CHAPTER 2
LITERATURE REVIEW

2.1 Theory Related to Software Engineering
2.1.1 Software Engineering

Formally, software engineering design is defined as (1) The process of identifying, evaluating, validating, and specifying the architectural, detailed, and construction models required to build software that meets its intended functional and nonfunctional requirements; and (2) the result of such process (Otero, 2012).

The phrase software design can be used to describe both the product and process of software design. From the process point of view, software design is used to generate the phase, activities, tasks, and interrelationship between them to build software's structure and behavior before construction begins. And from the product development perspective, software design is used to identify the design antiquity that result from the identified phase, activities, and tasks; therefore, these products by themselves, or collectively, are referred to as software design. Design products vary according to several factors, including design perspective, language, purpose, and their capabilities for evaluation and analysis (Otero, 2012).

Design can be in architectural form, using architectural notations. These types of design can be presented using block diagrams, Unified Modeling Language (UML) diagrams, etc. In some cases, design can be in detailed form, where a more white-box representation of the system is used o model structural and behavioral aspects. These can include software models that contain class diagrams, object diagrams, sequence diagrams, or activity diagrams. Other design products include models that represent interfaces, data, or user interface designs (Otero, 2012).

2.1.2 UML

UML provides a typical vocabulary of object-oriented terms and graphing procedures that is sufficiently rich to demonstrate any systems improvement project from examination through usage (Dennis, Wixom, & Tegarden, 2015).

The UML provides auxiliary support to build up the structure and characteristic of an information system, the Unified Process gives the behavior support. The Unified Process, obviously, is utilize case driven, engineering driven, and iterative and incremental (Dennis, Wixom, & Tegarden, 2015).

2.1.2.1 Use Case Diagram

Use cases are represented graphically by a horizontal ellipse with the name of the use case appearing above, below, or inside the ellipse. A use case represents a single goal of the system and describes a sequence of activities and user interactions in trying to accomplish the goal. Use cases are initially defined during the requirements stages of the life cycle and will be additionally refined throughout the life cycle. (Whitten & Bentley, 2007).
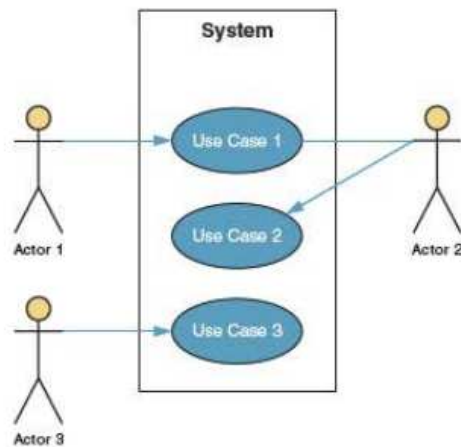

Figure 2.1 Use Case Diagram Sample

(Source: *System Analysis and Design Method - Whitten and Bentley,* 2007)

Association is a relationship between actor and a use case which interaction happen between them (Whitten & Bentley, 2007).

There are several types of association in use case (Whitten & Bentley, 2007).:

- Association with an arrowhead connected to the use case indicate that the use case was initiated by the actor.

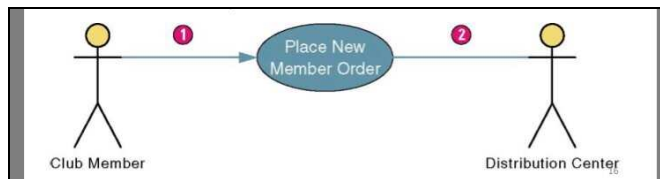- Association without arrowhead indicates an actor that receive.

Figure 2.2 Association Sample

2.1.2.2 Sequence Diagram

A sequence diagram can be seen as a way to integrate the steps of a use case with the objects of a class diagram. It can be used as a communication tool with programmers to specify what methods (behaviors) to call in implementing a use case. (Whitten & Bentley, 2007). These are some sequence diagram notation:

- Actor. User that communicating with the application interface.
- Interface Class. Show that the class is the interface class to eliminate confusion to what kind of class it is and notated with <<interface>>.
- Controller Class. Each use case has at least one or more controllers and notated with <<controller>>
- Entity Classes. Boxes that symbolizes the entity in a class diagram and requires collaboration at every step. Object instance is marked with a colon (:).
- Message. The horizontal arrow to convey the message of each method in a sequence diagram.
- Activity Bars. Symbols are used to indicate the use of an object for a specific period.
- Return Message. Horizontal arrow with a dotted line indicates the results obtained input from the input object.
- Self-Call. Object invoke its own method.
- Frame. Indicates the area on the diagram for selection, repetition, or a special action.
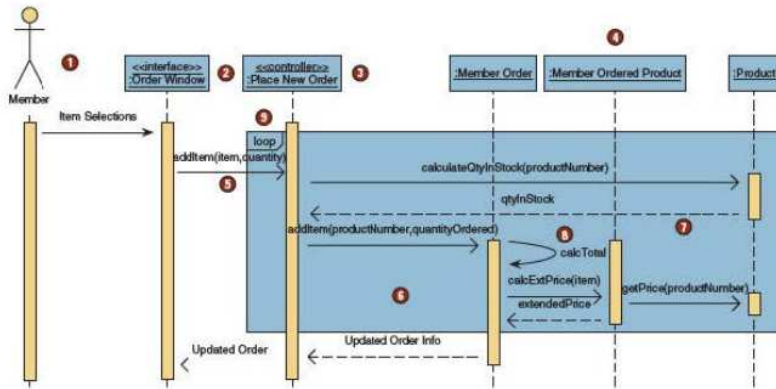
Figure 2.3 Sequence Diagram Sample

(Source: *System Analysis and Design Method - Whitten and Bentley,* 2007)

2.1.2.3   Class Diagram

Class diagram is a diagram that is used to depict the object static structures and their associations (Whitten & Bentley, 2007). The following are the types of relationships that exist in the class diagram (Whitten & Bentley, 2007):

- Association depict the relationship between classes.
- Multiplicity to specify the number of instance of the described element.
- Generalization/Specialization Relationship allows people who create the class diagram to take advantage of inheritance.
- Aggregation/Composition. Aggregation is used to show that a class can be aggregated by other class. Composition is used to show that a class has ownership over other class.

A design class diagram a diagram that depicts classes that correspond to software components that are used to build the software application. There are some steps in creating a design class diagram which are (Whitten & Bentley, 2007):

- Add design objects including entity, entity, and control objects to diagram.
- Specify attributes and their types info to design objects.
- Add attributes visibility such as public, protected, or private.

- Add methods to design objects. Include methods to implement any found responsibilities and behavior, such as creating or deleting class instances or class associations.
- Specify method visibility such as public, protected, or private.
- Add association navigability between classes to indicate the direction messages.
- Add dependency relationships between interface class and the control object.

Figure 2.4 Class Diagram Sample

(Source: *System Analysis and Design Method - Whitten and Bentley,* 2007)

2.1.2.4 Activity Diagram

The UML offers an additional diagram called an activity diagram, to model the process steps or activities of the system. They are similar to flowcharts in that they graphically depict the sequential flow of activities of either a business process or a use case. (Whitten & Bentley, 2007). According to Whitten & Bentley, activity diagram have some notation, which are:

- Initial node. Drawn as a circle, it represents as a start of the process.
- Actions. Drawn as a rounded rectangle, it represents individual steps.

