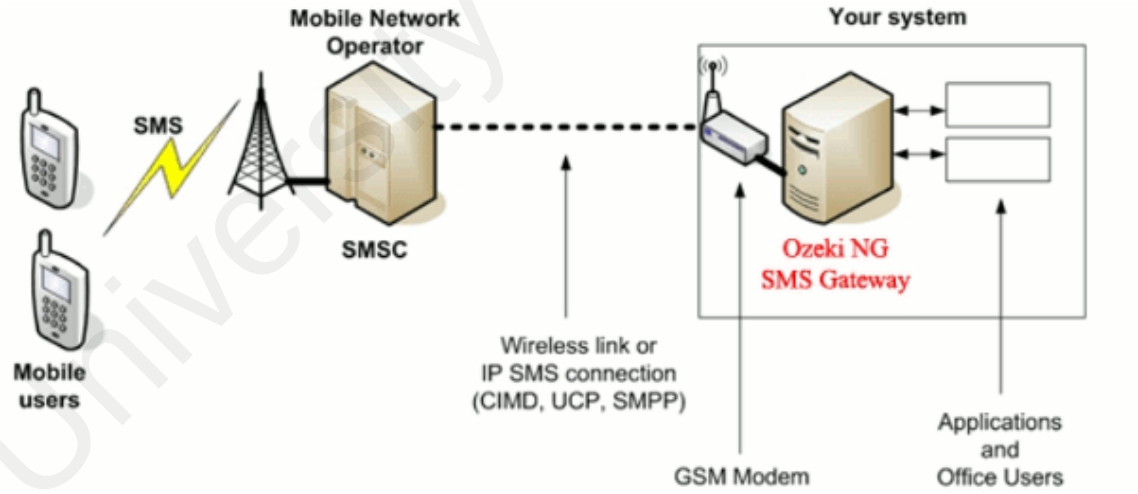

Figure 2.6: General Framework for SMS Gateway Architecture (Ozeki NG SMS Gateway)

(Source: Gateway, (n.d.))

2.4.4 Mobile Technology

More recently, mobile technology has become the dominant technology in the experience of human life since the last decade to accomplish many tasks in daily working fields. It has received much attention for improving its infrastructure and its

supporting equipment such as mobile devices and networks equipment. Furthermore, new operating systems have been developed to support mobile technology expansion (i.e. Apple, Android, Windows, and Blackberry). The mobile technology consists of mobile services, which provide information to mobile devices via variety networking infrastructures (i.e. cellular networks and Wi-Fi networks). Rosen (2002) defined mobile technology, as "*a combination of hardware, operating systems, networking, and software*." All these components contributed in developing the mobile technology in general frame, and each component has its world of developments. Figure 2.7 depicts the four child components, which belong to a father metric called Mobile Technology.

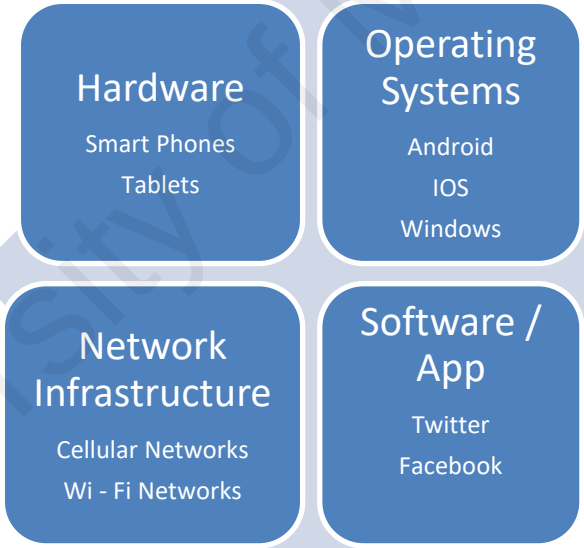

Figure 2.7: Mobile Technology Components

Thus, Mobile Technology is being adopted in many industry fields such as medical, engineering, information technology, learning, commerce, and much more. As a result, mobile technology establishes new classifications and categories to facilitate and let researchers pay attention to focus their research on the particular category development. The categories leading researchers, are Mobile Learning, Mobile Healthcare, Mobile

Gaming, Mobile Commerce, Mobile News and many others (Dinh, Lee, Niyato, & Wang, 2013).

As a part of industry fields, journalism and news have begun for adopting mobile technology to improve its production. However, in the early days of adoption, mobile technology did not encourage journalists to use it due to its potential negative impact, especially on the hardware components. Michael Er (2007) conducted a user case study to examine print journalist reporting from the field. He reported that "*Major impediments to mobile technology adoption include the potential negative effect which the device has upon the established information system and, in particular, its influence on the level of collaboration of different mobile workers*." Although, the rapid development of mobile technology components has changed the perspective of the news industry to attract the journalism organizations for adopting the new improvements in mobile technology. One of the improvements that have been developed is introducing Mobile Cloud Computing Technology (MCC), the core of the current study.

2.4.4.1 Mobile Cloud Computing (MCC)

Mobile Cloud Computing was introduced in mid-2007 (Dinh et al., 2013) after cloud computing had released and proved its prosperity in computing technology. MCC was introduced to integrate and link cloud computing and mobile computing technologies features together. Based on that MCC overcomes the limitations of the hardware components of mobile technology (i.e., Mobile Devices). Khan, Othman, Madani, and Khan (2014) defines MCC as "*an integration of cloud computing technology with mobile devices to make the mobile devices resource full in terms of computational power, memory, storage, energy, and context awareness*." The following figure depicts the MCC architecture.

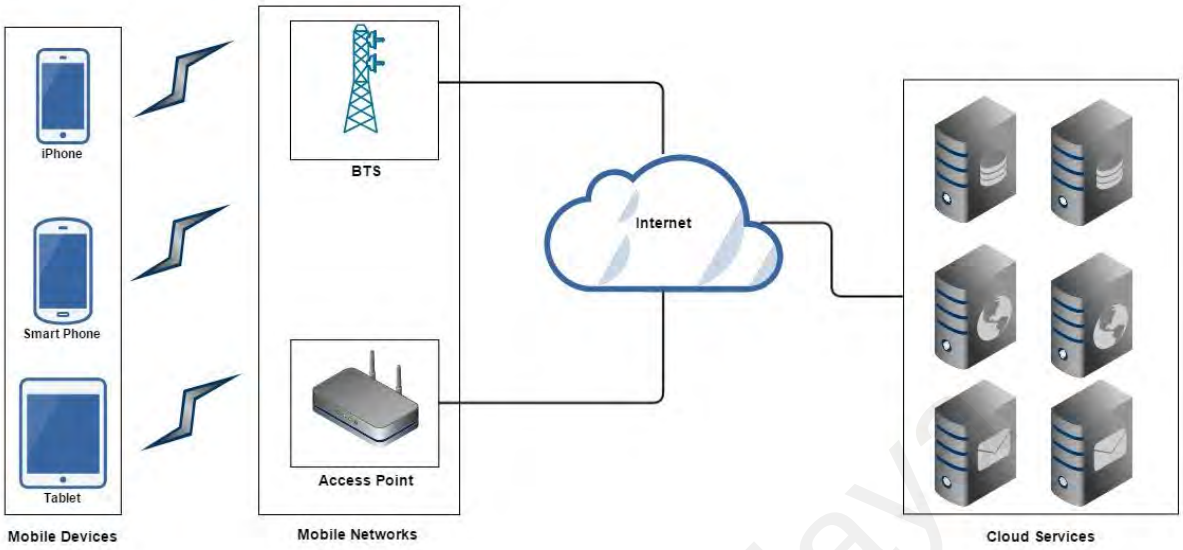

Figure 2.8: Mobile Cloud Computing Infrastructure

Consequently, Mobile Cloud Computing (MCC) opens tremendous opportunities in different industry fields. News and journalism-industry are significant aspects of these fields, which gain several features (e.g. Mobility and Availability) to improve its role in society. Therefore, Mobile News has been introduced to equally serve both news consumers and producers.

2.5 Mobile News

Mobile news, from its terminological perspective, is defined as the news contents (i.e. text, photo, audio, video), which is produced and consumed using mobile devices either by using a mobile browser or native applications. However, mobile news includes multiple means of delivering news contents to mobile users. The various ways would be varied from instant messaging service (SMS and MMS) to particular news website for mobile browser and dedicated mobile native applications (Westlund, 2012).

Due to the success of online publishing in the news for many years, mobile news has been enabled to attract both news producers and consumers to use it as a new platform

for the news industry (Westlund, 2012). The advancements of mobile devices in recent years play a significant role in human life by changing the way of communication and technological convergence such as embedded camera and GPS. This change refers to the new operating systems that have been developed and introduced in the market (i.e. Android, iOS Apple, Windows, and Blackberry) which create new mobile platform environment. In addition, the new structure of mobile devices added value as well. Accordingly, mobile device users start to use the mobile browser for searching, following up updated news, using e-commerce service and many other services on the Internet. Many research studies reveal that Internet–based services have gained an increase by mobile users more specifically in the developed countries (i.e., Europe and The US). Among mobile services, social media, e-mail, news and research are the most popular mobile services for mobile users (Westlund, 2014).

The updated news was one of the Internet services that attract mobile users to track the news via mobile devices, and news organizations have noticed this following from mobile users. Therefore, news organizations began to develop mobile news sites, which would be suitable for mobile devices on different screen sizes. Moreover, mobile news not only serves mobile users but also can support mobile journalists and reporters in the way of delivering news contents from event reality. The mobile news relationship for both producers and consumers has been visualized in Figure 2.9. A mobile reporter (staff / freelancer) or a journalist interacts as a receiver and sender from and to the newsroom. While the mobile user interacts as only a receiver to receive updated news from the newsroom.

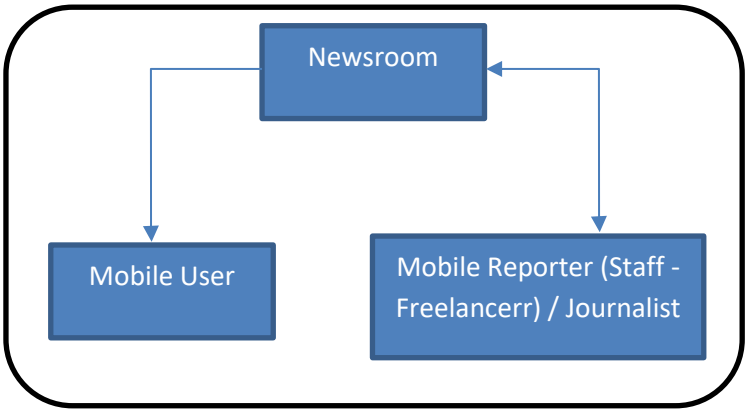

Figure 2.9: Mobile News Relationship for Both Producers and Consumers

Additionally, mobile news consists of one category of mobile technology categories. It has its own characteristics that enable producers and consumers to adopt mobile news. Chan-Olmsted, Rim, and Zerba (2013) conducted a research study to examine mobile news adoption among young adults. They revealed that mobile news adoption depends on three elements namely, perceived the relative advantage of contents, utility, and ease of use of the mobile news. That means when the news content is valuable and has quality, then, it will have the ability to be an advantage for mobile news users. While the perceived utility and ease of using it, takes place in user's mind whenever the mobile news developing follows to enrich the user experience using the new platform.

2.5.1 Mobile News Development

Mobile news development is divided into two main categories. The first category is mobile news consumption for mobile users, which can include news navigation and news updating. The second category is mobile news production for a mobile reporter or journalist, which can include news reporting and supporting tools (i.e. Photo processing audio and video editing). Therefore, developing mobile news service gains more consideration in recent years due to technological convergence, advancements in mobile devices and telecommunication networks. The advancement is targeting both news consumers and producers. The mobile news consumption among mobile users shows a

rise in using a mobile device to access online news websites (STAFF, 2012). Furthermore, mobile news reporting for mobile reporters and journalists has been suggested as a new reporting approach from event reality. Westlund (2014) reported that mobile devices play an important role in attracting news organizations to invest in mobile news services.

Previously, the mobile news service provider was using pushed alert messages (SMS / MMS) for sharing important news to service subscribed customers. However, the development of mobile infrastructures and devices have reduced using such ordinary type service. As for mobile reporting service, the email and web app are used to send news contents from a mobile reporter to newsroom.

News organizations tend to develop mobile news sites and mobile news app as a response to news consumers. In the early days of mobile news service, the development faces challenges to produce mobile news sites that could be open using mobile devices, have different screen sizes manufactured in the early last decade. In addition, intelligent news services such as personalized news–based and location–based were requisite for news consumption. On the other hand, in earlier era of mobile devices, the mobile reporting encountered obstacles which were difficult to overcome due to mobile devices limitations in early last decade as well.

Due to the barriers which encounter mobile news and other problems such as navigation and getting updated news, several researches, in the last decade, has paid attention to improve mobile news platform for both news producers and consumers. However, on the one hand, most research studies have focused on news consumption while others focused more on production. This difference between these two perspetives could be

due to more challenges in mobile phones. In addition, new innovative approaches to news consumption were introduced such as Intelligent Location-based Mobile News Service System and Automatic Illustration System for Media Content (Chen et al., 2009; Coelho & Ribeiro, 2011; Lee & Park, 2007; Papadogiorgaki et al., 2007; Popovici et al., 2010; Su, Chan, & Chan, 2005). On the other hand, few research studies have been conducted on mobile news reporting as a new approach for delivering news contents into the newsroom from event reality. For example, Reuters news agency collaborates with Nokia Research Center to develop MoJo Application that can run on Nokia N95 and N900 device (Väätäjä & Egglestone, 2012; Westlund, 2012). Consequently, The following section is going to discuss the mobile news reporting approaches to explore the current development and future development required from researchers, and that is the scope of our research.

2.5.2 Mobile News Reporting (MNR)

The importance of Mobile News Reporting (MNR) from event site acquires more significance in news industry due to its effectiveness and efficiency. The importance comes to provide the news materials (photo, audio, video, and text) to the newsroom as soon as possible to be presented to the audience rapidly. The establishment of MNR began in 2007 by Reuters News Agency through establishing MoJo project with Nokia Research Center. Quinn (2012) reported that "*a significant development in the evolution of reporting tools occurred in late 2007 with the arrival of the MoJo, or Mobile Journalist*." Moreover, Quinn (2012) described mobile journalist (MoJo) reporter as the person who has a mobile phone at the event site. S/he can use it for "*stream video live to the web, record audio interviews with the phone's built-in recorder, take still images with the phone's camera and write text messages with fold-away keyboard – all before sending them wirelessly to the office via 3G or Wi-Fi networks"*. Khattak et al. (2012)

assumed that "*the journalist of the future will have to balance the humanistic sensitivity that produces the best journalism with newfound technological tools, journalists must not settle for becoming mere scientists' apprentices; they will have a look at the impact of technology on values.*" Similarly, the researcher predicted that "*in the future, the mass-media journalist may be the exception rather than the rule. The journalist will have to spin a deeper, more diverse understanding of communication, largely because of the way information will be stored in databases.*"

In general, the current cycle process of MNR presented by (Väätäjä & Egglestone, 2012) which is depicted in Figure 2.10. As could be seen in the Figure, MNR is of five steps. First, newsroom sends the assignment to a reporter for a particular event. Second, reporters begin to collect news material based on assignment. Third, reporter prepares news report to be sent to the newsroom. Fourth, reporter submits the news report via mobile app into the newsroom. Lastly the fifth step is the process of editing the news material by the newsroom journalist and preparing it for publishing.

Figure 2.10: Mobile News Reporting Process

(Source: (Väätäjä & Egglestone, 2012)

The development of MNR system either of the mobile or the web–based has continued since 2007 such as Reuters MoJo mobile-based project and CNN iReport web-based application. By the advancement of mobile devices and mobile communication network providers, research studies related to MNR began to discuss some issues.

Such issues have widely been discussed such as assignment–based mobile news reporting, the delivery mechanism of the report contents to the newsroom and mostly the supporting of freelancer reporters. For instance, (Väätäjä et al., 2011) conducted two user studies to support the future development of mobile tools that can support mobile crowdsourcing processes for news reporting. Their aim was to examine all processes of MNR from crowdsourcing by covering mobile assignments, collecting news material and submitting using mobile phones. The mobile phones are suggested as enabling tools for reporting. Moreover (Väätäjä & Egglestone, 2012) conducted two exploratory user studies to examine assignment–based approach for briefing mobile news reporting using smartphones as new reporting tools and to address accessing reporters location with the newsroom in news organizations. The purpose of accessing reporter's location is to send the reporter assignment for a particular event around the the reporter. Their research aimed to obtain perceptions, needs, and challenges to support the future development of MNR service.

Furthermore, (Westlund, 2012) conducted a study review on the mobile news production by exploring literature review of journalism studies and mobile media. His study aimed to suggest research agenda for future development concentrating on the mobile news production. Another issue which has been discussed is reporting via social networks. In his research conclusion, he provides some suggestions for future development such as implementing mobile reporting from citizens. In relation,

(Kiscuitwala et al., 2013) raises this issue by discussing how a citizen or professional journalist face risks by reporting through social media. Accordingly, he suggested three areas of research. The first is to isolate the physical identity of reporter and replace it with a pseudo-anonymous presence during report activity by creating a supporting application. The second is by building social media applications that can be resilient to censorship and service disconnection. However, some recent works proved that this kind of applications can be implemented but still need more research study to enhance its protocols. The third area is related to developing systems to connect the power of the crowd and social networks to prevent identity theft.

In a similarity, (Garbett, Comber, Egglestone, Glancy, & Olivier, 2014) conducted a research study to explore how professional journalist relies on citizen journalist and how they search for the reliable source of local news. As a result of analysis, a set of design implications for building future systems has been presented. Furthermore, (Westlund, 2014) wrote a chapter in a book titled *"The Routledge Companion to Mobile Media"* about identifying how the news produced and consumed in the age of mobile media. He discussed how the different news organizations around the world utilize the mobile platform to produce and consume the news and suggest to consider new approaches for mobile reporting He reported that *"The production and consumption of news-related content and services for mobile devices has certainly thrived in recent years. Still, it is an insurmountable task to predict exactly the ways in which mobile news will influence legacy news media industries and our social everyday life. Nevertheless, we can be assured that the future unfolding of mobile media will involve an extensive and longstanding change to how news is produced and consumed"*.

More recently, specifically in 2015, some media organizations have released mobile applications such as (Ana Ara & The Journal.ie News) to get citizens contributions of providing supported news contents such as photos and videos from the sites and places where they are located. In the following section, the related app that has been developed and demonstrated their weakness has been introduced.

2.5.2.1 Reuters MoJo June 2007

Reuters was the first news organization that adopts mobile journalism toolkit since mid-2007 (Quinn, 2012; Westlund, 2012, 2014). Having dual efforts, Nokia Research Center was side-by-side with Reuters in carrying out this development. The project was developed to enable mobile journalist reporter to deliver news contents from event site without considering assignment-based. Thus, the Reuter MoJo project was the start of a new way to tell stories (Quinn, 2012).

Figure 2.11: Reuters MoJo Toolkit

(Source: Aamoth, 2007)

Nokia developed mobile phone application for Nokia N95 device that links with the word press software, which powers Reuters' blogs. The software enables mobile journalists to send video to the Reuters content management system where the editor checks the video before it goes live. The Reuters' reason to cooperate with Nokia might be due to Nokia N95 devices' camera, which has the required capability at that time.

Nokia N95 devices have a five-megapixel camera capable of taking thirty frames a second of video as well as stills. It also has a digital stereo microphone and software for video and picture editing.

2.5.2.2 CNN iReport August 2007

So far, the CNN iReport had Internet connected computers or mobile device running web browsers. The site accepts texts, images, and videos and some submissions are included in mainstream news broadcasts. The CNN iReport was designed to collect news material from the public audience, as some audience would have a value content that could be shared by CNN to its followers. However, CNN iReport is still web version only.

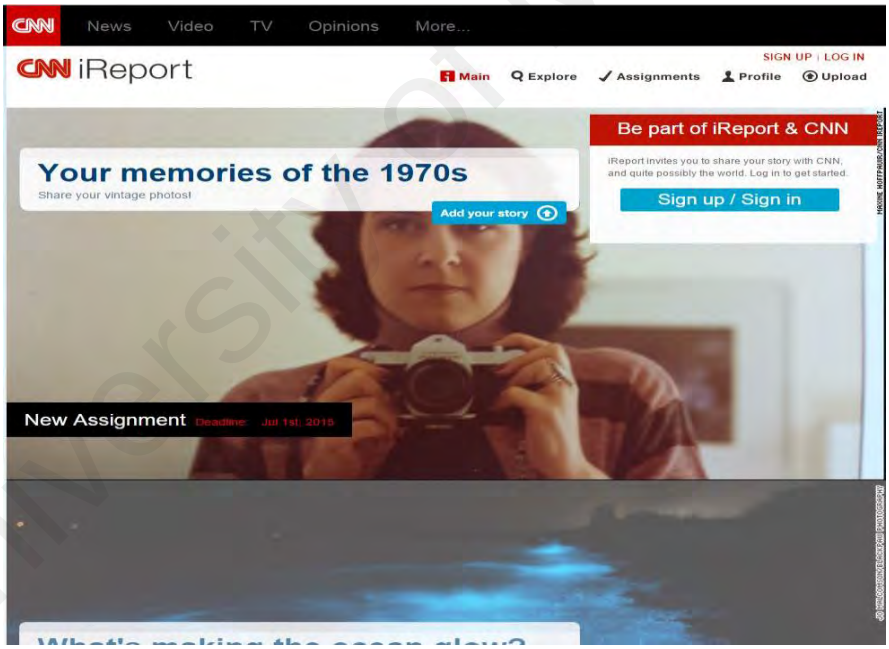

Figure 2.12: iReport CNN Home Page Before User Login

(Source: CNN, 2007)

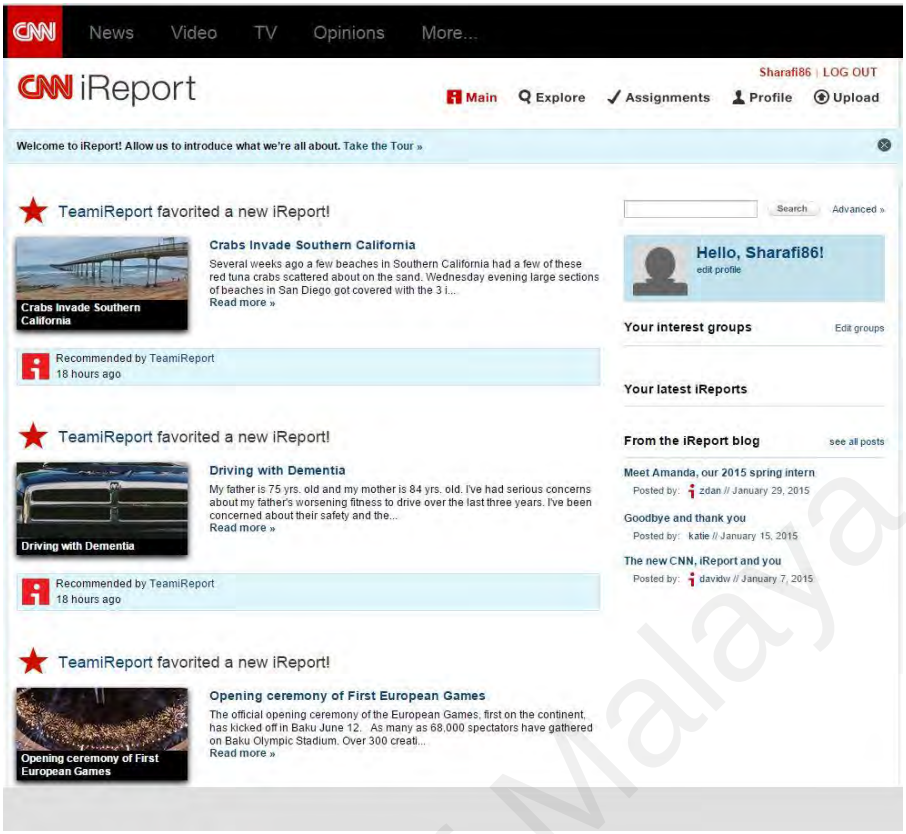

Figure 2.13: iReport CNN Home Page After User Login
(Source: CNN, 2007)

2.5.2.3 Heli Väätäjä, Teija Vaini, Esa Sirkkunen, and Kari Salo Model 2011

Väätäjä et al. (2011) designed a prototype model that can be supported for future development of mobile news reporting system. The prototype system has three main components. The First component is a mobile client for capturing photo, recording video, and uploading contents. This mobile client is known as "OK Reportteri." The Second component is backend service, which is responsible for uploaded store files. While the third component is the standard browser to browse the uploaded files. However, this prototype was developed to examine the three steps of the mobile news reporting system. These steps are to cover news based on assignment, collecting news material and submitting these materials into newsroom by using a mobile phone. The assignment was sent to reporters via SMS service to inform them to execute the particular assignment. The mobile client was developed in Java programming language

for Android platform version 2.1. Figure 2.14 demonstrates the designed user interface for the mobile client.

Figure 2.14: OKReportteri App
Study 2 Mobile App Screenshot (Väätäjä et al., 2011) OKReportteri's main menu (left) and selection menu for photo functionalities (right)

2.5.2.4 Heli Vaataja & Paul Egglestone Model 2012

In 2012, (Väätäjä & Egglestone) conducted a research study to enhance the mobile news reporting system by adopting mobile assignment in the mobile client. Hence, the researchers designed two prototype models (MCC and N4F) to conduct two field studies where the mobile assignment and location were the aspects of this particular research study.

Figure 2.15: MCC Mobile Client
Study 1 Mobile App Screenshot Väätäjä and Egglestone (2012) Briefing News Reporting with Mobile Assignments - A) The main UI of the MCC mobile client and B) The task description field.

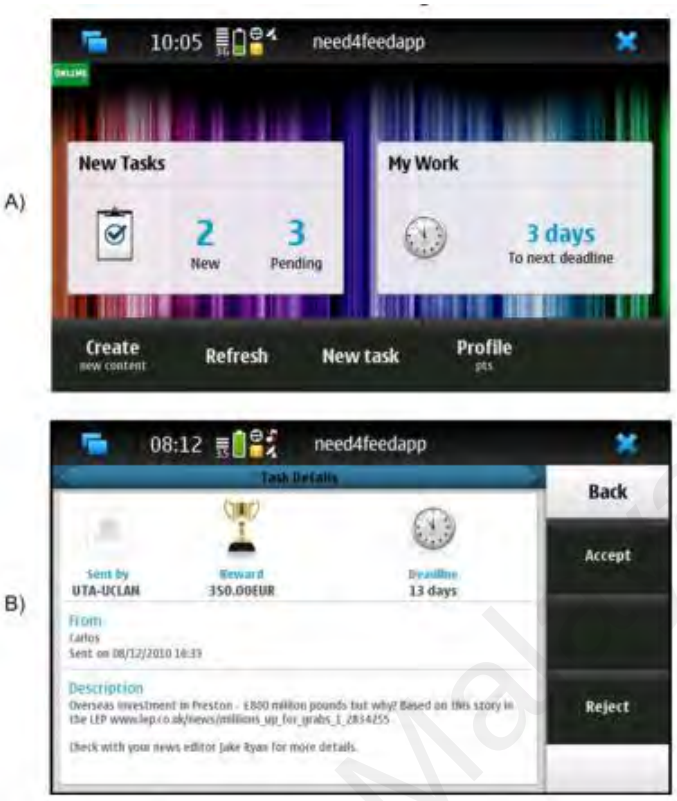

Figure 2.16: Need4Feed Mobile Client

Study 2 1 Mobile App Screenshot Väätäjä and Egglestone (2012) Briefing News Reporting with Mobile Assignments - A) Opening UI of the Need4Feed mobile client and B) an opened assignment with details

The research studies of the above models conduct an experimental study and reveal that mobile news reporting applications still need enhancements for some essential features, which are required for both newsroom staff and remote reporters. These features would help make the application more attractive for news industry if it is implemented in the real application. Tables 2.1 and 2.2 provide a summary of what editors and reporters need from each other and can be added to the future development of implementing a new approach for mobile news reporting application.

Table 2.1: Mobile Assignment Process Enhancements Needed From A Research Study Väätäjä and Egglestone (2012); Väätäjä et al. (2011)

Feature Required	Editors Needs From Reporter	Reporters Needs From Editor
Availability	Mobile user for carrying out assignment	Give instructions on duty either for staff reporter or freelancer
Location	Accessibility of reporter location	Reporter: 1- Not all the time, in urgent cases 2- When on duty 3- Choose to enable location Freelancer: 1- When ready 2- If the precision of the location can be approximate 3- In dangerous areas with safety risks
Acknowledgement	Knowing whether the respondent: 1- Has read the assignment 2- Has understood the assignment or needs clarification 3- is going to carry out the assignment	Knowing whether the reporter 1- He/she was the only one getting the assignment or whether it was sent to some reporters. 2- If the assignment is sent to some reporters but intended for only one or a few to carry out, the reporters need to get information if the assignment has been undertaken.
Assignment carrying out and deadline	Information on 1- When to expect the story or the material. 2- To know whether there were significant problems in carrying out the assignment to negotiate the issues. 3- To know whether the story or material will be on time or delayed.	
Additional Features	Wished 1- For an automatic confirmation that the editorial system received the material. 2- After the news story or material has been delivered, editors may need to check some facts or details related to stories or ask for updates or more materials	Know 1- Whether the assignment was completed as is 2- To know alternatively, whether further action or info is needed.
Assignment Control	Reporters and editors agreed that editorial staff in the newsroom should remain in control of organizing news reporting and the delivering of assignments.	
Preferable Mobile Device		Prefer to use Tablets rather than Mobile Devices

Table 2.2: Reporters' Needs for Information in Mobile Assignments

Main requirement	Sub-requirement
Need to provide basic information on the location (Address) and event/interviewee of the assignment.	N/A
Need to provide brief background information such as links to information, old articles, etc. for the event that need to be covered.	N/A
Need to tell what kind of contents (text, photo, audio, video) does reporter need to send along with:	a. Length of text (number of characteristics) b. Length of video and audio c. Desired quality d. Number of photos and video clips e. Special requests for the media content
Need to provide more information for	a. Reporting Schedule b. Deadline c. Kind of response e.g. whether fast report with the certain material is wanted and more material or updates later. d. Intended usage (Online, Print, SMS, TV, Radio/Audio) e. Department f. News Category (Main/local news, column, first page, feature, short interview, Premium) for photos

2.5.2.5 Al Arabiya Channel – Ana Ara App 2015

The mobile app "Ana Ara" by Al Arabiya News Channel launched in Google Play in April 2015. The app launch coincided with the beginning of the war in Yemen. It was developed to help and support the people in Yemen sending any photo or video of the events instead of professional media because of the difficulties of reporting the events lively by professional reporters. Selected photos and videos are shown during the news streaming hours on each day. Photos and videos volume, which are presented to the audience is subjected to editor approval in channel newsroom. However, the user is enabled to login the app by using his/her account in google+. After the user successfully lakes the login, s/he has to enable the GPS to activate his location. Ana Ara app has only the functionality to capture and send either photo, video or both. Figure 2.17 shows screen snapshots of "Ana Ara" app from Google Play.

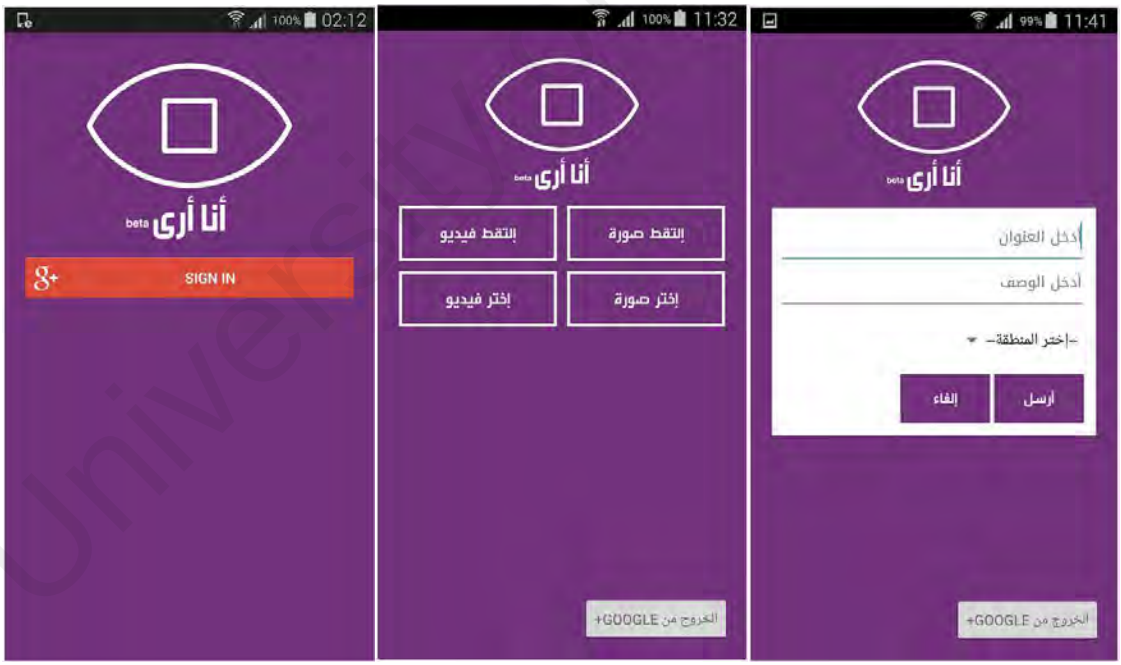

Figure 2.17: Ana Ara – Al Arabiya Mobile News Reporting

(Source: AlArabiyaTV, 2015)

2.5.2.6 The Journal.ie News 2015

Another mobile application that has been launched is "theJOurnal.ie." This application provides updated news feed for news consumers in Ireland. Besides, there is a feature for crowdsourcing news consumer to enable them just to submit text news, photo and video only like Ana Ara - Al Arabiya News Channel. Figure 2.18 shows screen snapshot of "theJOurnal.ie" app from Google Play.

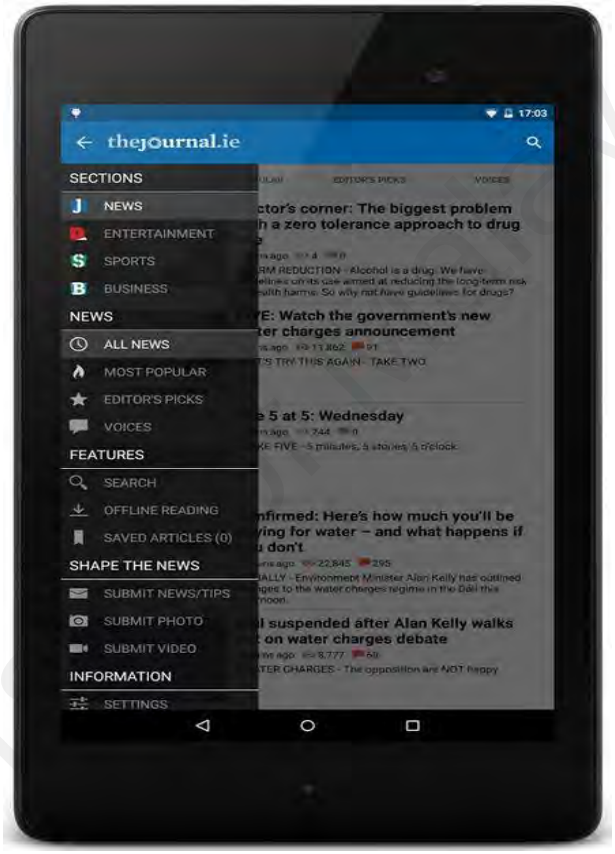

Figure 2.18: Screen Snapshot of the Journal.ie Mobile Including "Shape the News."

(Source: theJOurnal.ie, 2015)

2.5.2.7 Previous Implementation Summary

Mobile Journalism: Reuters Mojo was targeting staff journalists while iReport CNN was a web–based app targeting freelancers. Therefore, both of them do not support mobile news reporting for employees and freelancers based on mobile environment. Yahoo and Reuters created websites to accept news contents from audiences to publish

them on their websites along with YouTube. CBS launched a citizen journalism website where members of the public could upload videos and photos of events from their mobile phones for newsworthy. Moreover, Ana Ara and The Journal.ie News applications were developed to enable news consumers to participate by uploading their photos and videos only, and this implementation is already used previously by Väätäjä et al. (2011).

Table 2.3: Comparison Features of Mobile News Reporting App

Feature	CNN iReport 2007	Reuters MoJo 2007	Vaatge & others model 2011	Vaatge & Eggleston model 2012	Ana Ara Al Arabiya 2015	The Journal.ie 2015
App type	Web	Mobile	Mobile	Mobile	Mobile	Mobile
Mobile platform	N/A	Nokia N95-Symbian		Nokia N82 & N900 Symbian	Android	Android
Staff & freelancer supporting	Freelancer Only	Staff Only	Test Only	Test Only	Freelancer Only	Freelancer Only
Assignment–based	Yes	No	No	Yes	No	No
Newsroom control assignment	Yes	No	No	No	No	No
Assignment for selected reporters	No	No	No	No	No	No
Supporting interactive notifications between newsroom and reporter	No	No	No	No	No	No
Mobile cloud computing – based	No	No	No	No	Yes	Yes

2.5.3 Mobile News Reporting Highlighted Issues

Although, few MNR app has been suggested in recent years, yet still needs for more improvements as reported in (Garbett et al., 2014; Väätäjä & Egglestone, 2012; Väätäjä et al., 2011) research study. Mobile news assignments delivered to journalists' mobile devices are one potential future development step. Moreover, (Westlund, 2012) reported that *"contemporary research does not provide a general outlook on the extent to which legacy news media have engaged in reporting with mobile devices."* Therefore, there is an urgent need to suggest an approach for MNR to address the following issues:

1- Enhance mobile assignment process between newsroom team and mobile reporter either s/he is staff or freelancer.
2- Improve news contents delivering mechanism by supporting real-time notification function between newsroom team and mobile reporter.
3- Support crowdsourcing and freelancer mobile reporters in reporting application in the suggesting approach.
4- Activate interactive feature amongst the three issues mentioned above.
5- Developing, creating, and maintaining the most secure identity of a citizen or professional journalist.

This research presents an approach to improve and design mobile news reporting app based on mobile cloud computing MCC technology, which will address the first four points mentioned above.

2.6 Summary

In this Chapter, we have introduced a brief news background, which illustrates the idea of news as one the fields needed to inform the people about what is happening in the world. Besides, news composition and structure have been introduced by providing a real model from Yemen News Agency (SABA). The adopted technology section shows

that news industry always tries to evaluate and use any new technology that can help and support news producers and consumers. The main techniques were Telegraph, Computer, Stellate, Internet, Cellular, Mobile, and Mobile Cloud Computing respectively. The next section has discussed mobile news, as our focus is on mobile technology categories. Therefore, it could be stated that the mobile news adoption gains successfully due to its mobility and availability for both producers and consumers. Therefore, mobile news development begins to be adopted in computer science research to solve some issued that can optimize the usability of mobile news. One of the mobile news development areas is Mobile News Reporting MNR. The previous researches and implementations were Reuters MoJo project, CNN iReport, Al Arabiya ANA ARA and others. These implementations that have been conducted showed that there is still a need for improvements in MNR to optimize the functionality such as real-time notifications and to add more innovative features. Suggested features can facilitate the usage of a mobile application for news producers to be more efficient and useful. Our research scope will be to design and implement a new approach for mobile news reporting application.

CHAPTER 3:METHODOLOGY AND PROPOSED APPROACH

3.1 Introduction

The previous chapter has provided an overview of mobile news research trends based on the reviewed literature. It mainly discussed the mobile news reporting system and its challenges as scope of this research. It concluded that there is a demand to enhance mobile news reporting process to meet the journalism industry requirements and to facilitate getting news contents in an organized structure using new technologies.

This Chapter discusses the research approach in details and it also presents how this research would be conducted and applied. Thereafter, the proposed solution approach for the mobile news reporting system would be presented to address the issues identified in literature review study. Finally, this Chapter would be concluded by a brief summary.

3.2 Research Approach

This research involved a proposed approach for web and mobile application system to address mobile news reporting system issues regarding assignment and news contents report. The quantitive and qualititve methods along with the positivist approach were chosen to implement the research objectives. Besides, a proposed approach was experienced through the web and mobile design to meet the mobile news reporting system requirements.

Many types of studies in the computer science discipline are conducted using quantitive and qualititve research methodology due to its indicative and flexible characteristics to evaluate the outcomes of most computer science investigations. Elio et al. (2011) discussed five methods in computing science namely: formal, experimental, build,

process and model respectively. The formal method is used to prove the evidence and success of algorithms and systems. The experimental method is used to assess the new solutions for problems. Relatively, the build method is used to develop new physical artifact or software systems to present its possibilities and news features that have never been presented before. Process method, on the other hand, is used to perform tasks in the systematic process, and it is used mainly in software engineering and Man–Machine Interface. In this research, the experimental method was selected to achieve the research objectives. This method would be used due to its ability to provide feedback during the evaluation phase of the proposed solution for the mobile news reporting system.

3.2.1 Research Design

The research design for this study is ispired by the reviewed literature. Accordingly, the research methodology, proposed approach design discussion and system development have been stated and each topic have been elaborated in the following:

- Literature review: the general overview of news has been debated intensely to provide information on the news industry growing along with technology. An interview with news manager from Yemen News Agency (SABA) was conducted to understand the process of news contents gathering. The reason for choosing SABA only was due to their acceptance and accessbility to meet the person from news field to explain and explore the news gathering process. While the other reason was due to that SABA is following the same standards used by other news agencies in the world, and this is ensured by mainting SABA as a member in multi alliances such as Federation of Arab News Agencies (FANA) and Non-Alighned News Agencies Pool (NANAP). After that, adopted technologies in news industry were presented from the early stage until they start to use mobile technology. However, the main discussion focused on mobile

news reporting system to present the current research and identify the gaps between the mobile user and newsroom user. Finally, the major issues of mobile news reporting system were outlined.

- Research methodology and proposed approach: a general discussion of research methodology about study type, steps, information gathering and data analysis were also presented. Moreover, the conceptual framework of the proposed approach of the system modeling has been reported providing a guide on how the research was designed and implemented. Section 3.3.1 obviously reports on how the proposed approach was implemented in terms of hardware, software, platforms and framework requirements. Choosing particular platform and framework was justified and then discussed for more clarification. Finally, the outline of research methodology and proposed approach were entailed with a brief summary.

- The system development was divided into three main phases. The first phase included analysis and design phases. The second phase included implementation and testing phases. The third phase deal with evaluation and discussion of the proposed approach system.
    - System Development Phase 1: this phase was conducted to analyze the proposed approach using Unified Modeling Language (UML). By using UML, the system components were illustrated using use case diagram and activity diagram. However, the analysis and design of the proposed approach began by analyzing and designing web and server side and then followed by mobile application. UML has been selected due to its characteristics of developing any interactive software systems.

- System Development Phase 2: by completing phase 1, implementation of the proposed approach were conducted in terms of programming part. In this stage, the node.js plays the role a platform and meteor framework which have been used to achieve the implementation requirements. In section 3.3.3 more details have been discussed to justify the platform and framework chosen in this Chapter. After completing the programming part, the initial function testing has been conducted to ensure that the proposed approach was implemented, analyzed and designed. More details on testing type can be found in chapter four.
- System Development Phase 3: this phase was designed to evaluate and discuss the proposed approach. However, this phase was targeting professional journalists and news reporter to get the real evaluation from targeted industry. For more details, chapter five has discussed the proposed approach evaluation.

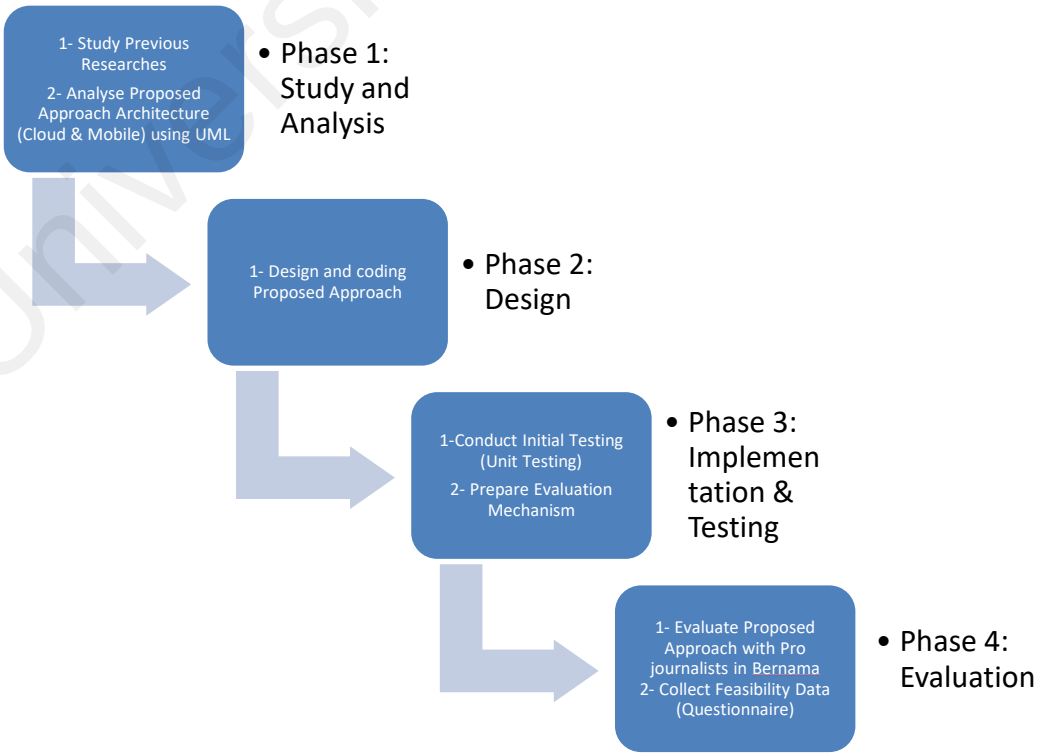

Figure 3.1: Summary of Research Methodology

3.2.2 Data Collection

This research study has applied multiple data collection techniques to produce reliable data. The data collection techniques used are document analysis, personal interviews, group interviews, questionnaire, and observation. In this study, the combination of selected techniques (Documents Analysis, Personal Interviews, Questionnaire, Descriptive Analysis) have been chosen, due to the need to meet the study requirements. A brief discussion is presented in the following sections:

- *Documents Analysis:* this technique used to review and examine the previous and current work published in journal papers, books, and reliable Internet resources, which allow us to write a brief description in literature review part.
- *Personal Interviews:* this technique used in this study was to conduct an interview with News Director in Yemen News Agency (SABA) to understand the news contents gathering process to assist in problem-solving and system development.
- *Questionnaire:* the questionnaire technique is used in the system development phase 3 to obtain experimenters' opinion and the feedback of using proposed approach for the web and mobile news reporting application. The questionnaire was given to experimenters once they finished from using the real application.
- *Descriptive Analysis:* it used to illustrate the feedback obtained from the proposed approach experiments for analysis and discussion part.

3.2.3 Evaluation Design

The evaluation of the proposed approach is one of the main objectives of this research. The evaluation phase was planned to be conducted by completing the implementation and testing phase to get the opinion and feedback of the targeted industry. As has been mentioned earlier, this research proposes an approach to improve the mobile news

reporting process to assist the journalism industry in facilitating their daily tasks of news contents gathered by using mobile devices with the advancement of mobile technology. Therefore, the targeted audiences were editor journalists, reporter journalists, and photojournalists who participated in the evaluation phase.

The evaluation from industry recommended by (Spangenberg & Heise, 2014; Väätäjä & Egglestone, 2012; Westlund, 2014) to obtain a valuable result of the proposed approach and to get the evaluation from news industry particularly with professional journalists and reporters. Therefore, the evaluation phase was planned to be conducted in any news organization particularly in a news agency, which can accept and agree to adopt this research evaluation. The reason to choose news agency is due to that it has professional journalists and reporters in different departments such as News, Editing, Photograph, e-News and News Translation departments. Moreover, a news agency is considered as a reliable news organization to feed other news organization by correct and trusted news contents because it usually, has branches offices in all states of the country to cover the daily news. It provides all news categories to governmental media (TV and Newspaper) and non-governmental media based on the subscription fees. However, other news organization such as TVs and Newspapers could be targeted and could use the same proposed approach. Furthermore, the freelancers were chosen to participate in the evaluation phase to reveal how they could be satisfied with the proposed approach.

3.2.4 Participants and Sampling

As mentioned in the evaluation phase section, the evaluation would be conducted with participants working in a news agency, TV Channels, Newspapers and freelancers report or deal with a variety of media organizations. The News agencies are the most reliable source of media contents among news industry organizations due to their ability to have reporters in all provinces and states of each country. In each country, there is a

national news agency, which consists of the main reference and news provider to other news organizations such as Newspapers, TV channels and Radios Channels.

Moreover, some International news agencies cooperate and deal with national news agencies to get updated news in some countries and vice versa. Therefore, Bernama National News Agency in Malaysia and Yemen News Agency (SABA) in Yemen have been chosen to select the most number of participants to get their evaluation of the proposed mobile news reporting application. The selected participants have chosen from different departments particularly from News, Editing, and Photograph departments due to the granted approval that has been obtained from these two news agencies to conduct the evaluation. As for freelancers, they have selected based on the recommendation received from reporters and editors work in both news organizations mentioned above. Table 3.1 presents the details of the numbers of candidates to participate in this research evaluation.

Table 3.1: The Evaluation Participants' Details

P[1]. Source	**Malaysian National News Agency BERNAMA**			**Yemen News Agency (SABA)**			**Freelancer and Other Organizations**		
P. Position	Editor	Reporter	P.J[2]	Editor	Reporter	P.J	Editor	Reporter	P.J
P. Number	2	2	2	2	2	2	2	2	2

The number of sampling size has been appointed based on the granted approval obtained from participants due to the time spent with each participant to get his/her valuable feedback on the proposed web and mobile news reporting application. Moreover, it has been improved in terms of sample studies as compared to research conducted by (Väätäjä & Egglestone, 2012; Väätäjä et al., 2011) since they only

[1] Participant
[2] Photojournalist

managed to get ten participants for each research study on their evaluation. In this study, the response from 18 participents takes more than 6 months to collect their feedback due to their limited time.

The evaluation began by demonstrating and briefing how the web and mobile news reporting application was designed and developed. The workflow has been explained to participants by providing step by step sheet with a diagram. The web and mobile application evaluation have been divided into two groups. The first group is newsroom editors participants while the second group is the reporters and photojournalist participants. The first group would examine both web & mobile application as they are responsible for assigning an assignment and follow up news report while the second group would examine mobile application as they are responsible for delivering news report daily.

The first group has granted the authorities required to access web application via dedicated website link: www.i-mnreport.com. As for mobile application, the apk file of Android platform has been installed on each mobile device of participants in the first and second groups to start testing the functionalities and features of the proposed application. After that, the participant who were given the questionnaire form to fill it up to evaluate the proposed web and mobile application feasibility and write their feedback for any enhancement and optimization required for future development.

3.2.5 Data Analysis

As mentioned in the Data Collection section the document analysis, personal interviews, questionnaire and descriptive analysis which can be used to obtain the research data. These approaches were transcribed to provide more explanation. However, the data

from the questionnaire were analyzed by describing questionnaire categories using statistics theme.

3.3 Proposed Approach for Mobile News Reporting Application

In Chapter two, the reviewed literature reveals that the current news reporting systems still need more improvement and optimization regarding the real-time response of mobile assignment, news report delivery and, in between, the interactive communication among newsroom team and mobile reporters. Due to of these issues, the new approach was proposed to develop and enhance news reporting based on Mobile Cloud Computing Technology and interactive approach using the web and mobile concept, which meet the requirements of the mobile news reporting system.

3.3.1 Proposed Approach Scenario

The proposed approach assumed that there are two types of the news report. The first type based on mobile assignment whereas the second type based on the breaking news.

3.3.1.1 Report Based on Mobile News Assignment

1- In the first type, newsroom editor creates the assignment via a web application and send it either to an individual reporter or group reporters based on the assignment criteria. During assignment creation, online reporters would be shown on Google map to make editor awardable for the nearest reporter for a particular event. Moreover, the assignment details required have been obtained from the research study conducted by (Väätäjä & Egglestone, 2012; Väätäjä et al., 2011).

2- The mobile reporter receives the mobile assignment via the mobile application, which includes all details about a particular assignment. However, the mobile reporter can not be able to receive any assignment if the GPS in the mobile

device is not activated. Therefore, when the mobile reporter makes a login into mobile news reporting application (i-MNReport), an alert message will be displayed to notify mobile reporter to activate GPS.

3- Once the mobile reporter receives the mobile assignment, the newsroom editor will get a notification message that the assignment has been delivered to a mobile reporter. After that, in mobile reporter side, the user has options to respond to the newsroom for undertaking the assignment. The offered options .

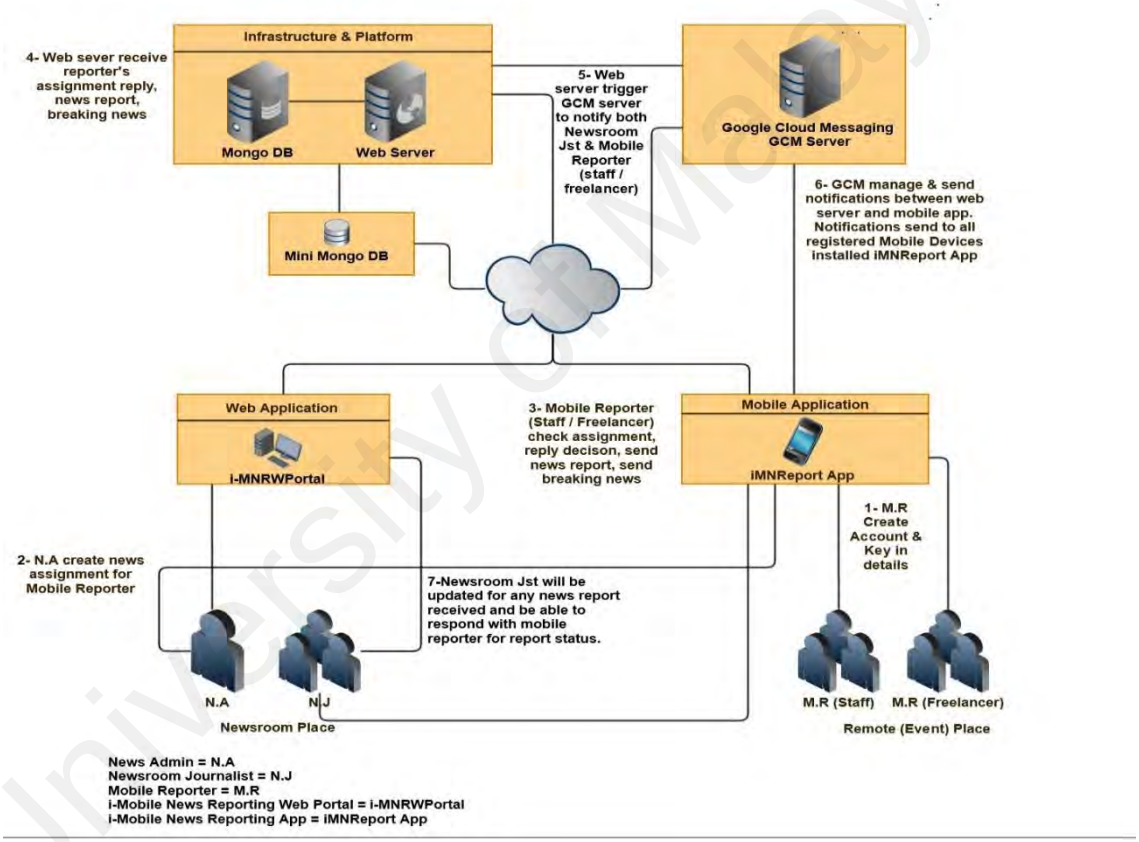

Figure 3.2: High-Level i-MNReport System Proposed Architecture

are accepted, but need some clarification to avoid being rejected. In the accepted but need some clarification option, there is a chat box for each assignment created could be used to send and receive conversations for interactive between newsroom editor and mobile reporter.

4- If the mobile news assignment sent to a group of mobile reporters, but it is intended for only one mobile reporter, the proposed application would get the response from the first reply and at the same time notify other mobile reporters that somebody has undertaken the particular assignment.

5- The Mobile application enables the mobile reporter to upload the news contents (photo, audio, video) from mobile resources. Alternatively, the mobile reporter could take an instance photo, audio, or video using mobile device application of camera, and voice recorder. Once the news contents are ready to deliver, the mobile application checks the delivery contents based on the assignment criteria. If it meets the criteria, the delivering can be transferred to the server if not an alert message displayed to remind the user to adjust the upload based on the delivery criteria. This process continues with each delivery report function. Mobile reporter receives notification message for successful delivery.

6- Newsroom in the web application would receive the news report, which includes the news contents. Once the report is delivered, a notification message alert the editor and the editor will check the report to verify whether the report meets the assignment requirements. If not, the editor has to asks the mobile reporter to resend the report by identifying more clarification for a mobile reporter. This process continues until the editor accepts the report and mark the particular assignment as completed.

3.3.1.2 Report Based on Breaking News

In this report, the mobile reporter would deliver highlighted breaking news to the newsroom. The web application would notify the editor about the recent report received from a mobile reporter and also, notify the mobile reporter that the breaking news has been delivered successfully.

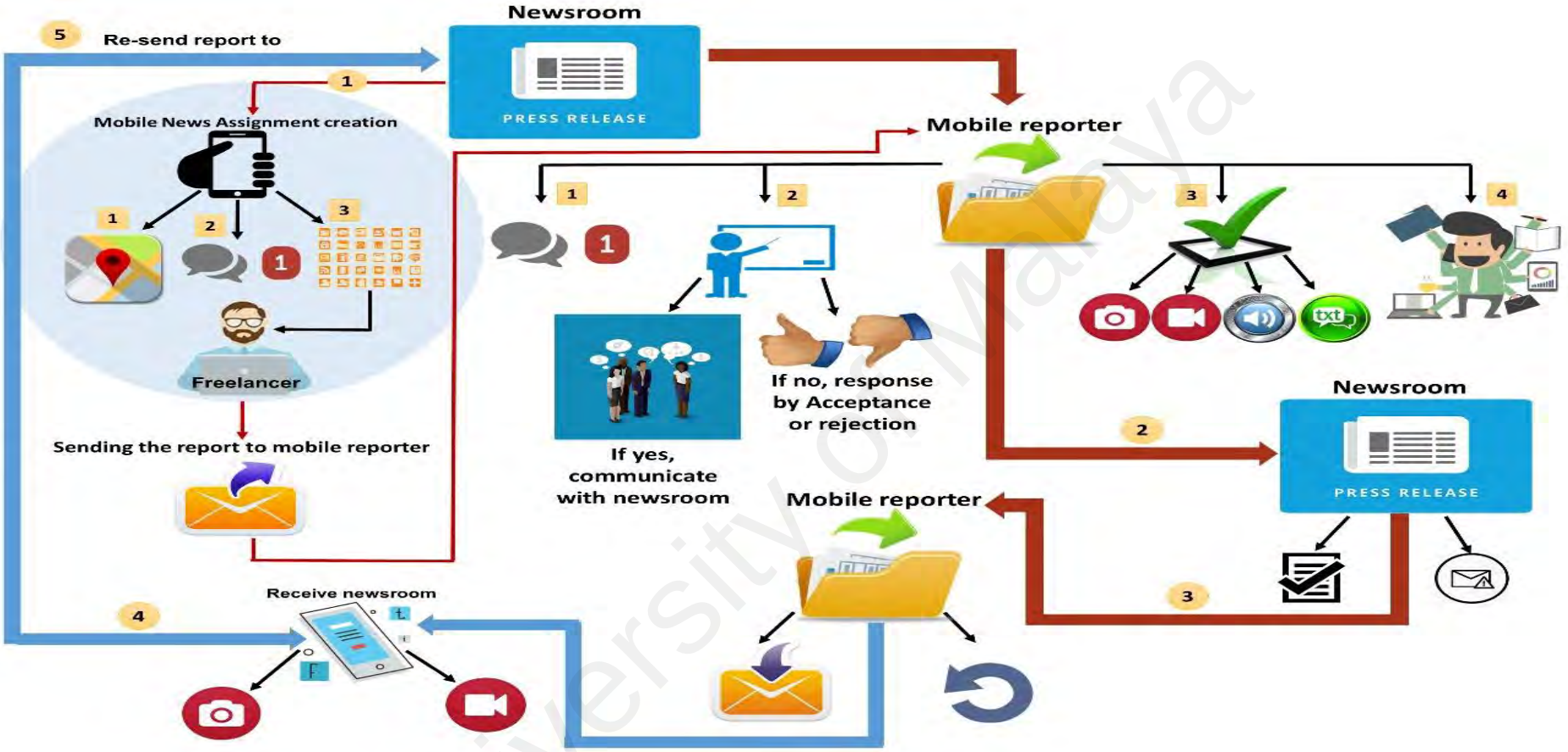

Figure 3.3: High-Level i-MNReport System Proposed Scenario

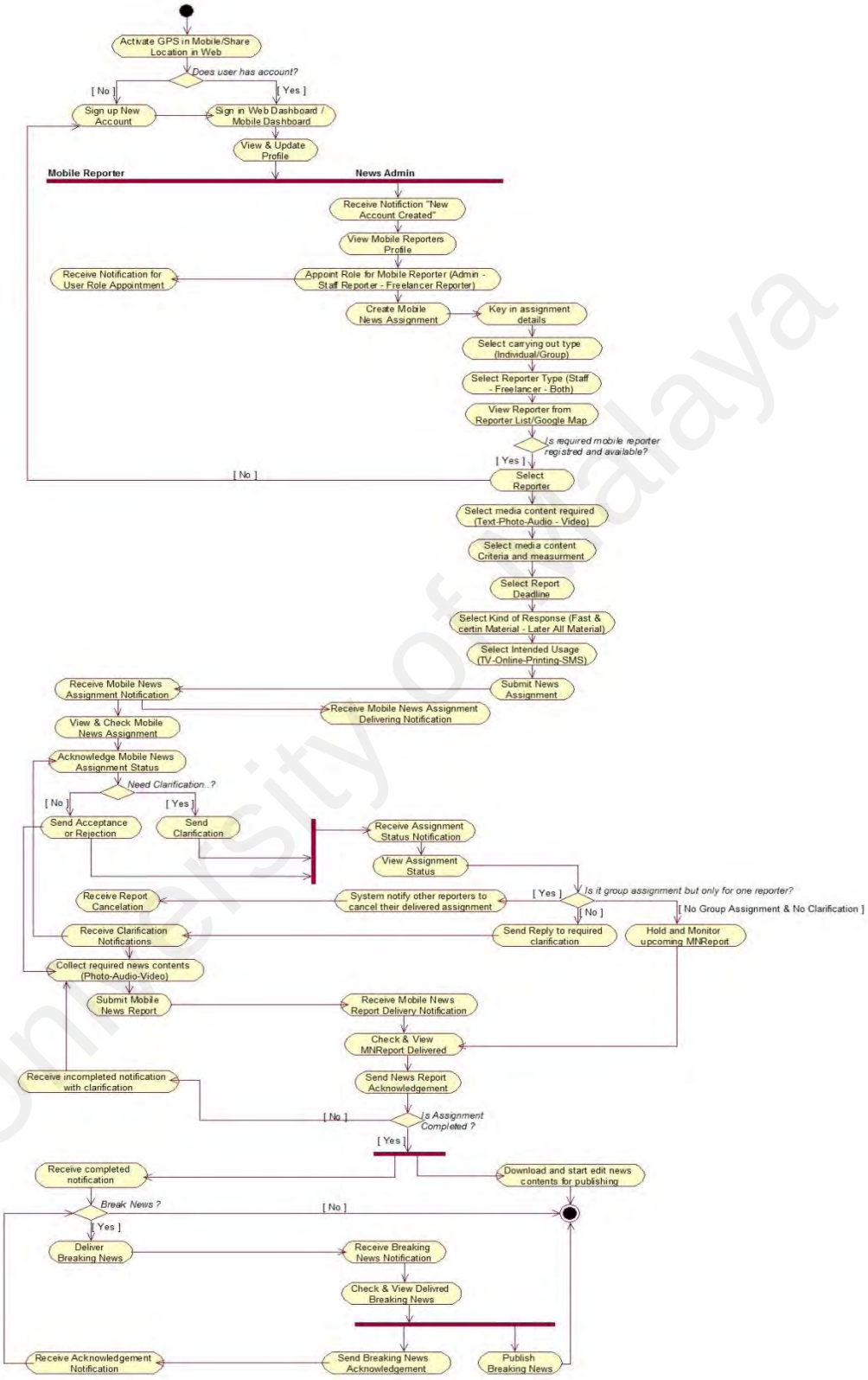

Figure 3.4: i-MNReport Proposed Process Design and Flow

3.3.2 Hardware & Software Resources

In this research, the hardware and software components were required to develop and implement the proposed scenario solution of mobile news reporting application, the list of hardware and software required are as following:

3.3.2.1 Hardware Components

List of hardware components specification are presented in Table3.2 and Table 3.3:

Table 3.2: List of Computer Hardware Specifications

Components	Minimum requirement	Maximum requirement
COMPUTER TYPE	PC / Laptop	PC / Laptop
PROCESSOR	Intel Core 2 Duo 2.0GHz	i7 NG 2.3 GHz
RAM	2 GB DDR2	8 GB DDR 3
HD	320 GB	1TB
NETWORK	Fast Ethernet LAN Wireless 802.11a/b/g WLAN	Gig Ethernet LAN Wireless 802.11a/b/g WLAN
GRAPHICS CARD	Built in Intel Graphics up to 358MB	NVidia GeForce GT 755

Table 3.3: List of Mobile Hardware Specifications

Components	Specs	Minimum Specs Requirement	Maximum Specs Requirement
GENERAL	2G Network	2G Network GSM 850 / 900 / 1800 / 1900	GSM 850 / 900 / 1800 / 1900 CDMA 800 / 1900
	3G Network	HSDPA 900 / 2100	HSDPA 850 / 900 / 1900 / 2100 CDMA2000 1xEV-DO HSDPA 850 / 1900 / 2100
	4G Network	N/A	LTE 800 / 850 / 900 / 1800 / 2100 / 2600 LTE 700 / 1900 / 2100
	SIM	Mini-SIM	Micro-SIM
BODY	Dimensions	134 x 67 x 9.9 mm (5.28 x 2.64 x 0.39 in)	151.2 x 79.2 x 8.3 mm (5.95 x 3.12 x 0.33 in)
DISPLAY	Type	IPS LCD capacitive touchscreen, 16M colours	Super AMOLED capacitive touchscreen, 16M colors
	Size	480 x 854 pixels, 4.5 inches (~218 ppi pixel density)	1080 x 1920 pixels, 5.7 inches (~386 ppi pixel density)
SOUND	Alert types	Vibration, MP3 ringtones	Vibration; MP3, WAV ringtones
	Loudspeaker	Yes	Yes
MEMORY	Card Slot	microSD, up to 32 GB	microSD, up to 64 GB

	Internal	4 GB, 512 MB RAM	16/32/64 GB, 3 GB RAM
DATA	GPRS	Yes	Yes
	EDGE	Yes	Yes
	Speed	HSDPA, 7.2 Mbps; HSUPA, 5.76 Mbps	HSDPA, 42 Mbps; HSUPA; LTE, Cat4, 50 Mbps UL, 150 Mbps DL
	WLAN	Wi-Fi 802.11 b/g/n, Wi-Fi hotspot, DLNA	Wi-Fi 802.11 a/b/g/n/ac, dual-band, Wi-Fi Direct, DLNA, Wi-Fi hotspot
	Bluetooth	v2.1, A2DP, EDR	v4.0, A2DP, EDR, LE
	Infrared port	No	Yes
	USB	microUSB v2.0	microUSB v3.0 (MHL 2), USB Host
CAMERA	Primary	5 MP, 2592 x 1940 pixels, autofocus, LED flash	13 MP, 4128 x 3096 pixels, autofocus, LED flash.
	Video	720p	2160p@30fps, 1080p@60fps
	Secondary	VGA	2 MP, 1080p@30fps
FEATURES	OS	Android OS, v4.1 (Jelly Bean)	Android OS, v4.3 (Jelly Bean), upgradable to v4.4.2 (KitKat)
	Chipset	Qualcomm MSM8225 Snapdragon	Qualcomm Snapdragon 800
	CPU	Dual-core 1.2 GHz Cortex-A5	Quad-core 2.3 GHz Krait 400
	GPU	Adreno 203	Adreno 330
	Sensors	Accelerometer, proximity, compass	Accelerometer, gyro, proximity, compass, barometer, temperature, humidity, gesture
	Messaging	SMS(threaded view), MMS, Email, Push Mail, IM	SMS(threaded view), MMS, Email, Push Mail, IM
	Browser	HTML	HTML5
	GPS	Yes, with A-GPS	Yes, with A-GPS, GLONASS
	Java	Yes, via Java MIDP emulator	Yes, via Java MIDP emulator
BATTERY		Li-Ion 1700 mAh battery	Li-Ion 3200 mAh battery

3.3.2.2 Software Components

The list of software that used to design and develop the proposed approach are presented in Table 3.4:

Table 3.4: List of Software Components

SOFTWARE CATEGORY	SOFTWARE REQUIRED
DEVELOPMENT	
PC Operating System	Windows 8.1 or 10 Ubuntu 15.x
Mobile Operating System	Android 4.2 Jelly Beans and newer
Web & Mobile Development Tool	Sublime Text
UML Tool	IBM Rational Rose Enterprise Edition
Text Processing	Ms-word 2013
Figures Drawing	Gliffy Diagrams Tool
CLOUD & SERVER SIDE	
Framework	Node.js
Platform	Meteor.js
Database	MongoDB
Notification	Google Cloud Messaging
CLIENT SIDE	
Web App Platform	Meteor.js
Mobile App Platform	Meteor.js + Cordova
IMPLEMENTATION	
PROGRAMMING LANGUAGE	Java Script, HTML5, CSS
API	Node.js & Meteor.js packages
Cloud Hosting Service	Digital Ocean
Website Link	www.i-mnreport.com

3.3.3 Development and Implementation Justification

The design and implementation of any system project would be successful by choosing the recommended, supported, reliable programming technology, framework, and platform. In addition, they should meet the system functionalities requirements. Since the last decade, there were different programming technologies and frameworks that could use to address different platforms for developing and designing network-based applications. For example, PHP programming language is used to develop a web-based application, J2ME programming language is used to develop a mobile application, and Visual Basic.NET is used to develop Windows application. These programming languages were developed to target a particular platform.

Nowadays, the concept of programming is going to be changed. In other words, there is a demand to uniform the web and mobile application developing, and this demand requires more efforts to develop new frameworks that can meet the technology revolution of combining mobile and web application in one platform. Currently, Java programming technology is the dominant programming language used to develop several different webs and mobile networking applications. Bouwkamp (2016) reported the nine most programming language used in 2016 for developing network-based applications. The report reveals that SQL was in the first list. Then, Java came in the second list while JavaScript was the third list and these programming languages are considered as the most predominant in systems and applications development.

3.3.3.1 Native vs-a-vis Hybrid Approach

Mobile app development is divided into four different categories namely: Native apps, Hybrid apps, Dedicated web apps, and Generic mobile app. The native apps are developed using a particular mobile platform such as Android or iOS using its programming language to implement and deploy the particular application. The Hybrid apps are developed based on such framework, which affirms the ability to access mobile hardware such as camera, recorder, or GPS. In the dedicated web apps, the mobile web application is developed to meet the requirements of a specific platform. The Generic mobile apps, on the other hand, is a mobile web application, which is designed to work on all web-enabled mobile device.

In this research, the hybrid app category has been chosen to meet our research requirements needed to access mobile hardware and web technology. Therefore, in the current study, the JavaScript, HTML5, CSS programming languages have been used to develop the mobile news reporting application (i-MNReport) using the Node.js

framework, Meteor.js platform, and MongoDB database. The reason beyond that is that they are prevailing, reliable, and robust for developing advanced mobile and web applications. The following sections will provide a brief description of the programming language, framework, and platform.

Figure 3.5: Native vs. Web vs. Hybrid Apps 1

(Source: Apps4All, 2015)

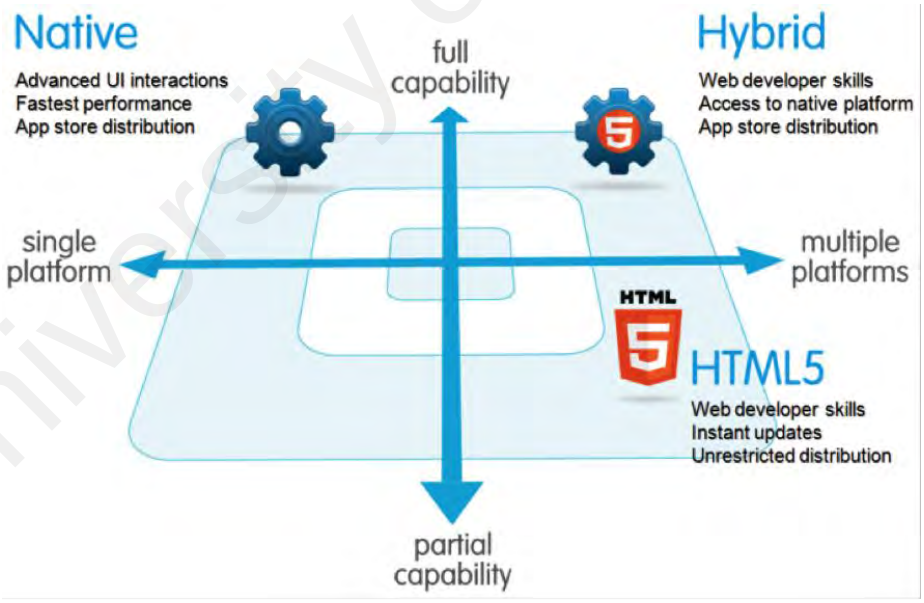

Figure 3.6: Native vs. Web vs. Hybrid Apps 2

(Source: Dayal, 2016)

3.3.3.2 JavaScript Programming Language

Historically, JavaScript was released in 1995 by Brendan Eich, who was working in Netscape Company, the owner of the Navigator Browser. The purpose of creating JavaScript was to make web pages working dynamically (Haverbeke, 2014) (W3C, 2016). However, JavaScript does not belong to Java Programming technology. In the beginning, JavaScript was called Mocha by Netscape founder Marc Andreessen. Later, in September 1995 the named changed to LiveScript and on December 1995 when the trademark license received from Sun Microsystems, the JavaScript name was adopted. The name was considered as a marketing strategy to promote the JavaScript programming language due to the success of Java Programming Technology in the 1990s. There were several versions of JavaScript which were introduced to fight among different programming languages all over the world. Moreover, the third version of JavaScript was the dominant between the period of 2000 to 2010. JavaScript was continued to be improved and enhanced by introducing the following new versions such as version 4 and version 5 which came with new essential enhancement and more expanding to the programming language performance. On the contrary, JavaScript is not used with browsers platform only. It is rather used with some databases such as MonogDB and CouchDB. The database uses JavaScript in its scripting and querying. Moreover, it is used for server and client programming platforms such as Node.js and Meteor.js (Haverbeke, 2014). Additionally, JavaScript is characterized as structured, dynamic, and almost object-oriented. It has contributed to being part of mobile application development. Currently, most of the mobile application development frameworks include three components namely: JavaScript, HTML5 and CSS. However, each framework has its APIs to facilitate the mobile application development.

3.3.3.3 HTML5

HTML5 is the new version of HTML, which was released in 2008 to keep pace with the advancement of new technologies in parllel with web and mobile development. The major improvement was to enable developing interactive web applications. However, HTML5 and CSS combining with the new version of JavaScript programming language were able to introduce new frameworks and platforms such as Node.js and Meteor.js to open opportunities to develop the web and mobile applications for cross-mobile platforms (Android, Apple, Windows). This combination supports developers to develop the web and mobile applications with less effort comparing with a native application for each mobile platform.

3.3.3.4 Node.js

Node.js is defined as "*a JavaScript runtime built on Chrome's V8 JavaScript engine. Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient*" (Node.JS, 2016). It is used to build scalable network–based applications due to its ability to handle many connections simultaneously. It has been designed for the server-side environment using JavaScript programming language. The focus of Node.js is on the majority in high performance and low memory consumption. In addition, it depends on asynchronous I/O Event Model (Tilkov & Vinoski, 2010). Lei, Ma, and Tan (2014) conducted a study to compare the performance of the most efficient web server application which can be used for developing web applications. The study reveals that Node.js is lightweight and effective comparing to PHP and Python web for the server–side cloud. However, Node.js has contributed to support developing mobile web application efficiently by using mobile cloud computing technology (Chaoran, Yuansong, Lee, & Murray, 2014).

3.3.3.5 Meteor.js

Meteor.js is a platform used to develop mobile and web application using JavaScript programming language and Node.js. As it consists of an execution environment, Metero.js is used to develop the entire application in terms of back and front ends, which can be implemented in the environment of the application server, web browser, and mobile devices. Meteor.js platform has been defined by Meteor (2016a) as "*a full-stack JavaScript platform for developing modern web and mobile applications. Meteor includes a key set of technologies for building connected-client reactive applications, a build tool, and a curated set of packages from the Node.js and general JavaScript community*". Moreover, Sevilleja (2015) defined Metero.js as "*an open-source platform built on Node and MongoDB. It is not just a framework; it is more than that.*"

Due to supporting the full–stack Javascript platform, Metero.js platform have components that could facilitate the development and make the developer focus on developing particular application rather than spending the time dealing with infrastructure. Figure 3.7 depicts Meteor.js platform components and services constituting the platform client layer, view layer, database layer and sources layer.

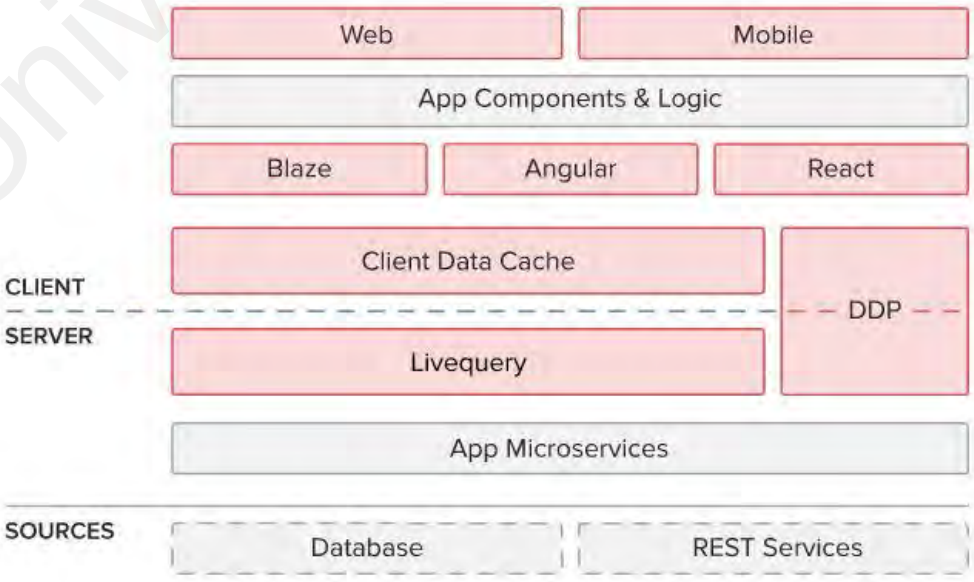

Figure 3.7: Meteor.js Component Platform
(Source: Meteor, 2016b)

The Meteor.js platform is supports web and mobile platform client. In the view layer, three user interface (UI) templates can be used namely, Blaze, Angular and React whereas the Blaze is the Meteor.js default UI template. These templates are used for creating reactive graphical user interfaces and live-updating in the client application. As for database layer, there are two components, one in client-side called Client Data Cache while the other is in the server-side called Livequery. Client Data Cache is the client-side cache memory called minimongo which is used to allow the client consume Mongo data reactively synchronizes data over Distributed Data Protocol (DDP).

From its name, Livequery is a real-time database connector that performs the instant query between client and server. The server Livequery updates the client app, and the client app, in turn, refreshes the update received in user interface automatically. This means that a user does not need to manually refresh client app to receive updated changes in the database. DDP is an abbreviation for Distributed Data Protocol. It is a meteor protocol standard used to connect meteor client app to meteor server app. However, it can be implemented with a non-meteor app to be connected with meteor server or even non-meteor server using WebSocket-Based. In a sense, DDP is like REpresentation State Transform (REST) for WebSocket. App Microservices is an architectural approach which is used to divide the application into modules. These modules can run services separately and communicate among these modules using service discovery or DDP. Meteor Platform uses MongoDB as a database for application sources. More details about MongoDB has been discussed in more details in the following section (Meteor, 2016a; Owens, 2014; Paul, 2015).

3.3.3.6 MongoDB

MongoDB is an alternative database used with cross-platform application development. It is an open source and document-oriented database used and designed to facilitate the development and scaling. MongoDB officially defined as "*an open-source document database that provides high performance, high availability, and automatic scaling*" (MongoDB, 2016). It is used with variety platforms such as Python, C#, C++, Java, and Node.JS. Relatively, MongoDB is integrated with Meteor platform to create persistent database either on the server side or client side.

3.3.3.7 Cordova

Cordova is an open–source framework applied for mobile development through the use of web technologies such as HTML5, JavaScript and CSS3 to develop applications, which can work in cross platforms (Apache, 2016). The application is executed in targeted platform by the wrapper file codes. Additionally, Cordova is applicable if the application is devoted to:

- Implement the application across multiple platforms by coding one time.
- Deploy mobile web application that can be distributed on multiple platforms
- Integrate and develop an interface for web components and mobile device components, which can access device API.

More significantly, Cordova has the ability to integrate with Meteor platform to develop cross-platform applications. Figure 3.8 presents the high level of Cordova architecture.

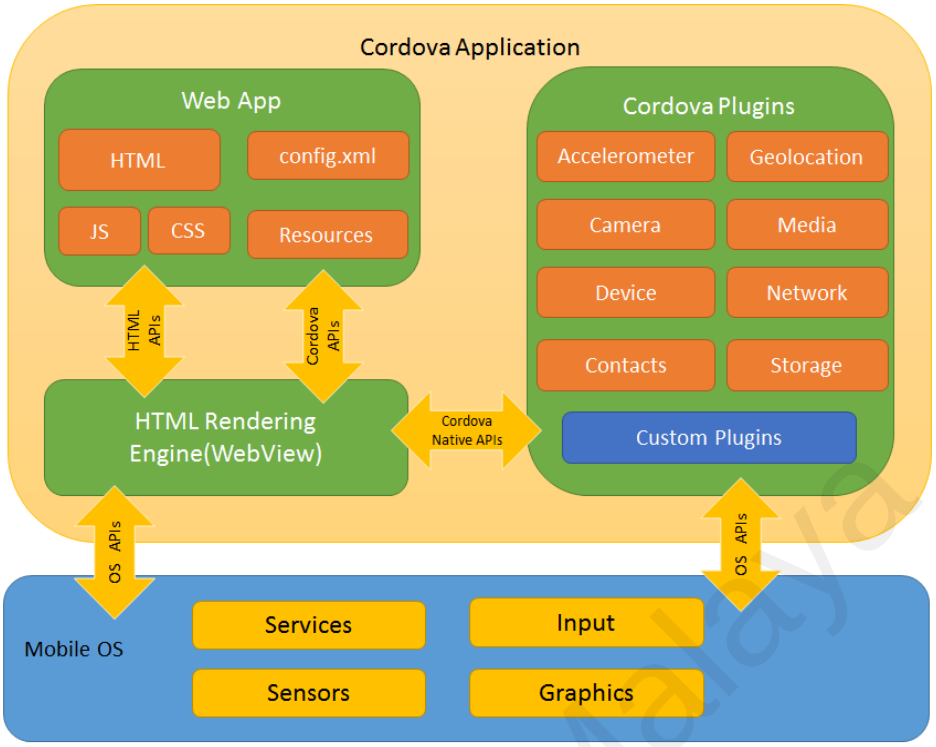

Figure 3.8: High-Level Diagram for Cordova Architecture

(Source: Cordova, (n.d.)))

3.3.3.8 Java Programming Technology

Java technology is defined by Oracle (2016) as "*the foundation for virtually every type of networked application and is the global standard for developing and delivering embedded and mobile applications, games, Web-based content, and enterprise software.*" Java programming language is running on 3 Billion Mobile Devices (Oracle, 2016) worldwide due to the code flexibility, robust security, and independent platform. Furthermore, Java technology is the programming language used for Android operating system and its mobile applications. However, It is used to support company websites such as LinkedIN.com, Netflix.com, and Amazon.com (Bouwkamp, 2016). Purposefully, Java was designed to enable portability development and applications to work in high-performance on independent platforms.

3.3.3.9 Google Cloud Messaging (GCM)

Google Cloud Messaging (GCM) is cloud-based messaging service provided by Google to receive and deliver notifications between server and client app. It supports Android, iOS, and Chrome platforms. GCM is officially defined as "*a free service that enables developers to send messages between servers and client apps. This includes downstream messages from servers to client apps and upstream messages from client apps to servers."* (Google, 2016).

The architecture of GCM includes server app, Google connection server, and client app. To explain, there are two types of stream messaging namely, downstream and upstream. The downstream is existed when the server app triggers Google connection server to send a message to client app using HTTP protocol while the upstream occurs when the client app sends a message to server app through Google connection server using Extensible Messaging Presence Protocol (XMPP). However, client app must be registered in GCM to obtain unique identifier called "registration token." However, the XMPP protocol must be implemented in server side to enable GCM forward messages from client app to server app. Figure 3.9 presents GCM Architecture.

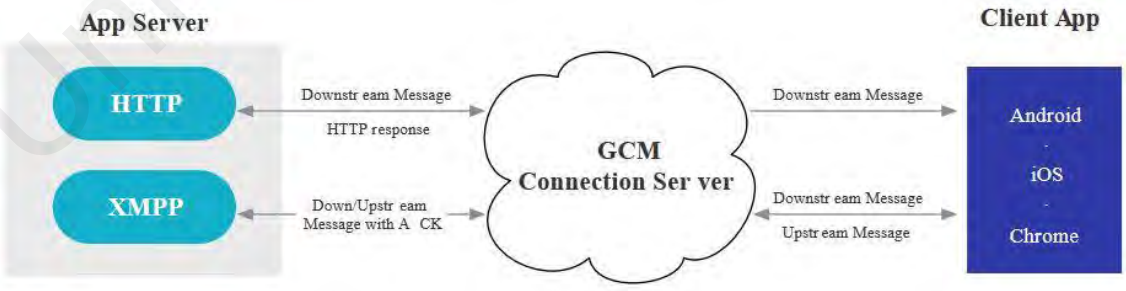

Figure 3.9: GCM Architecture

(Source: Google, (n.d.)))

3.3.3.10 Cloud Hosting "DigitalOcean."

Digital Ocean has been chosen to be a cloud hosting for the server application. Digital Ocean is defined as "*a cloud infrastructure provider focused on simplifying web infrastructure for software developers a cloud infrastructure provider focused on simplifying web infrastructure for software developers.*" Digital Ocean has some advantages. These advantages are Solid State Disk (SSD – only – cloud) and Simple Control Panel.

3.4 Summary

In this chapter, the general research approach has been introduced to provide the methodology type used for this research study. Specifically, more details and outline plan of the research approach have been reported in the research design section. After that, data collection has been briefed and explained to show the data collection techniques used in this research. In addition, evaluation design has presented how the proposed approach was evaluated using professional journalists through the beneficial academic discussions with participants as mentioned in the sampling section. Next, data analysis has been briefly discussed. Moreover, The proposed approach for mobile News Reporting Application, known as i-MNReport App has been discussed in details by providing the approach scenario with explained figures. Besides, hardware and software resources section has been presented with more focus on the hardware and software components. As a related topic, the development and implementation justification section has discussed the reasons for adopting the particular framework and platform. To make more obvious, the native vs-a-vis hybrid approach section has provided details about each approach. Lastly, the programming language, platform, and framework used in this research have been briefly introduced in this Chapter.

CHAPTER 4:APPROACH DESIGN AND IMPLEMENTATION

4.1 Introduction

This chapter has been devoted for the proposed approach designed for Mobile News Reporting Application (i-MNReport) including its implementation. The chapter begins with explaining the approach design regarding the scenario and architecture. The logical design has been described using the Unified Modelling Language (UML). This Chapter concludes with a reflection on the implementation & testing and its relation with demonstration of the Graphical User Interface (GUI) for both web and mobile application.

4.2 Approach Design

The proposed approach has been designed to enhance Mobile News Reporting Application (i-MNReport). It considers the requirements and divides the design into new scenario and architecture. The scenario architecture has been discussed in more details earlier in Chapter three. The following sections summarize the approach scenario and architecture.

4.2.1 Approach Scenario

The i-MNReport application has been divided into two main news reports. The first report based on a mobile news assignment while the second report based on breaking news. To explain, based–Mobile news assignment depends on newsroom assignment and guidance while based–breaking news report depends on mobile news reporter. However, the both types of news report have an instant interactive communication between newsroom editor and mobile news reporter to achieve and complete the news

report requirements. In addition, notifications are delivered to both users, newsroom editor and mobile reporter.

4.2.2 Approach Architecture

The architecture design for the proposed approach considers the mobile cloud computing (MCC) and interactive approach to implement the scenario design. It includes the high-level description of the application implementation. To visualize the approach, the whole design of approach architecture is depicted in figure 4.7. The approach architecture is of four main components namely: server side, client side, notification side and cloud hosting side.

- **Server Side**: This component is responsible for receiving clients' request and processing instructions using Node.js environment platform, which uses event-driven and non-blocking I/O model due to its ability to handle money connections simultaneously.
- **Client Side**: This component is responsible for sending requests and receiving a response to and from the server side. Client side uses Meteor.js environment platform to facilitate the communication with server-side either by using PCs or mobile devices.
- **Notification Side**: It is a third-party side for receiving and delivering notifications between server side and client side using Google Cloud Messaging (GMC) server. GCM server is cloud–based messaging service.
- **Cloud Hosting Side**: This side hosts the server components including server web application and Mongo DB.

4.2.3 Approach Design

This section is devoted to present the logical design of the i-MNReport application and its behavior by using Unified Modelling Language (UML). UML is the modeling language used to illustrate the proposed approach design. It is used to visualize the application functions, relationship, and communication direction. In this research, use case and activity diagrams have been used in the approach design. More details of use case and activity diagrams have been presented in the following subsections.

4.2.3.1 Use Case Diagram

The Use Case Diagram is used to illustrate the proposed approach main functions using its components namely actors, use case, and the relationship between them. Use case consists of series of scenario that describes the interaction between user and application. The i-MNReport application has three use cases and each use case has its functions. The three use cases are:

- News Admin / News Supervisor
- News Editor
- Mobile Reporter

Figures 4.1, 4.2, 4.3 depicts the use case diagram to present the functions of each use case.

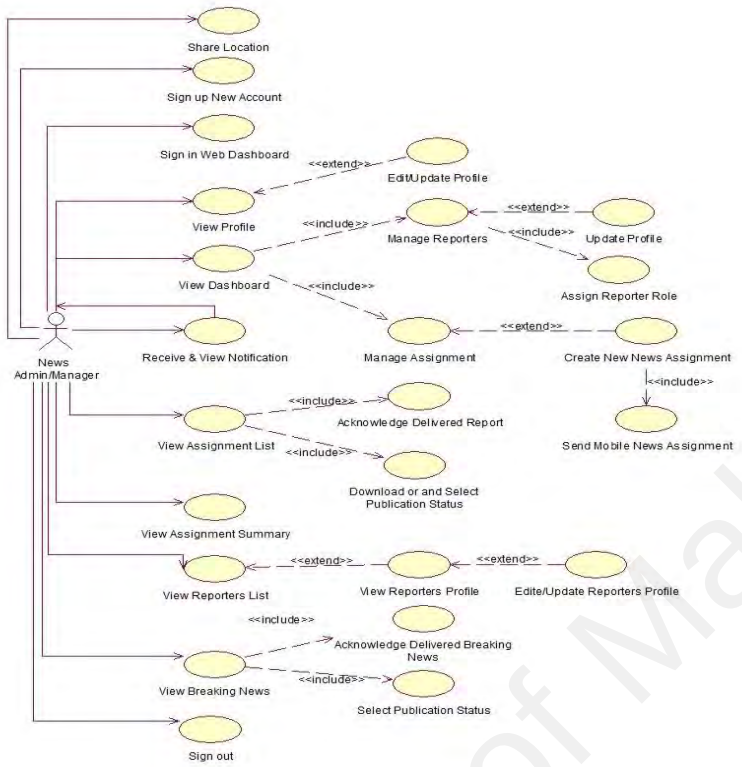

Figure 4.1: Use Case Diagram for News Admin

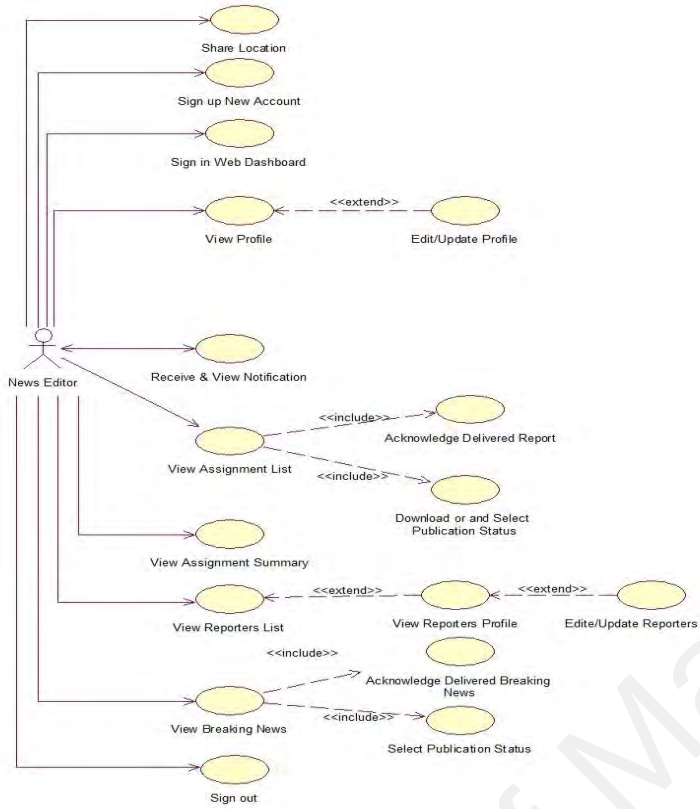

Figure 4.2: Use Case Diagram for News Editor

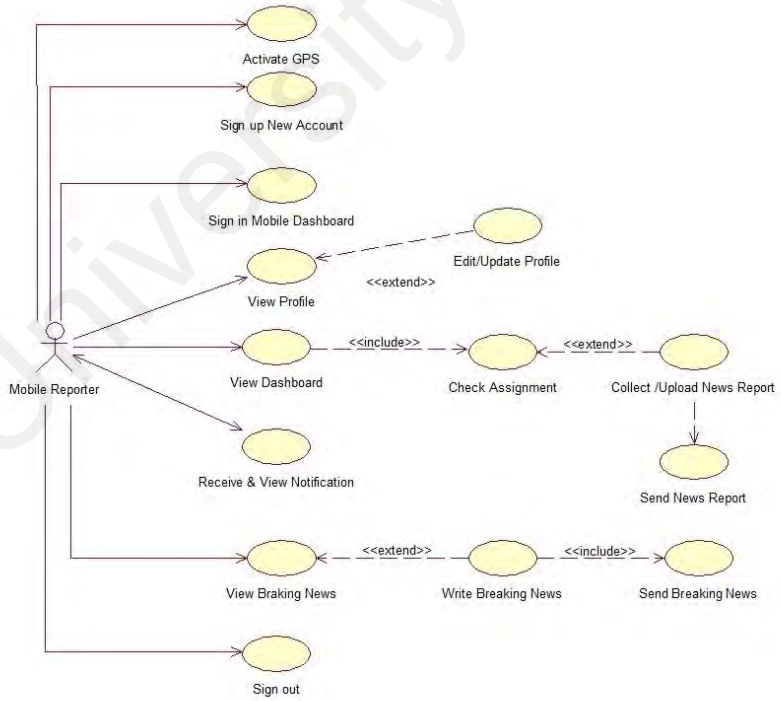

Figure 4.3: Use Case Diagram for Mobile Reporter

4.2.3.2 Activity Diagram

Activity diagram presents the procedures and workflow of the proposed approach application. The i-MNReport application has three activity diagrams. Figure 4.4 presents the Mobile Reporter Activity diagram. On the contrary, Figure 4.5 presents News Editor Activity diagram while Figure 4.6 presents News Admin Activity diagram. Lastly, Figure 4.7 shows the overall i-MNReport application activities.

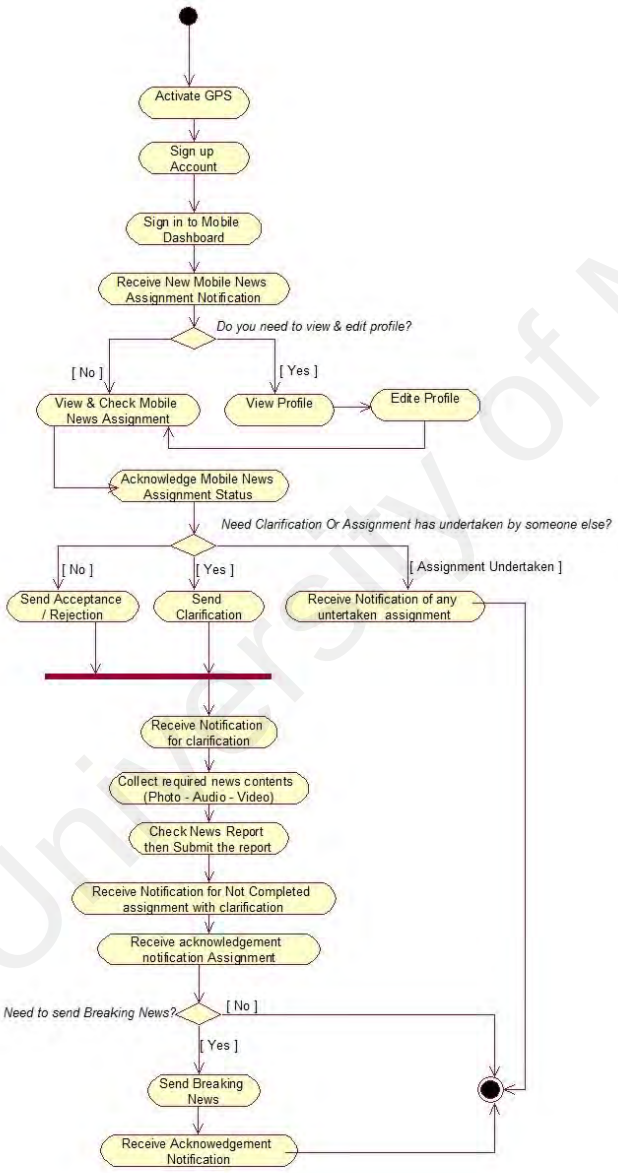

Figure 4.4: Activity Diagram for Mobile Reporter

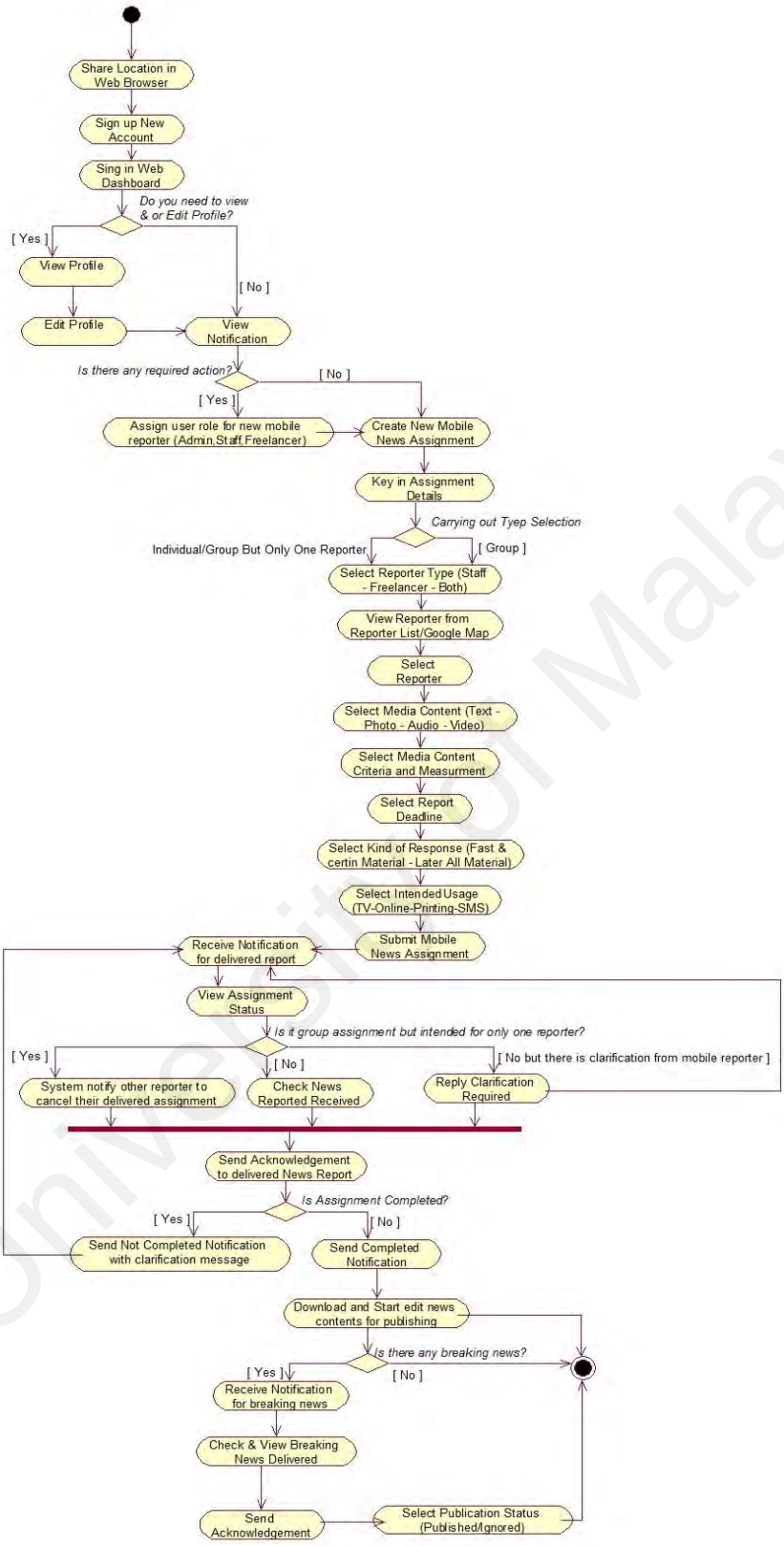

Figure 4.5: Activity Diagram for News Admin

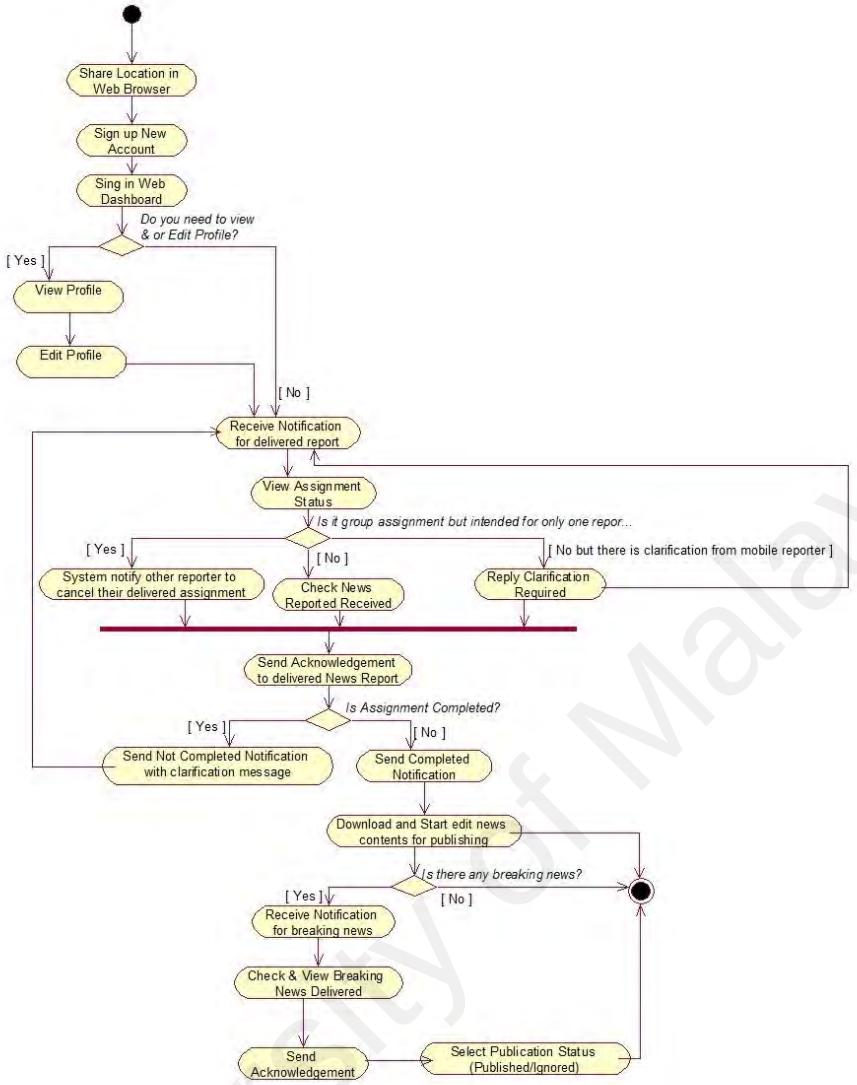

Figure 4.6: Activity Diagram for News Editor

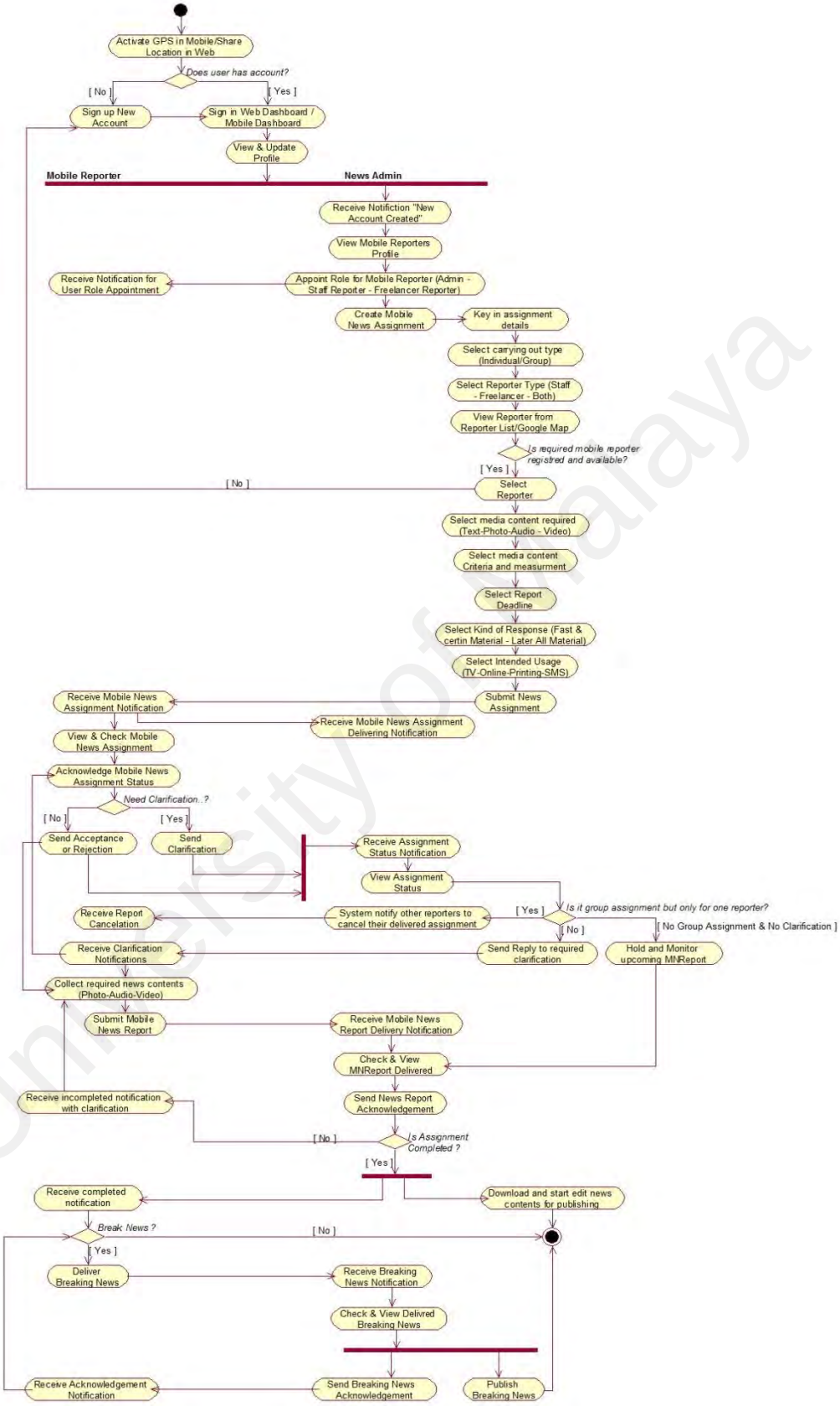

Figure 4.7: Activity Diagram for Overall Procedures

4.3 Approach Implementation

The approach implementation is divided into three stages. 1) Architecture implementation; 2) Users creation, assigning roles and data collection; and 3) Graphical User Interface demonstration. GUI demonstration is presented to show application functions and procedures in graphical interface among three users (i.e., News Admin, Mobile Reporter, and News Editor). The following sections demonstrate the three implementation stages.

4.3.1 Architecture Implementation

The domain name (www.i-mnreport.com) has been reserved to implement i-MNreport application by using cloud hosting via Digital Ocean. The cloud hosting is used to install the server side application. As for notification, the server side is connected to Google Cloud Messaging (GCM) server as a third-party cloud service for getting and pushing notifications between the server and the client sides. Consequently, client side works in web and mobile applications. The web application can be accessed via Internet browser while mobile application needs to be installed on a mobile device using Android platform.

4.3.2 Users Creation, Role Assigning, and Data Collections

To make the application implemented and to test its functions, users' creation, role assigning, and data collections need to be conducted. However, a root user can access the server and client application. Hence, the root user creates three initial users where each user represents Mobile Reporter, News Admin, News Editor respectively. By creating users, the assigning role is set to differentiate between the users' various functions. As for data collections, the required data type is multimedia data (i.e., Audio,

Video, & Photo). However, multimedia data can be generated by using mobile devices during news report creation. The collected multimedia data is used for web application.

4.3.3 Graphical User Interface Demonstration

This section demonstrates the graphical user interface for testing the i-MNReport application functions. Sequentially, the demonstration presents the web and mobile application for News Admin, News Editor, and Mobile Reporter. Besides, it presents the functions based on logical order. The i-MNReport application is divided into three stages:

1- Creating Users and Mobile News Assignment
2- Mobile News Assignment Discussion and Mobile News Report Submission
3- Creating Breaking News and Submission

The following sections present the Graphical User Interface (GUI) for each stage with a brief explanation.

4.3.3.1 Creating Users and Mobile News Assignment

To create a new account, the new user needs to sign up either via the web or mobile application exactly as shown in figure 4.8 and 4.9.

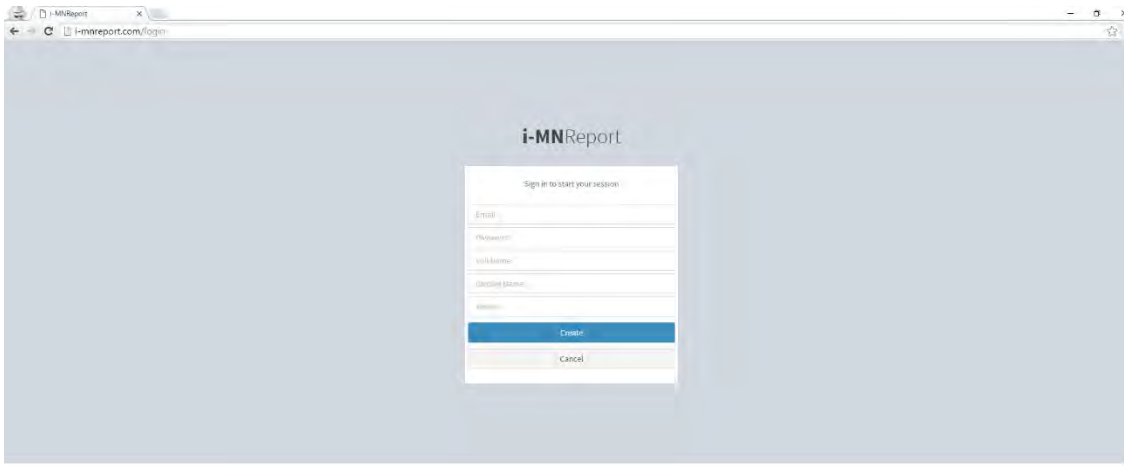

Figure 4.8: Sign up - Web Application

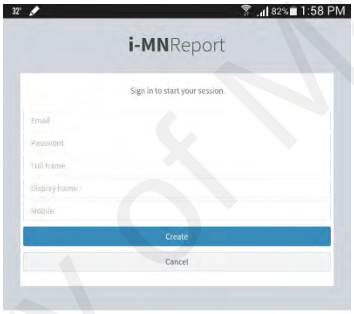

Figure 4.9: Sign up - Mobile Application

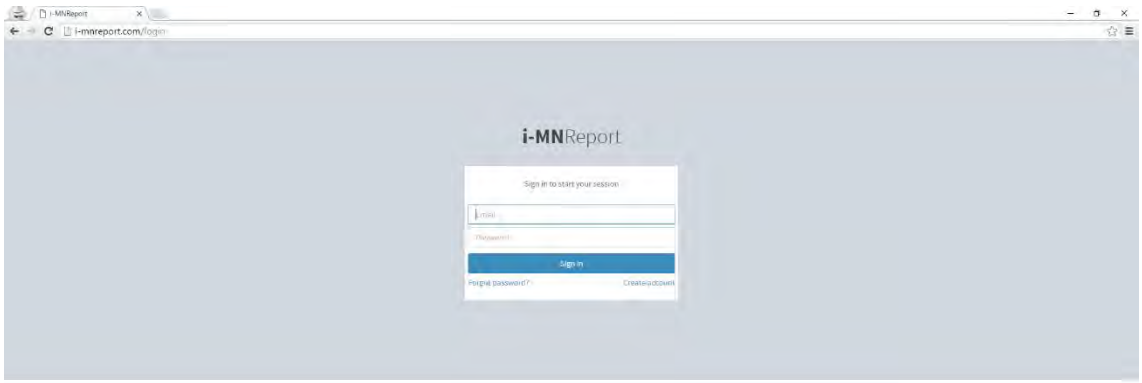

Figure 4.10: Sign in - Web Application

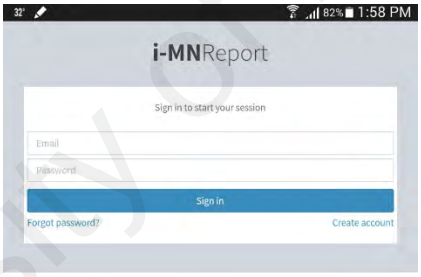

Figure 4.11: Sign in - Mobile Application

After the new user signs up a new account, the application notifies News Admin about the new user via notification tag displayed in the main dashboard when s/he sign in as shown in figure 4.12.

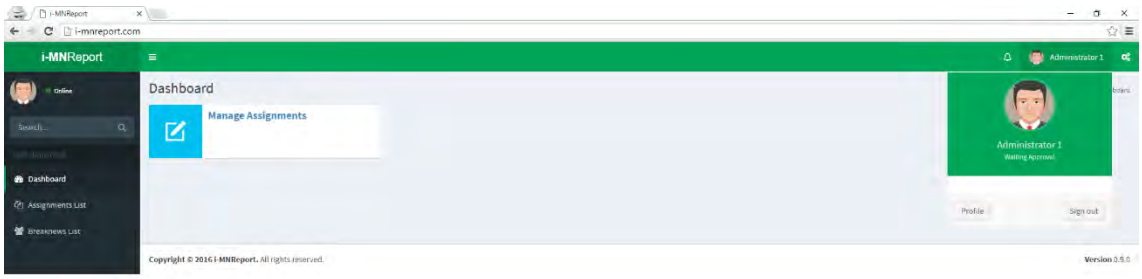

Figure 4.12: Web Admin Waiting for Approval

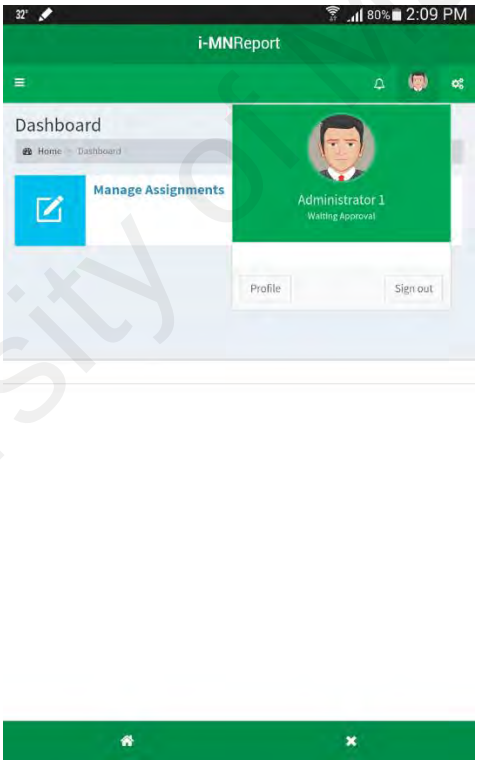

Figure 4.13: Mobile Admin Waiting for Approval

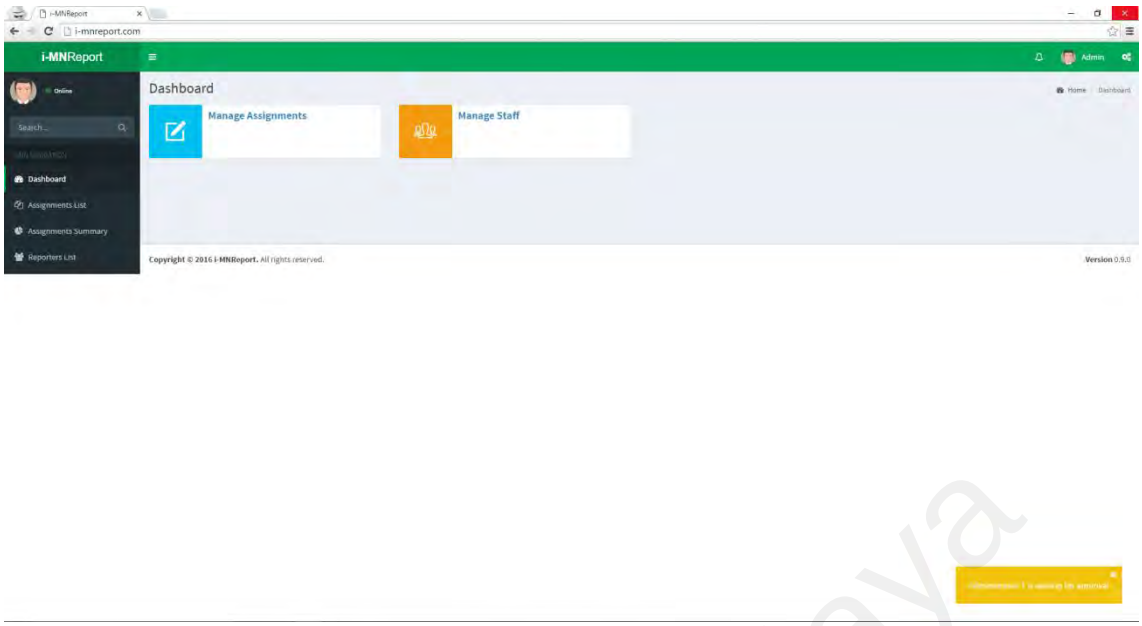

Figure 4.14: Web Super Admin Receive Notification

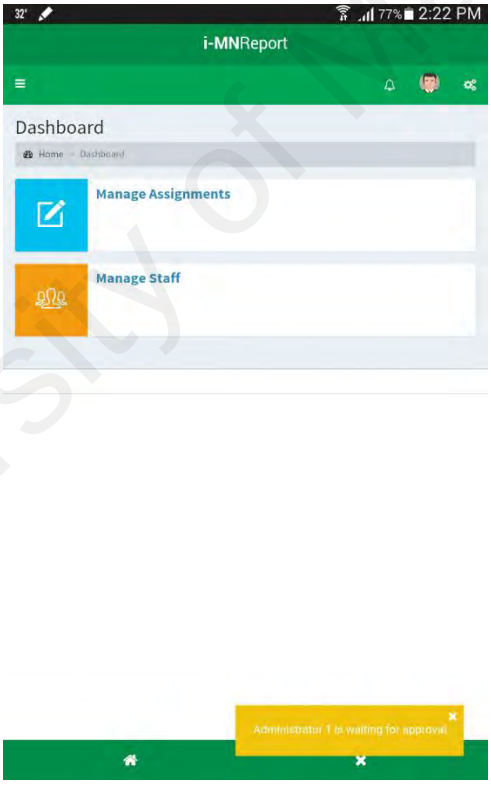

Figure 4.15: Mobile Super Admin Receive Notification

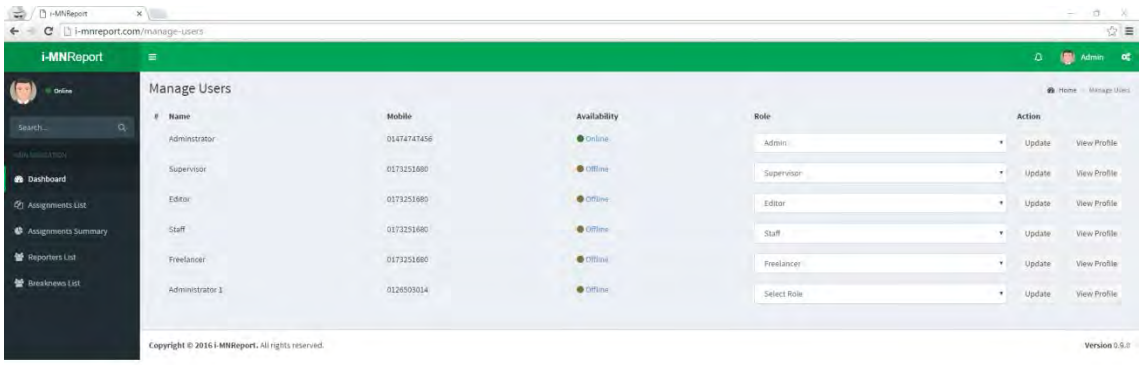

Figure 4.16: Web Assign Role

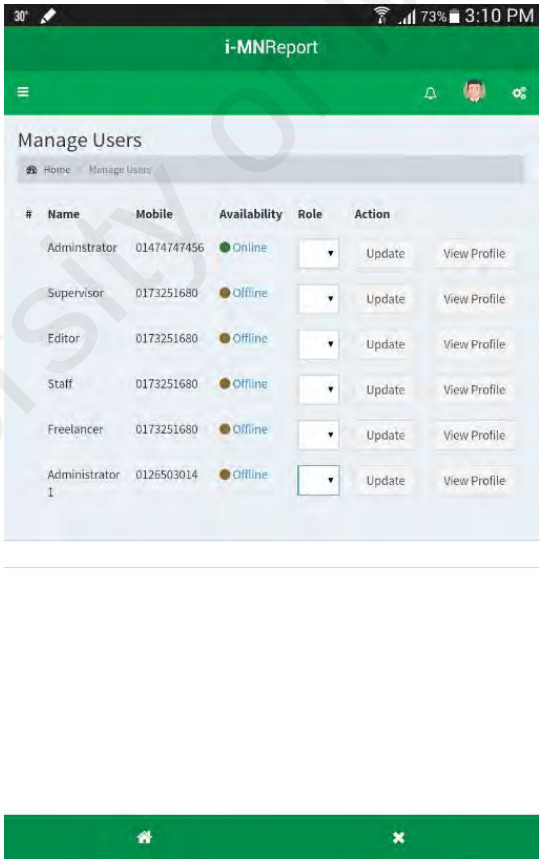

Figure 4.17: Mobile Assign Role

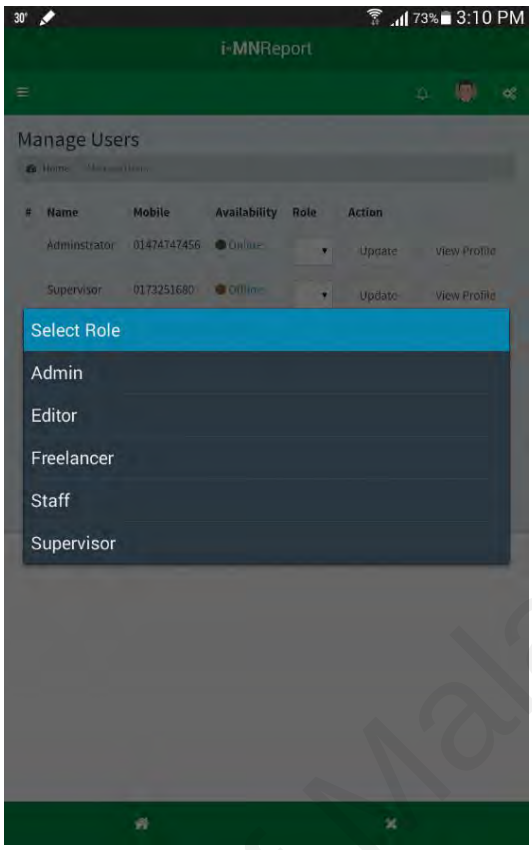

Figure 4.18: Mobile Select Role

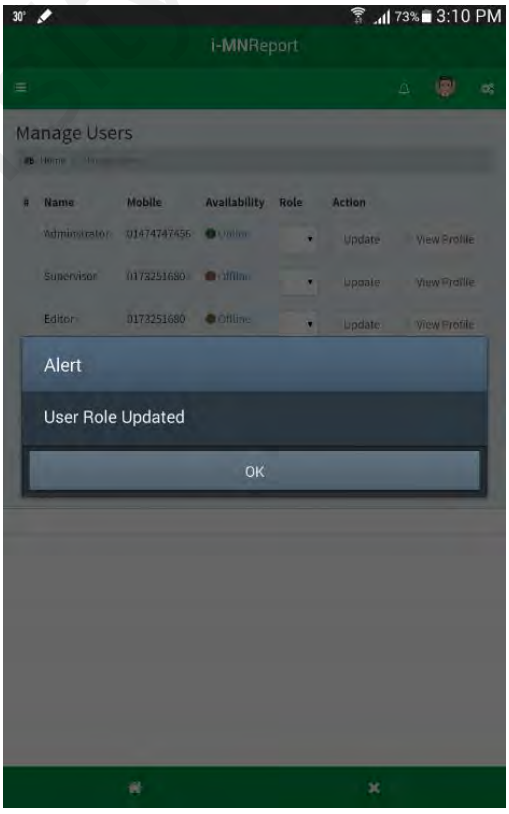

Figure 4.19: Mobile Update Assigned Role

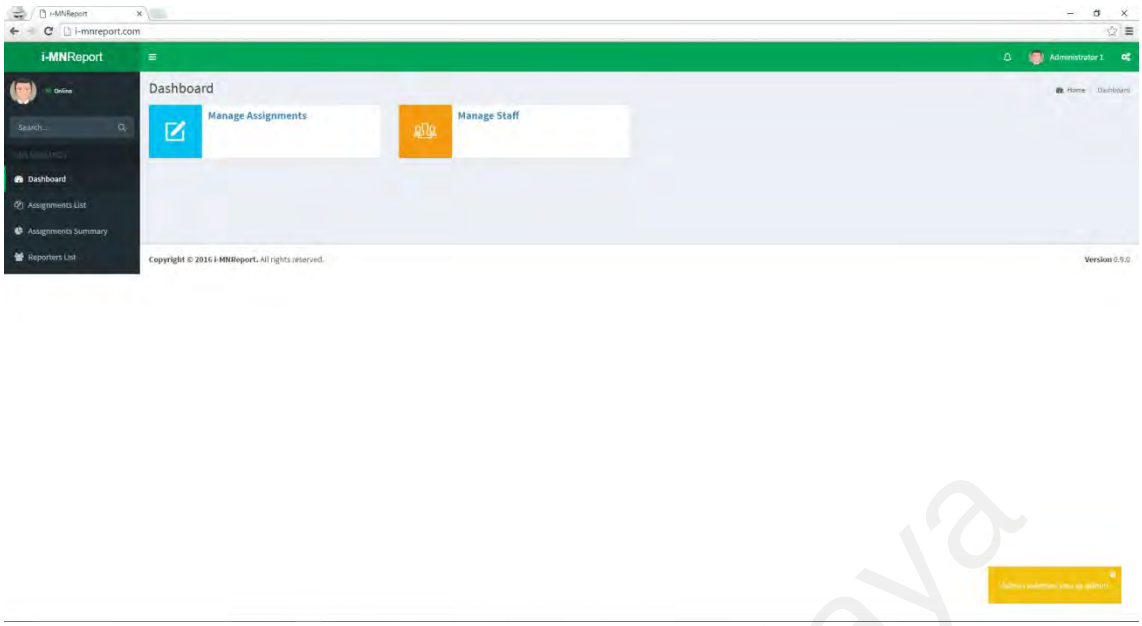

Figure 4.20: Web Admin 1 Receives Notification with All Features

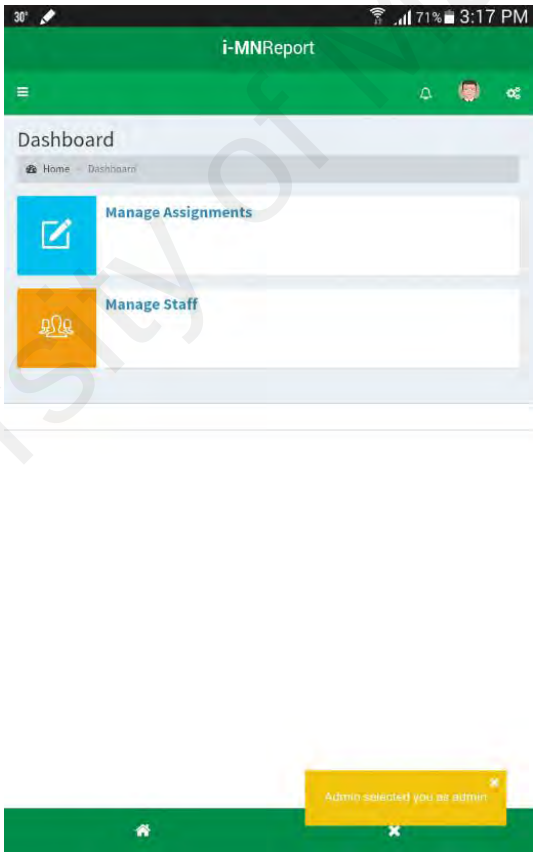

Figure 4.21: Mobile Admin 1 Receives Role Notification with All Features

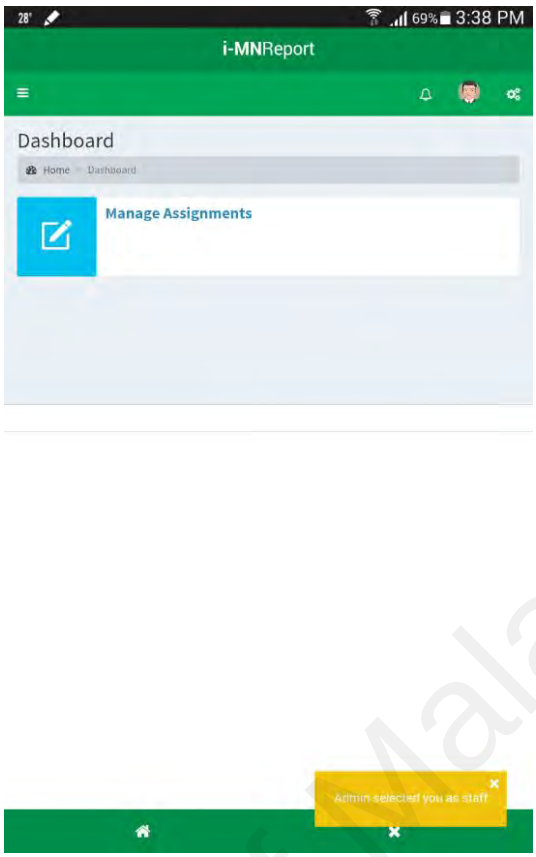

Figure 4.22: Mobile Staff Receive Role Notification with Some Features

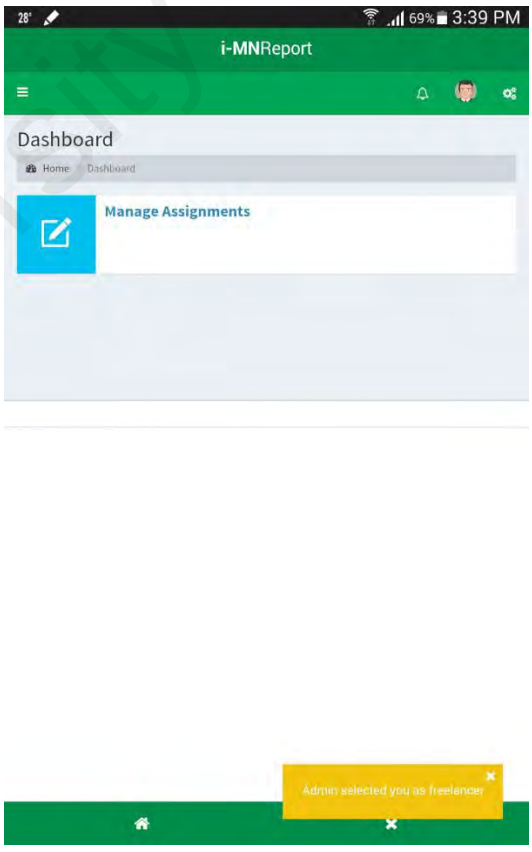

Figure 4.23: Mobile Freelancer Receives Role Notification with Some Features

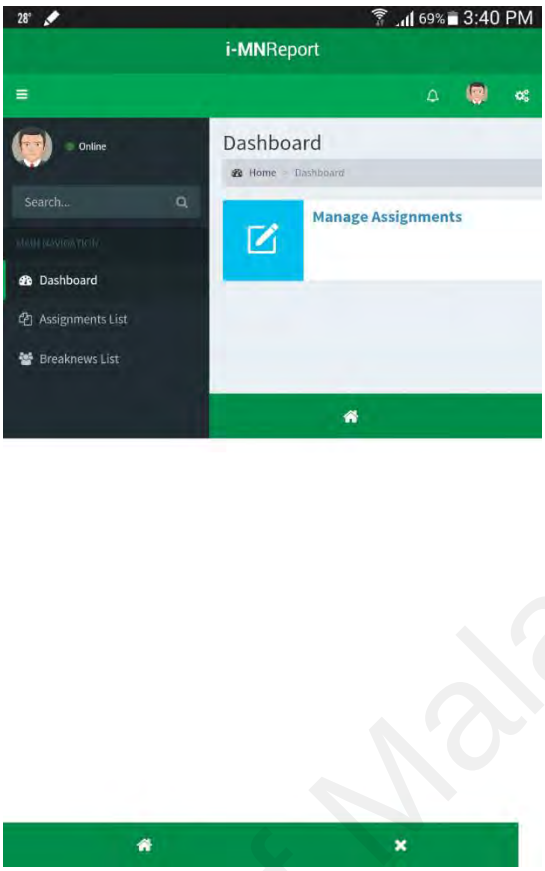

Figure 4.24: Mobile Staff and Freelancer Features

Figure 4.25: Mobile Staff Assignment Notification

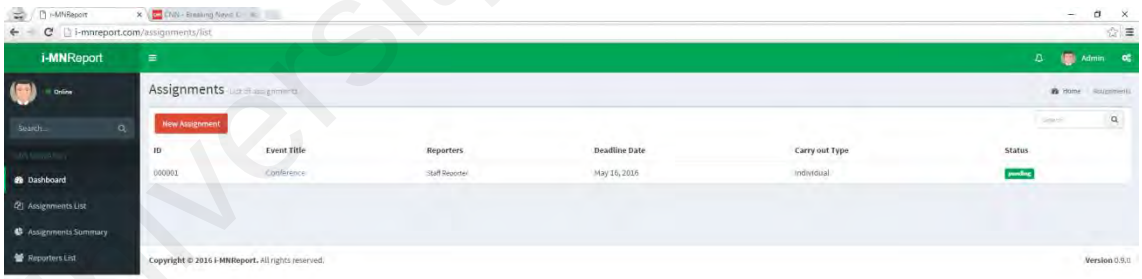

Figure 4.26: Web List of Assignment

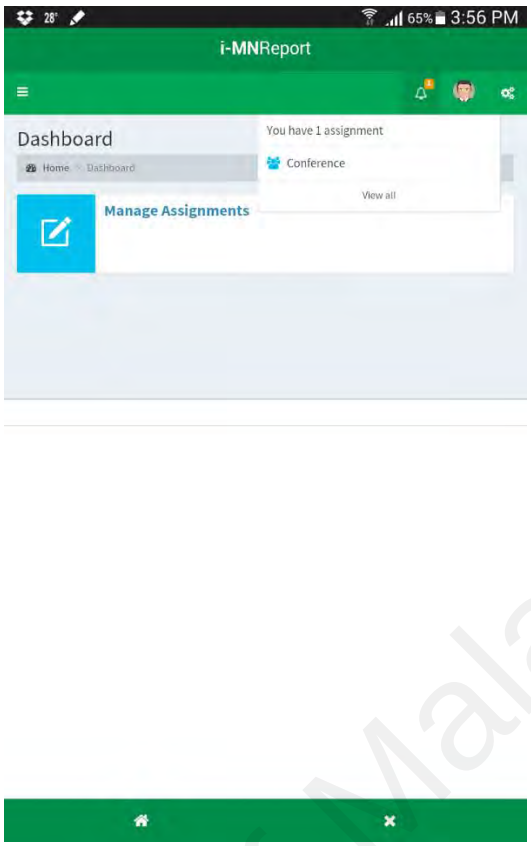

Figure 4.27: Mobile Staff Notification Icon

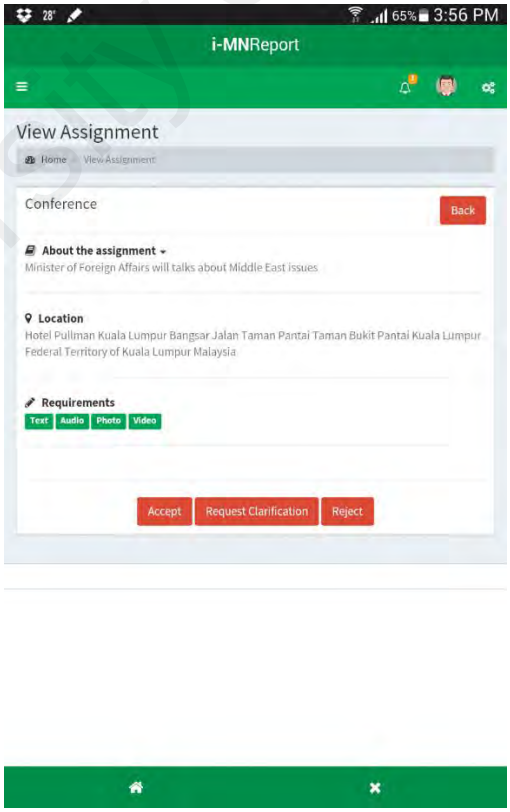

Figure 4.28: Mobile View Assignment

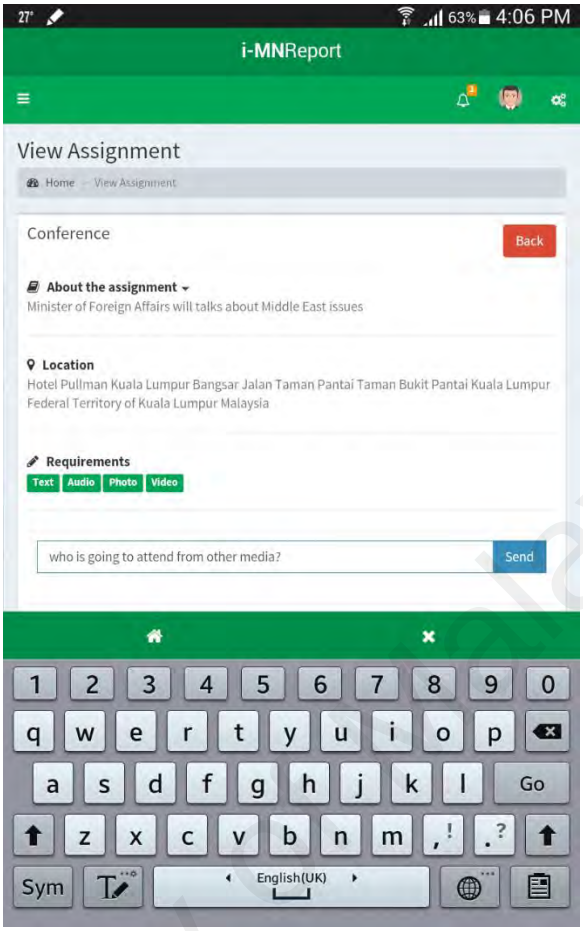

Figure 4.29: Mobile View Assignment

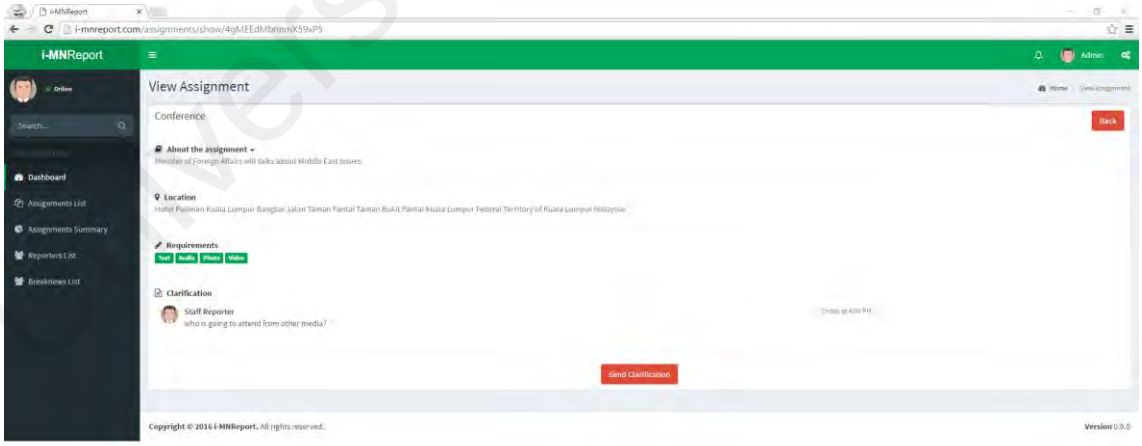

Figure 4.30: Web Editor Receive Clarification

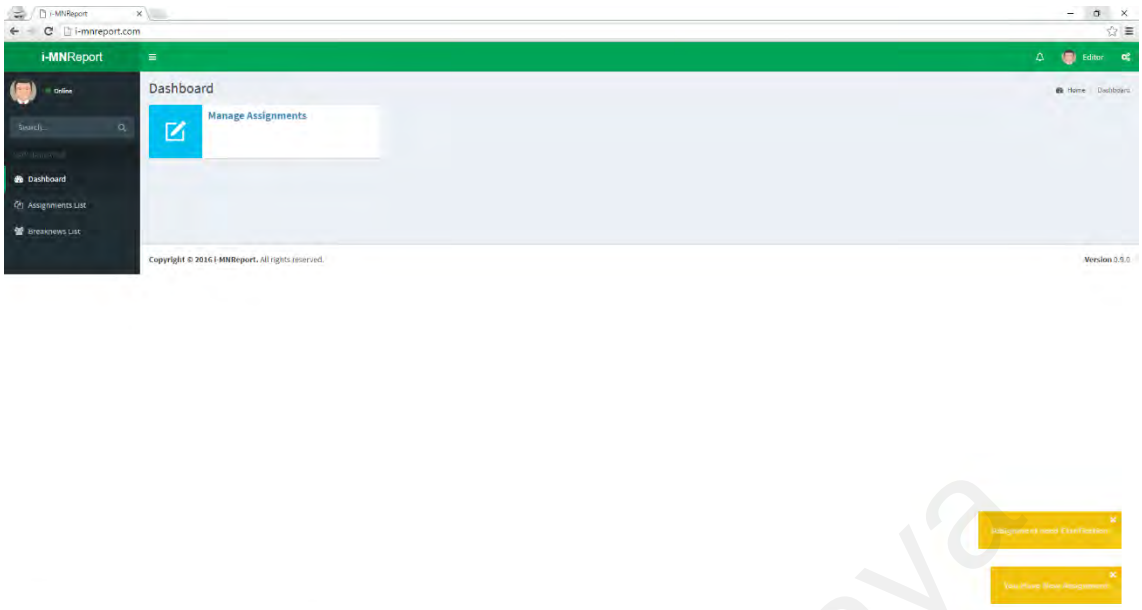

Figure 4.31: Web Editor Receive Assignment and its Clarification

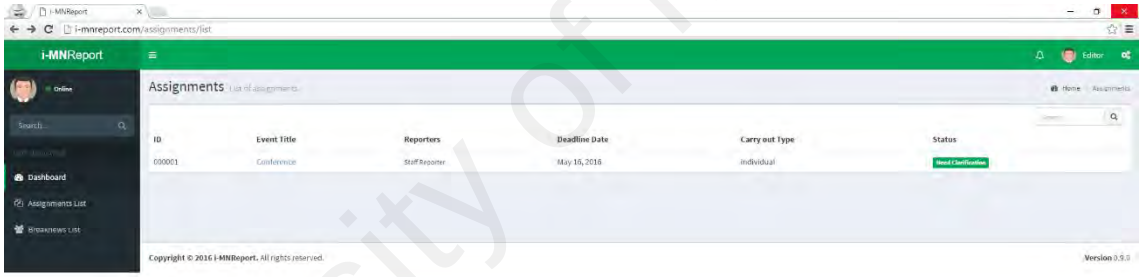

Figure 4.32: Web Editor Checklist of Assignment with Status

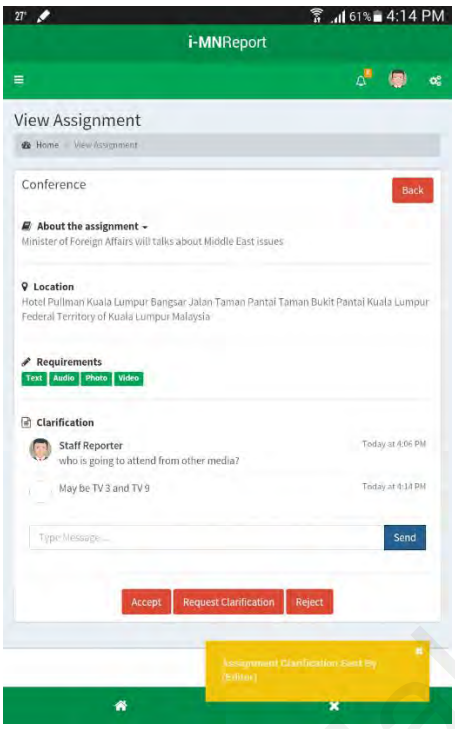

Figure 4.33: Mobile Receives Clarification from Editor

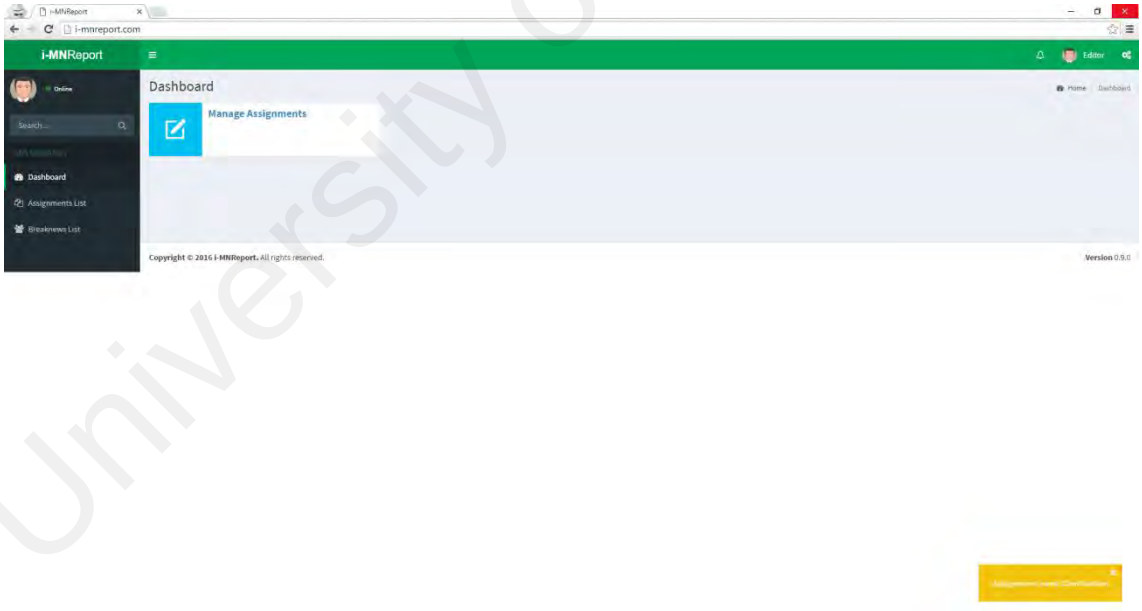

Figure 4.34: Web Editor Receives Rejection Notification from Mobile

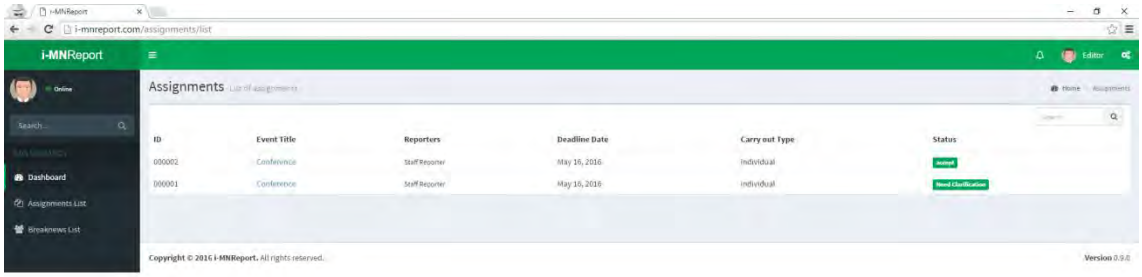

Figure 4.35: Web Editor Receives Accepted Assignment

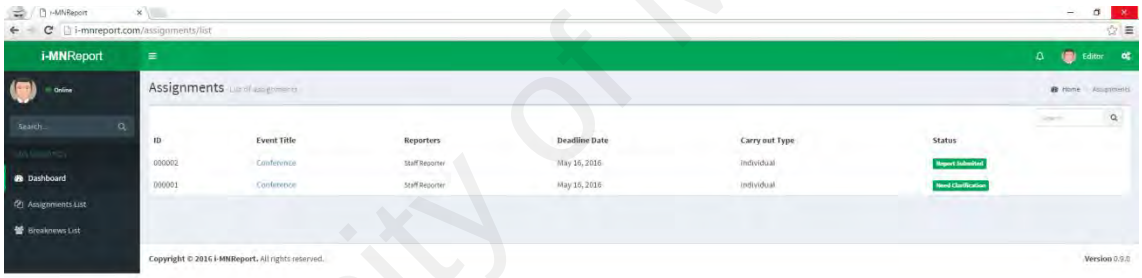

Figure 4.36: Web Editor Receives Report Submitted

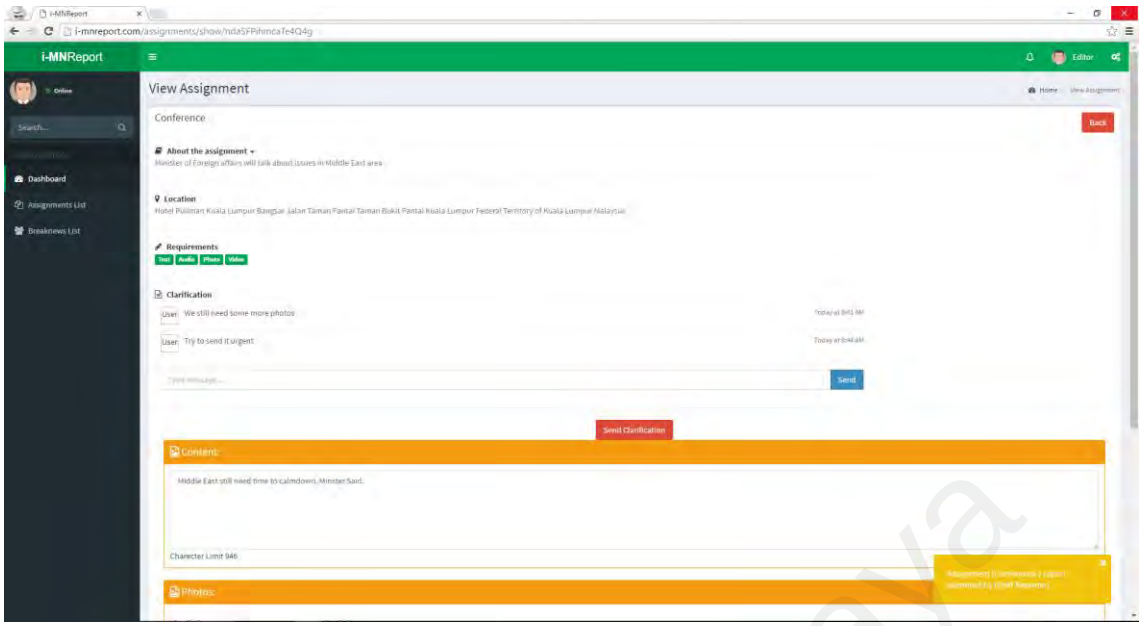

Figure 4.37: Web Editor Receives Report Submitted with Notification

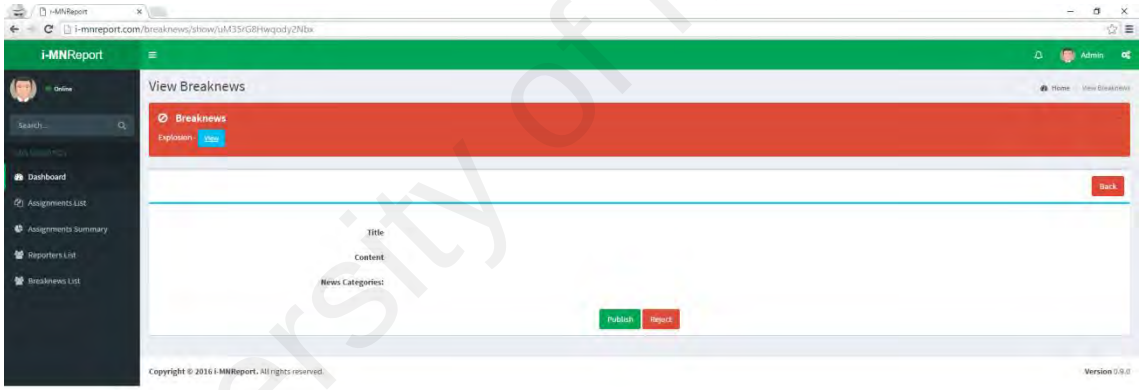

Figure 4.38: Web Editor Receives Breaking News

4.3.4 i-MNReport WEB AND MOBILE APPLICATION – USER GUIDE

This section consists of the user manual for the i-MNReport application to guide the user how to use and work with application either via mobile or web. The user guide contains three main parts. The first part displays the user's category along with the assigned authority for each user category, and instructions on how to sign up for a new account. The second part shows the steps for the news report from creating mobile news assignment until delivering and completing the news report. Finally, the third part guides the user how to send breaking news to newsroom without news assignment control from the newsroom. The user guide content is presented in Appendix E.

4.4 i-MNReport Application Features

Any new development comes out to improve the issues of the previous work should include new features. As a result, the features that included in the i-MNReport development are as follow:

1- Web and Mobile Application.
2- Control Mobile News Assignment creation by newsroom admin.
3- Check the availability of MJR on Google Map.
4- Support the communication between MJR and NJE by notification alert.
5- Chatting service between MJR and NJE within particular mobile news assignment.
6- Designed to serve staff and freelancer MJR.
7- Optional service to send breaking news from MJR, either the user is staff or freelancer.

4.5 i-MNReport Application Testing

The testing phase demonstrates that the system or application has met the required functionalities and has free errors to be used feasibly. System testing has various types of testing approaches, and each approach has own characteristics. The dominant system testing approaches are a white box and black box testing, unit testing, use case – based testing, system integration testing, and user acceptance testing. The brief explanation of each approach is presenting as following:

4.5.1 White Box and Black Box Testing (WBBBT)

This approach of testing conducted based on the previously knowledge of system implementation. In general, It takes care of the codes, data flow, control flow and information flow.

4.5.2 Unit Testing (UT)

It used to examine the small piece of the testable system in the application and to isolate it from the remaining pieces of code. Furthermore, it used to check the behavior of that particular piece of function. If there is any unexpected behavior, the needed troubleshoot to fix that particular piece of the function takes action (Rouse, 2017).

4.5.3 Use Case – Based Testing (UCBT)

This approach relies on the use case diagram for system analysis. It is utilized in the system testing to verify that the application or system components correctly implemented its associated use cases lists.

4.5.4 System Integration Testing (SIT)

This approach of testing is used to verifies that all the different system modules and component are correctly functioning and data integrity is maintained for the entire system solution (Johnson, 2007; Nasawaeng, 2016).

4.5.5 User Acceptance Testing (UAT)

UAT consider as the last process of system or application testing. Actually, It is used to make sure that the developed system or application performs the functions as required, friendly user, can deal with the real-time request, and meet user requirements.

4.5.6 Selecting Appropriate Testing Approach

The testing approaches adopted in our research divided into two phases. The first phase was during the application development and implementation. We used UT, UCBT, and SIT testing approaches due to their characteristics to verify proposed approach functionalities and associated components especially it has different modules and third-party component, which is GCM. Firstly, unit test (UT) used to check that each piece of buttons and related actions works correctly as it meets the application requirements. Secondly, use cases requirements has been tested using UCBT testing approach to verify that it meets the system design. Thirdly and finally in this first phase, the system integration test used to verify that all application components (Mobile, Web and Cloud Messaging) are working properly without tolerance fault. The second phase was the UAT. In this phase, UAT used to achieve the fourth research objective for application evaluation. Consequently, we could have managed to fix and troubleshoot the errors and recompile the application to perform its tasks properly.

4.6 Summary

In this Chapter, the approach design has been discussed within three main sections. These sections reflected the approach scenario, architecture, design. Approach design discussed and demonstrated the use case and activity diagrams. Relatively, approach implementation demonstrates the i-MNReport architecture implementation, system usage, and application graphical user interface. More details of the graphical user design have been demonstrated in this Chapter. Moreover, the application user guide has been presented to explain how to use the web and mobile applications. Furthermore, the main features of the i-MNReport application have also been discussed. Last but not least, testing approaches presented and briefly explained with the selected approaches discussion.

CHAPTER 5: PROPOSED APPROACH EVALUATION

5.1 Introduction

In the previous chapters, the proposed mobile news reporting application (i-MNReport) has been discussed in terms of system plan, analysis, design, implementation and testing. However, to complete any software development life cycle, the user testing and evaluation should be conducted to assure the requirements and quality. Therefore, the questionnaire has been prepared to get feedback and evaluation from working field especially from professional journalists and reporters. Moreover, one of the research objectives of this study aims to evaluate the proposed hybrid mobile application by professional journalists. The following sections present and discuss the results analysis. It also reflects the discussion obtained from questionnaire feedback.

5.2 Proposed Approach Evaluation

The evaluation phase comes in its position to verify that the designed and developed application has met the requirements collected after reviewing the previous works and study researches, which has extensively been discussed in the literature review Chapter. It was apparent beforehand that there was a need to improve the mobile news reporting method by proposing such approach, which could provide the news material as soon as possible to newsroom directly in an interactive approach. According to Bahri (2014a); Chan-Olmsted et al. (2013); Spangenberg and Heise (2014); Väätäjä and Egglestone (2012); Westlund (2012, 2014) such developed approach for mobile news reporting application could hasten to get news material faster and contribute to involving citizen journalist as a news reporter along with staff journalist reporter. However, it was reported that there is a need to develop an application, which could serve both parties to accomplish their tasks. In this research, the concepts of software development life cycle

(SDLC) has been used to propose an approach for improving mobile news reporting application (i-MNReport) using the hybrid technique for mobile and web development. As for feedback and evaluation, the questionnaire approach has been used.

5.3 Questionnaire Brief Description

The questionnaire is divided into two main sections. The first section has been devoted for the demographic data of respondents to provide background information about them, while the second section was for i-MNReport assessment to obtain the respondents' opinion on the prototype of i-MNReport application. To get valuable feedback, the second section has been divided into four subsections. The first subsection was about mobile news assignment form, which included seven questions. Then, the second subsection dealt with notifications and instant communication features on the application, which ecompassed five questions. After that, the third subsection was about the authorization of user category including four questions. Finally, the fourth subsection was to get the feasibility of using i-MNReport application cosisting of six questions. The following section demonstrates the figure and interpretation of questionnaire response collected from journalists who are working in Yemen News Agency (SABA), Malaysian National News Agency, and freelance journalist reporters. The questionnaire was distributed online using Google Forms to facilitate obtaining the response from the targeted users.

5.3.1 Questionnaire Feedback Analysis and Discussion

The analysis and discussion followed the divisions of a questionnaire to interpret the obtained feedback collected from the respondents. The following sections present the figures and illustrations of the questionnaire analysis, and they are reported by

descriptive analysis starting from general information and then moves to i-MNReport assessment sections.

5.3.1.1 General Information (Respondants Biodata)

There were four respondents from Yemen News Agency (SABA), five from Malaysian National News Agency and one from freelance journalist reporters. As can be seen in Table 5.1 and table 5.2, the respondents are varied in terms of gender, age, Education, designation and working place.

Table 5.1: General Information Section

Gender		Age			Education			
Male	Female	<25	25-35	>35	Diploma	Bachelor	Master	PhD
11	1	0	9	3	3	6	2	0

Table 5.2: Continue - General Information Section

Designation				Working Place		
Editor	Reporter	Ph.journalist	F.J.R & Others	SABA	BERNAMA	Other
4	2	3	3	4	5	1

In response to the usage of the mobile phone as a tool to collect news materials (Photos, Videos, Audios). As can be seen in Figure 5.1, almost all the respondents revealed that they use mobile devices to collect photos, videos, and/or audios to compose news report.

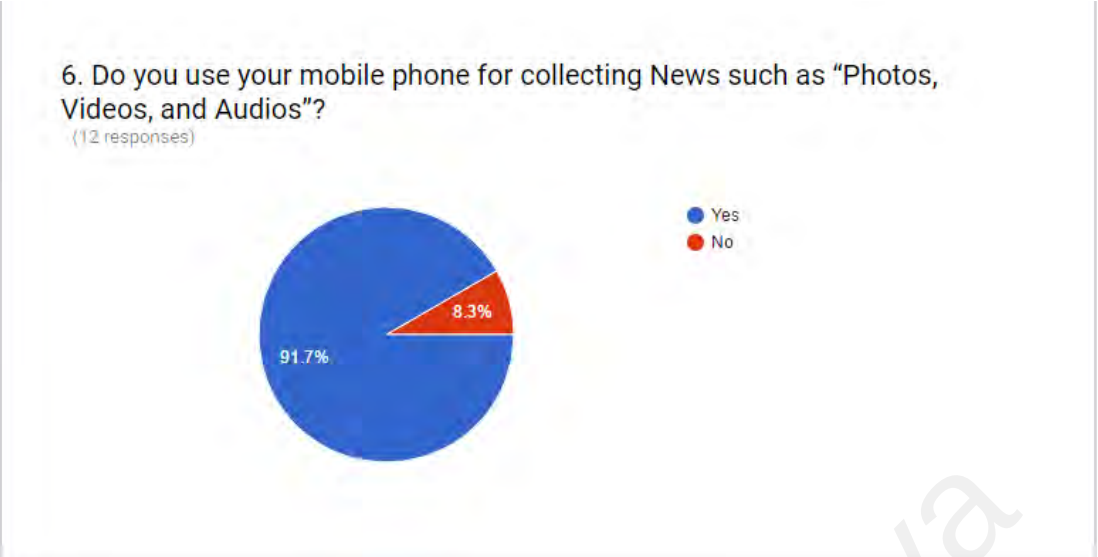

Figure 5.1: Mobile Phone Usage for Collecting News Materials

Regarding the the question specified for the preferable platform for the respondents to deliver news report either by mobile, web or both, almost more than a half of the respondents preferred using both Mobile and Web platforms for news reporting. However, the mobile platform obtained a great deal reflecting that it is a preferable platform for delivering news report as can be seen in Figure 5.2. This indicates that there is a higher demand from journalists to use mobile applications for making mobile news report where this result contributes to developing such mobile news reporting application.

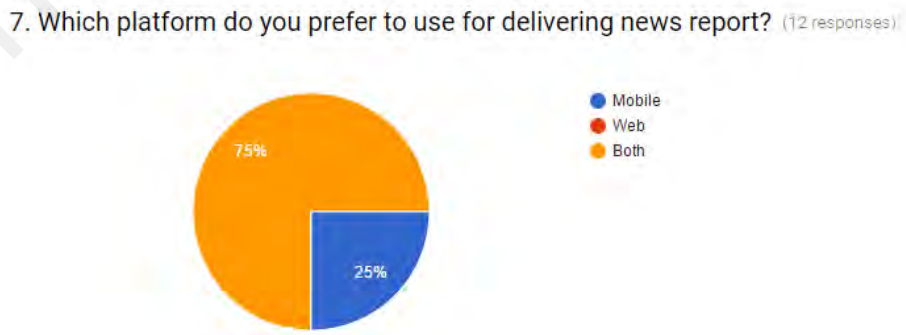

Figure 5.2: Preferable Report Delivery Platform

5.3.1.2 i-MNReport Assessment

First Section: Mobile News Assignment Creation Form:

The mobile news assignment form was developed to provide mobile reporters with the most important information needed to carry out the responsibility of the required news report. However, the required information included in the questionnaire based on the results of previous research studies. The following figures present the level of acceptance towards the developed form according to Likert scale of agrement.

Q1.1 In response to the satisfaction of mobile news assignment form, the respondents apparently showed a high acceptance (91%) for obtaining the required information about news report tasks, see Fig 5.3.

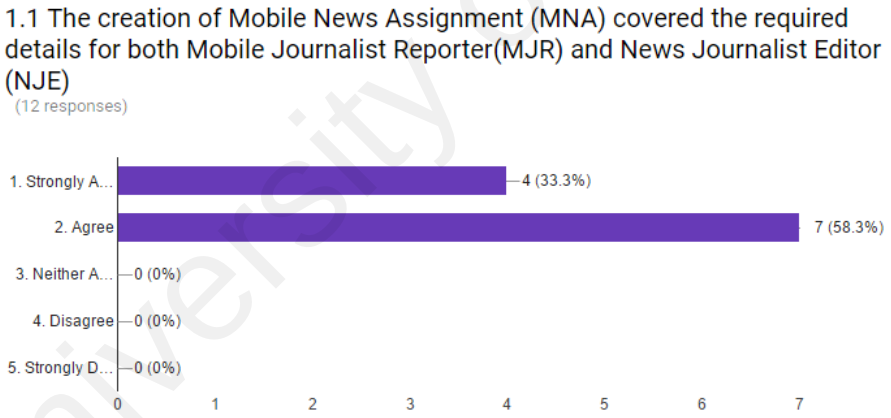

Figure 5.3: Mobile News Assignment Form Evaluation

Q1.2 As could be seen in Figure 5.4, the great majority (75%) of the respondents showed high satisfaction for adding the feature of searching task location using Google map for both news editor and mobile reporter. However, quarter of respondents reveal neither agree nor disagree.

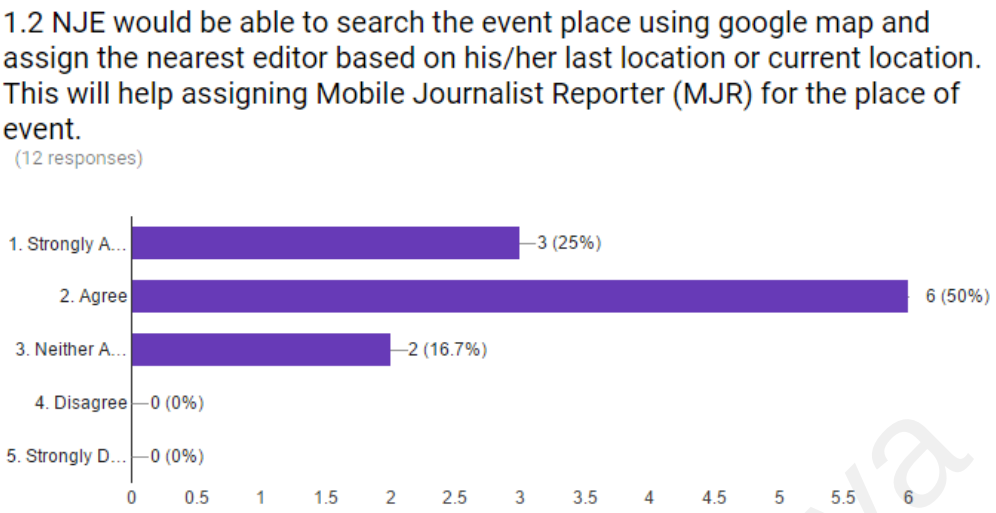

Figure 5.4: Google Map Usage in Assignment Form

Q1.3 In a question to mobile reporter either s/he could be able to know the news report assignment status that as complete or incomplete, the respondents almost agreed on the availability of this feature, See Figure 5.5.

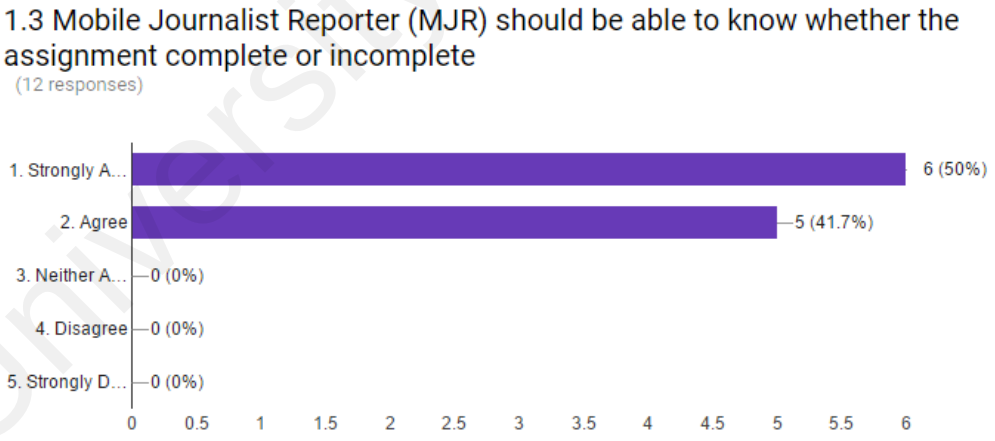

Figure 5.5: Awareness of Mobile News Assignment Completion Status

Q1.4 The response to the question devoted for the feature of displaying mobile news assignment status, which could help doing further action. The results revealed that there is a slightly different opinion, see Figure 5.6. However, almost more than half of the

respondents agreed while one of them neither agreed nor disagreed to this point. In general, the feature shows a high acceptance.

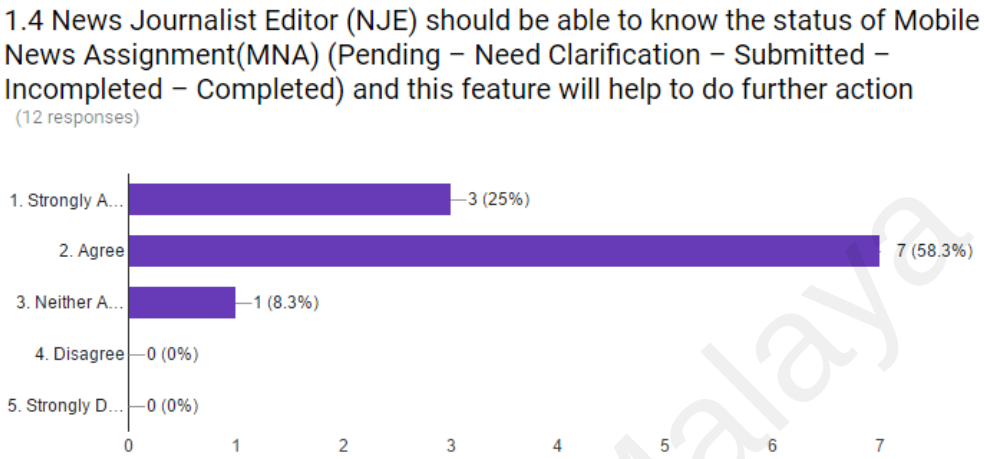

Figure 5.6: Awareness of Mobile News Assignment Process Status

Q1.5 i-MNReport application has offered the feature of assigning multiple mobile reporters whether staff or freelance/citizen journalist reports on a specific mobile news assignment. The results of this feature reflected a high level of acceptance among the respondents (75%) as can be seen in Figure 5.7. In fact, this feature is essential to obtain news resource from multiple reporters especially from the critical events such as wars and natural disasters. Although, quarter of the respondents provide niether agree nor disagree.

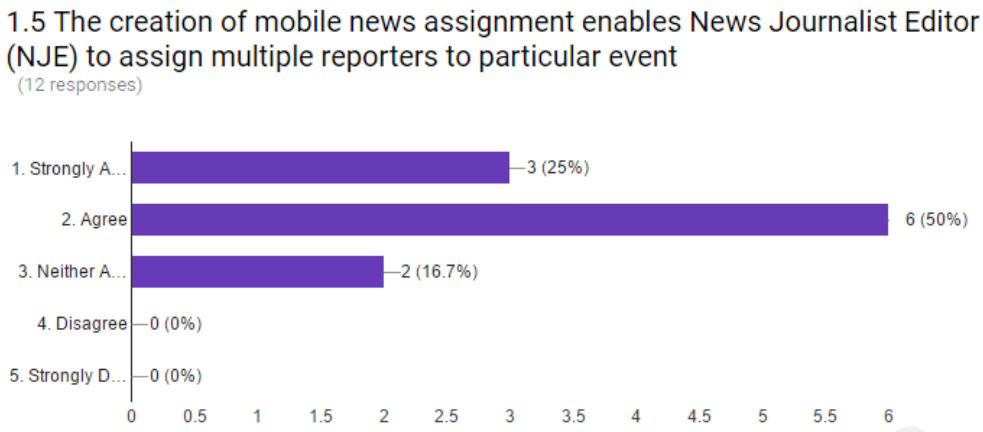

Figure 5.7: Ability to Assign Multiple Reporters to News Assignment

Q1.6 The statistics of the mobile news report is an important feature that could help editor to monitor and control the mobile news assignment daily and to follow up the reporters. Therefore, this feature fairly obtained high consideration from the respondents according to Figure 5.8. Eventhough, quarter (25%) of respondents descide to neither agree nor disagree.

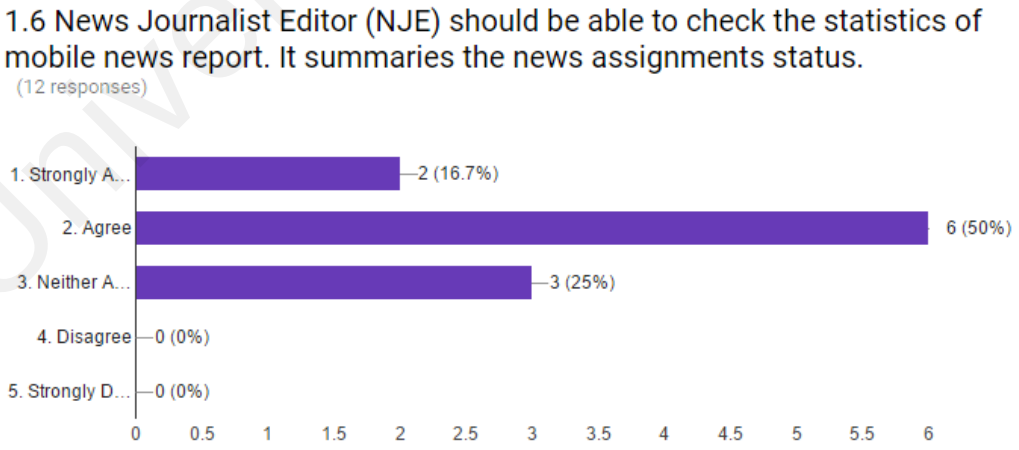

Figure 5.8: Assignment Summary Evaluation

Second Section: Notifications & Instant Communication:

Throughout the discussion of previous studies earlier in Chapter two, it could be noted that updating both sides MJR and NJE in real time was an important aspect to be considered in any future development. However, to make the both sides connected together for any clarification needed instantly, the interactive communication chat is added to each mobile news assignment created between MJR and NJE. The following figures demonstrate the response feedback towards this feature.

Q2.1 The obtained response towards the notification function that enables MJR and NJE to be alerted about the mobile news assignment status almost marked as agreed while the one marked as neither agree nor disagree as shown in Figure 5.9.

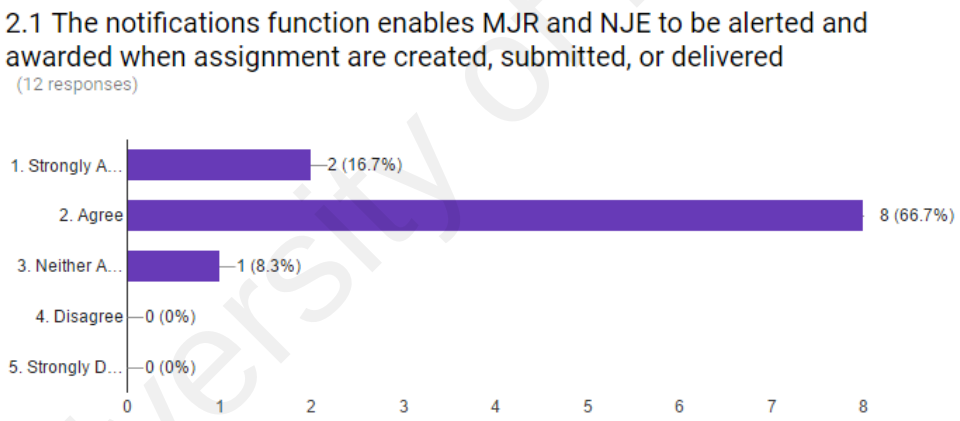

Figure 5.9: Awareness of Notification Function

Q2.2 In response to the instant chat in the mobile news assignment form, it is evident from Figure 5.10 that this feature is highly appreciable and accepted. In fact, this feature significantly contributes in helping the MJR and NJE to exchange information and clarification between them for the purpose of facilitating the real-time communication. This feature makes the application to be interactive and productive.

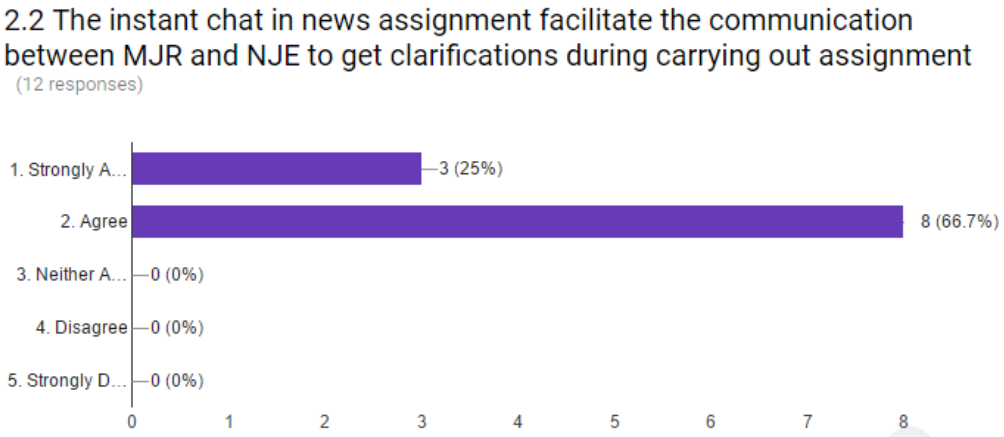

Figure 5.10: Feasibility of Instant Chat in Mobile News Assignment Form

Q2.3 Due to the nature of some news report, there is an urgent need to assign the mobile news assignment form to multiple MJRs for obtaining urgent acceptance response from only one of them. Because of this requirement, the application provides a notification mechanism to be sent to other MJRs to cancel the assignment. The respondents' view points on this feature were somehow contradictory where a significant number of them were undesided whether to agree or disagree to this issue. However, the majority of respondents showed high acceptance for the change in this feature, see Figure 5.11.

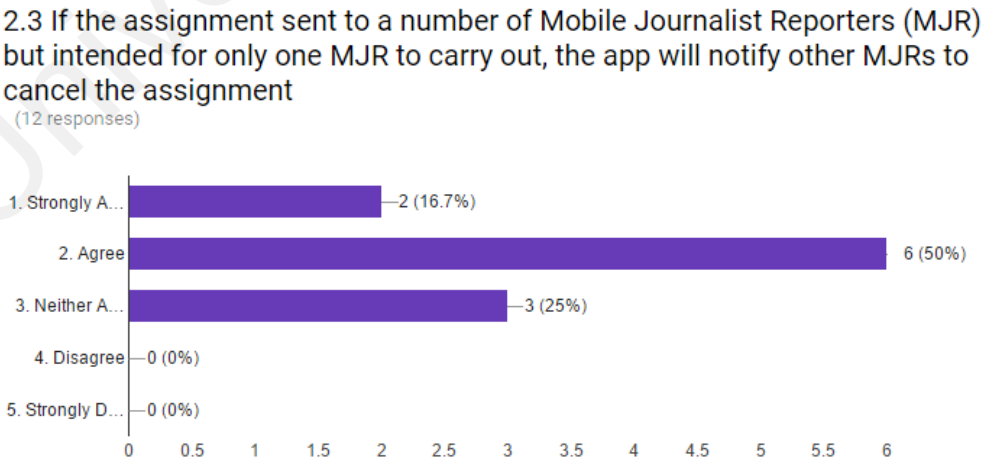

Figure 5.11: Awareness of Mobile News Assignment Cancellation

Q2.4 When the MJRs complete the assignment, s/he should receive an acknowledgment alerting her/him about the submitted report status. With regard to this feature, the respondents provided an apparent agreement to this point as could be seen in Figure 5.12.

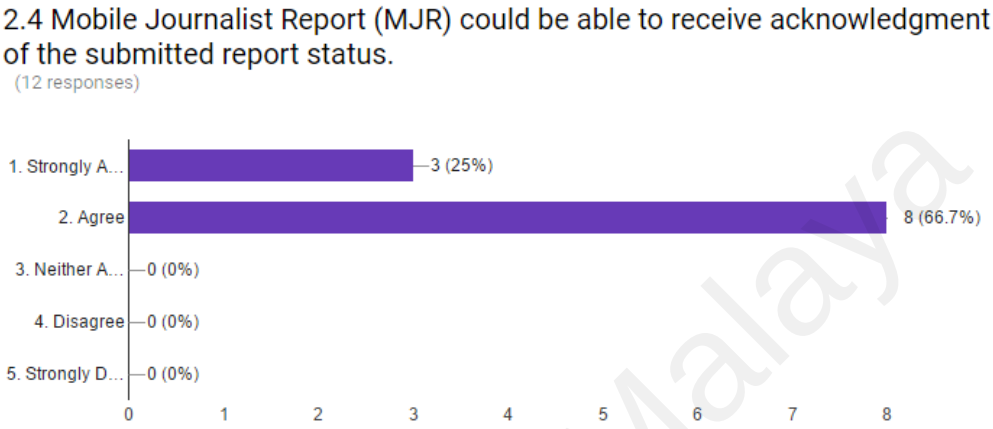

Figure 5.12: Awareness of Receiving Report Submission Acknowledgement

Third Section: User Category Authorization:

There are four types of users (i.e., Admin, News Supervisor, News Editor & Mobile Reporter) who have the authority to use the application. Each user has specific functionalities and features based on his/her role to conduct the tasks. The assigned role for each user has already been reported in Chapter four, section 4.3.4.

Q3.1 The respondents' point views showed that the user category for i-MNReport is suitable but it still needs to add other users such as photojournalists. However, the feature was accepted in general according to the available users category, see Figure 5.13. Whereas one of them decide not to agree nor to disagree.

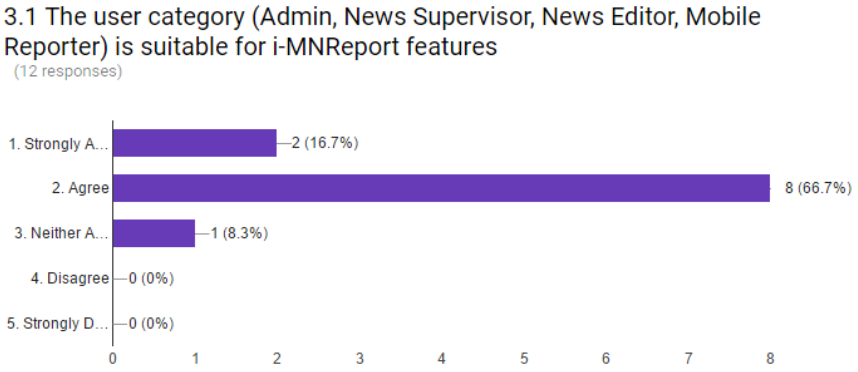

Figure 5.13: Suitability of Users Category

Q3.2 In response to the question about the corresponding functionalities and features assigned to a user based on his/her role. The respondent showed the same point of views they provided on the previous question about the user category. Nevertheless, the respondents provided positive satisfaction, and in the future work, it will be considered for the user category and the features assigned to them to meet the user requirements (see Figure 5.14).

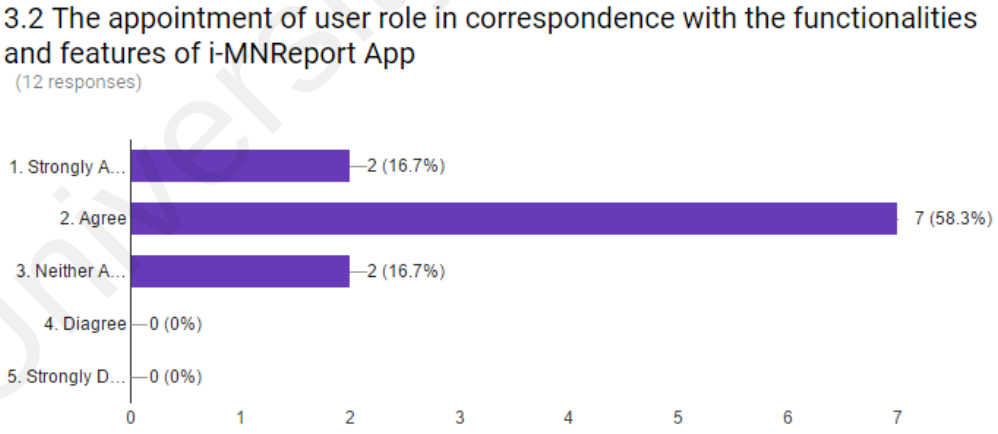

Figure 5.14: Suitability of Users Role Based on Function and Feature

Q3.3: According to users' duty and role, the respondents showed the highest level of agremment to the authority given to users as can be seen in Figure 5.15.

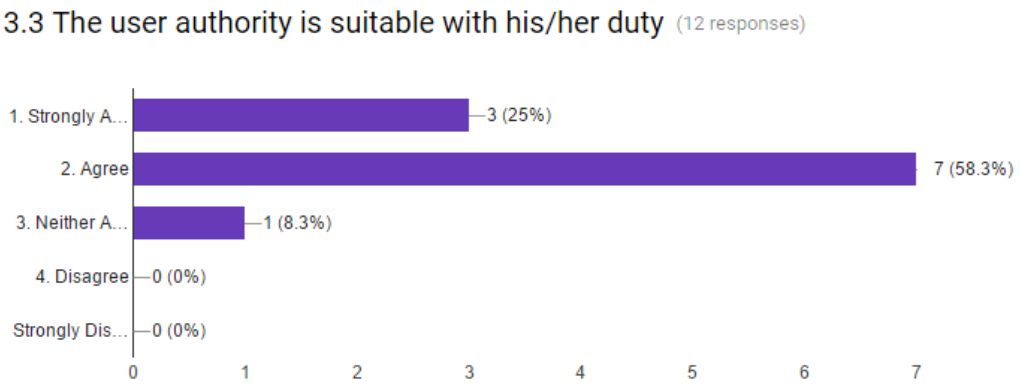

Figure 5.15: Suitability of Authority given to Users

Fourth Section: Overall Evaluation:

This part is specified for obtaining a general overview of the i-MNReport application to evaluate the feasibility of using and implementing it in real usage.

Q4.1 - Q4.2: Due to the significance of obtaining the news report from event to newsroom as soon as possible, the respondents strongly confirmed that the i-MNReport can help deliver news report faster based on the assignment given to them, see Figure 5.16. On the contrary, the respondents agreed that i-MNReport can save time regarding gathering required news contents and deliver it to the newsroom as undicated by the results Figure 5.17.

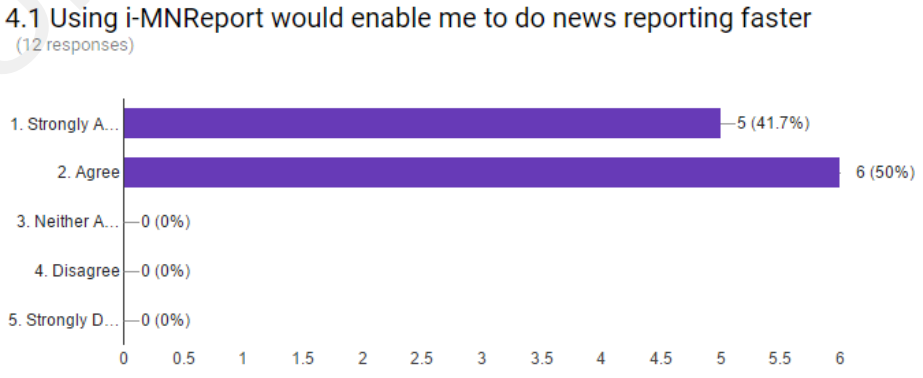

Figure 5.16: The Usability of i-MNReport in Terms of Delivery Time

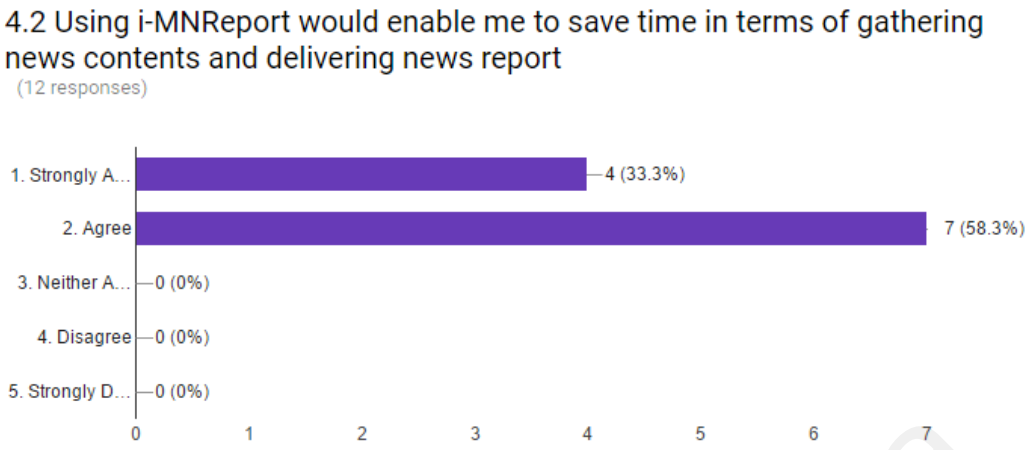

Figure 5.17: The Usability of i-MNReport in Terms of Saving Time

Q4.3: The effectiveness of any work is an important aspect of performing the tasks smoothly. Therefore, the respondents were given a question to obtain their feedback on the effectiveness of using the i-MNReport application to produce news to the audience. In response to this question, almost all of the respondents agreed to the effectiveness of using i-MNReport as could be seen in Figure 5.18.

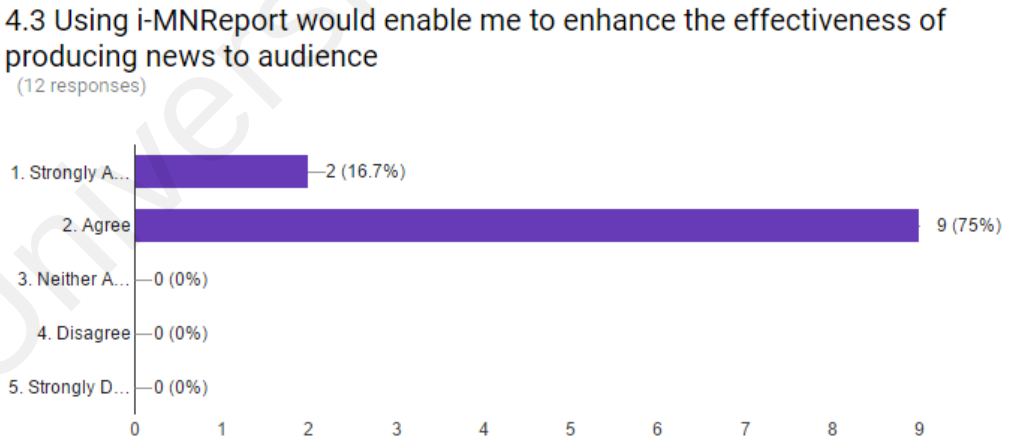

Figure 5.18: The Effectiveness of i-MNReport

Q4.4: Receiving journalism report from citizen journalist reporter is the new era of collecting news sources from the places where there is no staff journalist reporters. Moreover, citizen journalist reporter can provide more information especially from war

places such as the current war events in Syria and Yemen. In response to a question about the opportunity of making the citizen an official mobile journalist reporter for any news organization, the respondents provided contradictory opinions dwendling between 'strongly agree,' 'agree' and 'undecided' (i.e., neither agree nor disagree). Figure 5.19 obviously visualizes the respondents' opinions regarding this issue.

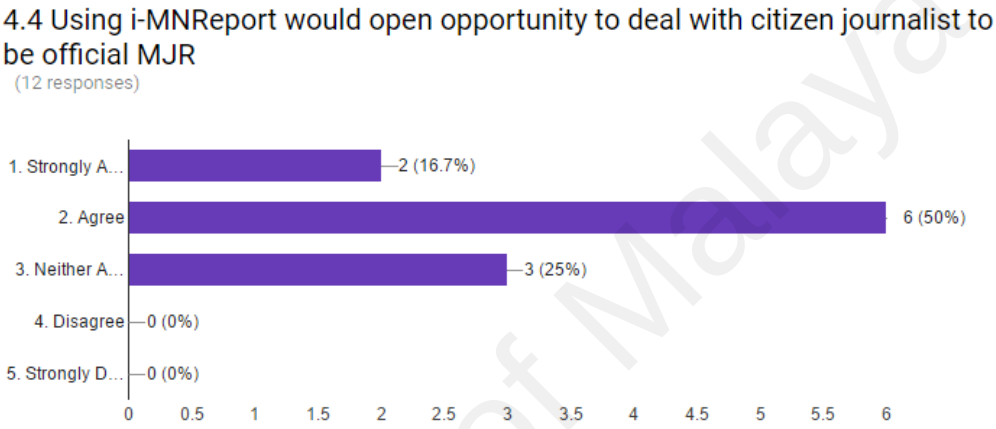

Figure 5.19: The Usability of i-MNReport for Citizen Journalist Reporter

Q4.5: Providing services that can be used in anywhere at any time has become the audience demand to enable the service availability. Therefore, the respondents highly agreed that i-MNReport application enables them to use it either via mobile or web platforms, see Figure 5.20.

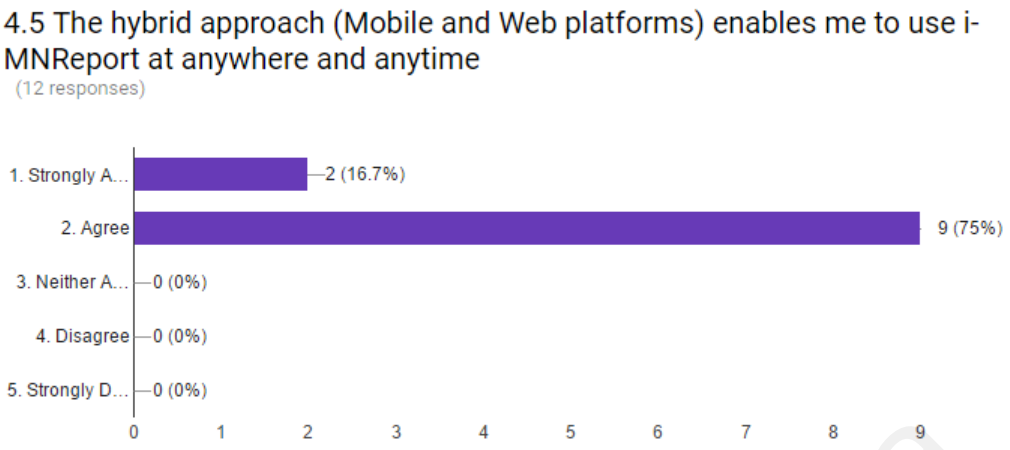

Figure 5.20: The Overall Feasibility of i-MNReport as a Hybrid (Mobile & Web) Approach

5.4 Brief Comparison with previous Apps

The i-MNReport application has been developed to enahnce the issues reported from the previous applications discussed in Chapter two. Table 5.1 compares the features of i-MNReport with other applications discussed earlier.

Table 5.3: Mobile News Reporting Application Comparison

Feature	CNN iReport 2007	Reuters MoJo 2007	Vaatge & others model 2011	Vaatge & Eggleston model 2012	Ana Ara Al Arabiya 2015	The Journal.ie 2015	i-MNReport 2016
App type	Web	Mobile	Mobile	Mobile	Mobile	Mobile	Web & Mobile
Mobile platform	N/A	Nokia N95-Symbian		Nokia N82 & N900 Symbian	Android	Android	Android *Can support iOS & Mobile Windows*
Staff & freelancer supporting	Freelancer Only	Staff Only	Test Only	Test Only	Freelancer Only	Freelancer Only	Both
Assignment – based	Yes	No	No	Yes	No	No	Yes
Newsroom control assignment	Yes	No	No	No	No	No	Yes
Assignment for selected reporters	No	No	No	No	No	No	Yes
Supporting interactive notifications between newsroom and reporter	No	No	No	No	No	No	Yes
Mobile cloud computing – based	No	No	No	No	Yes	Yes	Yes

5.5 Evaluation Suggestion

During evaluation and meeting with representatives from SABA and BERNAMA, there was a discussion about any suggestion to make i-MNReport more feasible. The main suggestions were to add new features in addition to improving the available features. The following section displays the suggestions and comments separately:

5.5.1 BERNAMA Suggestions

1- To make the news material published in a wide range of audience, BERNAMA suggests adding a feature that can enable editors to share the contents of mobile news report through social networks such as Facebook and Twitter.

2- To enable mobile journalist reporter send breaking news from mobile news assignment form. In a sense, when mobile journalist reporter receives mobile news assignment related to urgent publishing such as press conference for VIP speakers, the mobile journalist reporter should be able to send the breaking news of this particular assignment from the same assignment form.

3- To make the assignment summary more flexible by adding a searching feature, which can search by date, reporter and/or news category.

4- To adjust the current assignment summary chart displaying daily assignment and not all assignments.

5.5.2 SABA Suggestions

1- To add and link SMS messaging feature to the i-MNReport app, which can help editors to share the regular and urgent news to subscribers of SMS service.

2- To make “Report View” section more flexible by allowing the user to adjust contents display.

3- To make the publishing feature linked to news organization website. In other words, when the content is ready to be published, the editor should click on the "Publish on Web Page" to display the news content.

5.5.3 BERNAMA and SABA Suggestions

Due to the development progress of mobile technologies in the live streaming. Both parties suggest a new feature, which show live streaming videos to facilitate displaying live streaming of such events. This feature should support and assist citizen journalist reporter to show particular event as a live from his/her mobile phone. This feature should be considered in the future development.

5.6 Summary

Chapter five has discussed the proposed interactive i-MNReport application evaluation. As a result, the questionnaire method was used to get professional journalist feedback as this stage was one of the research objectives. Following, a brief description of the questionnaire design and components has been presented. The questionnaire contained two sections. The first section was for general information while the second section was for i-MNReport assessment. In general, the obtained results reveal a high acceptance of the proposed approach to contribute in assisting both news editor and news reporter to collect news materials and manage citizen journalist reporter. The questionnaire respondents were from National Malaysia News Agency BERNAMA and Yemen News Agency (SABA) who suggested some features to be added to improve the mobile news reporting application.

CHAPTER 6: CONCLUSION AND FUTURE WORK

6.1 Overview

Prior studies have reported the importance of considering and developing mobile news reporting system, which could facilitate news reporting management between mobile reporter and news editor using mobile devices. Moreover, the new era of journalism is interactive with audience contents, and in some places, such as Syria and Yemen, the audience becomes as citizen mobile journalist reporter. However, these studies have focused on analysis, perceptions, needs, challenges, and supports for the potential future development of mobile news reporting tools and applications. In this study, our focus is on the practical methodology to implement the reported needs and challenges for mobile news reporting. In addition, we have explored the other requirements, which need to be adopted for improving the proposed application. The requirements have listed in sections 5.5.1, 5.5.2 & 5.5.3. In the following section, the summary of achievement and contribution has been presented.

6.2 Achievement & Contribution Summary

Overall, this research aimed to improve news reporting using mobile technology and interactive approach. As a result, hybrid (mobile & web) interactive approach using Mobile Cloud Computing (MCC) technology and interactive approach have been proposed to improve mobile news reporting. The objectives are listed in chapter one in section 1.4. The following section is briefly summaries achievement of each objective.

First objective: Understanding the news life cycle is the most important aspect to find out how to propose suitable solution for research gap. Therefore, we have conducted an interview with News Director in Yemen News Agency (SABA) and this contribute to

add knowledge to the literature review in this research. Thereafter, by studying previous researches and developed applications, which have presented and discussed in chapter two in deep and detailed, it guided us to present the current news contents delivery method for daily news covering by looking in the aspect of productivity and efficiency, particularly in mobile news reporting. As conclusion, it identifies the need for improving the usability of mobile news report application.

Second Objective: Due to the research problem, it was needed to analyze and design a proposed approach in details by presenting the solution scenario. These details have been reported in Chapter three. It presented the research methodology and the proposed approach scenario and architecture.

Third Objective: During analysis and design, it was clear that we need to propose an interactive approach to meet the mobile news reporting requirements. Hence, the interactive design and application graphical user interface has been presented in chapter four. It provided more details about the web and mobile development and testing methods.

Fourth Objective: The evaluation of the proposed approach has been conducted by presenting the application features and functions to professional journalists who are working in SABA, BERNAMA, and as freelance journalist reporter to implement UAT. After that, users provide their opinion and feedback through questionnaire form. Chapter five presented and discussed the obtained results from respondents. It was found that the proposed approach gain high acceptance to be used as mobile news reporting tool or application. In addition, the result extends to confirm the importance of using a mobile device for mobile news reporting. However, the respondent has provided

some suggestions and comments towards adding other features and functions, which need to be adopted in the future work.

This study reveals the importance to implement such approach for mobile news reporting, which could benefit the citizen mobile journalist reporters. Those reporters could contribute to providing news contents to particular news organization especially in the places where the official mobile reporter could not be able to be in particular event.

This study contributes by discussing and presenting the survey of mobile news reporting issues and challenges. As a result, proposed approach has been developed and implemented towards the highlighted challenges and needs in interactive approach using MCC technology. In addition, proposed approach was examined by professional journalists in BERNAMA & SABA as an official news organization to get valuable feedback. Consequently, the proposed approach showed that it increase the productivity and efficiency of mobile news reporting system.

6.3 Research Limitations and Constraints

As it has explained in chapter one that our ultimate target research field is journalism, it was expecting that we would face some challenges, especially during the evaluation phase. During research methodology design, we defined the possible sample size to conduct user acceptance testing (UAT) by assigning two users in three related positions at two governmental news agencies and other news organization along with freelance journalists. The selected related positions were three positions namely as, Editor, Reporter, Photographer Journalist. While the news agencies, which we got their acceptance to conduct the evaluation phase were Malaysian National News Agency

BERNAMA and Yemen News Agency (SABA). In other words, the total number of sample size were eighteen users in three separated places.

The main limitations and constraints in this research were the sample size of testers and longitudinal response from testers. However, we have conducted UAT with twelve over eighteen users chosen as sample size. It was hard to assign more users as BERNAMA & SABA restricted it. In the prior researches, which had conducted user case studies for supporting future development in mobile news reporting had to select less than ten users as sample size (Väätäjä & Egglestone, 2012; Väätäjä et al., 2011).

The proposed sample size could not be achieved due to the non-availability of assigned users to this evaluation and the difficulty in tracing other users through online contact due to longitudinal response as we have limited time for conducting this research.

6.4 Future Work

i-MNReport application has been developed to provide an alternative method for getting news material from event reality by providing interactive approach between News Reporter and News Editor. However, the current development still needs more enhancement and development to integrate it with other services and systems such as social media, editing systems and event booking systems, which will help news industry producing news by the efficient approach. However, the future work that needs to be considered are as follows:

1- Sending the news contents (Text, photo, video, audio) securely by adopting encryption algorithm. This adoption will help to send and receive the data securely.

2- Developing collaboration - oriented aspect for group assignment category. This aspect will allow others to communicate with each other and exchange the news material between users for immediate action required from the newsroom.
3- Integrating the editing systems with the proposed approach to deal with news material (Photo, Video, Audio) for changing their properties that meet news organization's policy.
4- Integrating with social media, SMS, MMS, Chat App (WhatsApp, Telegram), and website to facilitate news publishing from the proposed approach.
5- Making news database more flexible, which means to facilitate news material sort by different options such as news category, news reporter, last update and so on. The flexible news database could facilitate to obtain the required information for making the correct decision.
6- Developing a booking service for media request to cover particular event to be available for public those who need and prefer media presence in their events and integrate it with i-MNReport app.

Therefore, the next development should include some, if not all, of the above features to make the application more integrated with other services which is used with news audiences.

6.5 Summary

In this chapter, we have demonstrated brief general overview about the research study. Then, we briefly summaries how each objective achieved along with our contribution. Last, but not least, the research study limitations have been presented to identify the constraints that encounter evaluation phase and implementation process. Finally, we listed out the potential future work, which can add value to improve the i-MNReport application.

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