- Flow. Drawn as an arrow, it indicates the progression through actions.
- Decision. Drawn as a diamond, it has one coming flow and two or more going out flows. The flows coming out to indicate the conditions.
- Merge. Drawn as a diamond, it has two or more coming flows and one going out flow. The two coming flows to combines flows that previously separated by decisions.
- Fork. Drawn as a black bar with one coming flow and two or more going out flows.
- Join. Drawn as a black bar with two or more coming flows and one going out flows, indicating the end of the concurrent processing.
- Activity final. Drawn as hollow circle that has a circle inside, it representing the end of the process.
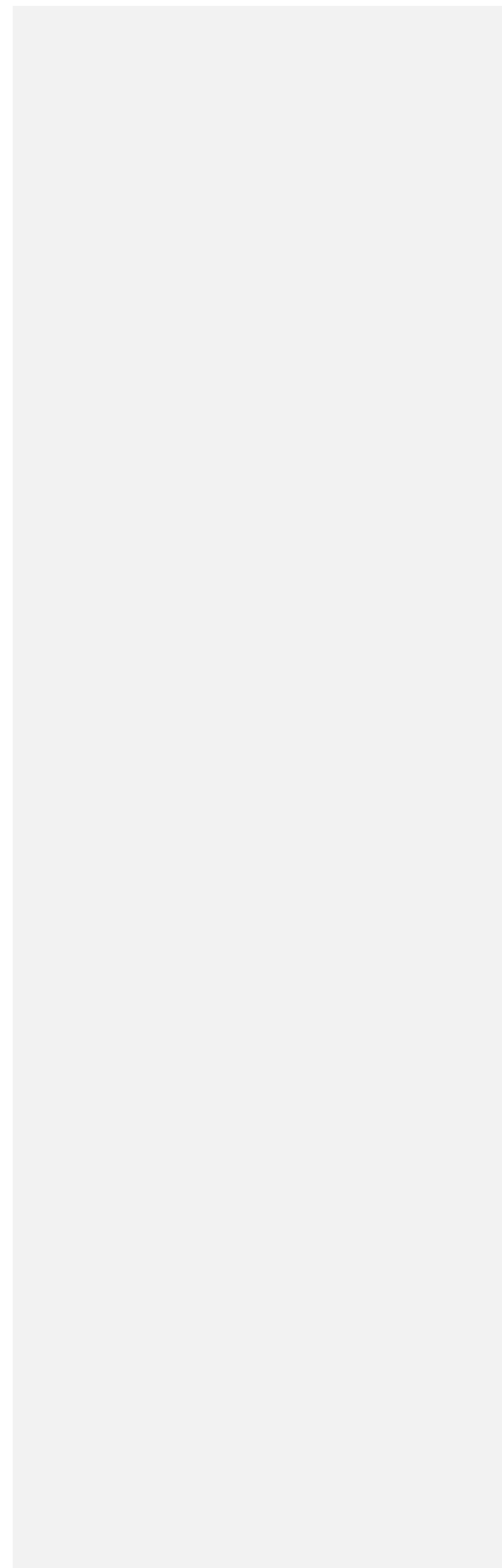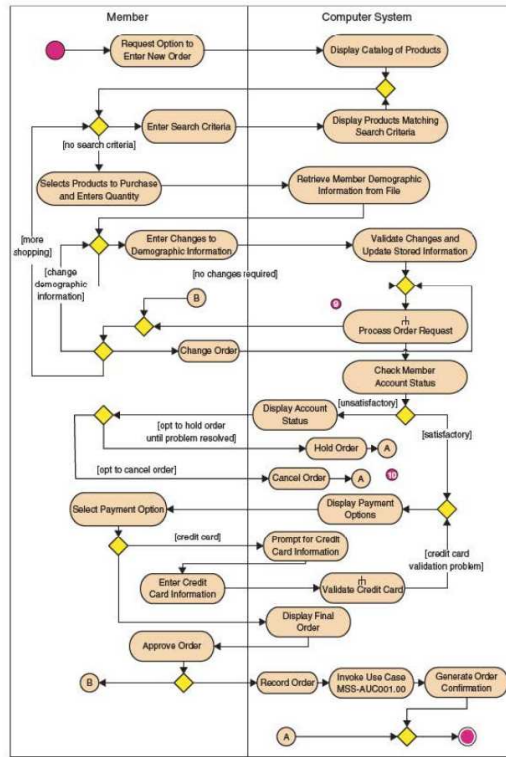
Figure 2.5 Activity Diagram Sample

(Source: *System Analysis and Design Method - Whitten and Bentley,* 2007)

2.2   Waterfall Model

Waterfall Methodology is the first organized outline technique for software improvement. With waterfall development based systems, the examiners and clients continue in sequence with one stage then onto the next. The key deliverables for each stage are ordinarily long and are exhibited to the venture patron for endorsement as the venture moves from stage to stage (Dennis, Wixom, & Tegarden, 2015, p. 7).
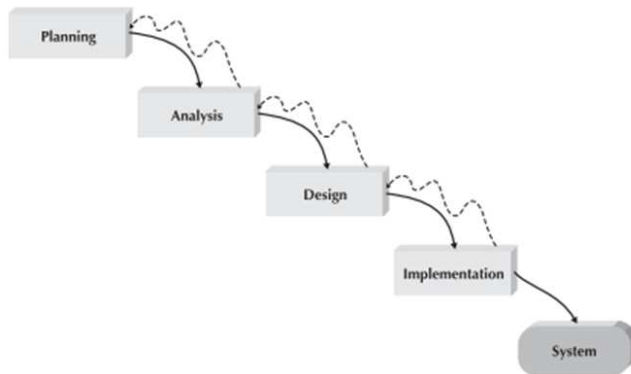
Figure 2.~~8~~ 6 Waterfall Development Methodology

(Source: *Systems Analysis and Design: An Object-oriented Approach with UML -*

Dennis, Wixom, & Tegarden, 2015 p.7)

2.3 ~~-~~Tools Theory

~~1.~~ 2.3.1 Android

According to (Lee, 2012), Android is a mobile operating system that is based on a modified version of Linux that is used to develop operating system for touch screen gadget like smartphone or tablet. It was originally developed by a startup of the same name, Android, Inc. Android operating system provides many platform that can be used by developer to create their own application, called open source.

~~2.~~ 2.3.2 Android Studio

Android Studio is the official integrated development environment (IDE) for the Android platform. The first step to be done in the development of android studio is to configure a computer system to act as the development platform. The steps include the installment of the Android Software Development Kit (SDK) (Smyth, 2015, p.3).
There are several system requirements that android application development can be operated (Smyth, 2015, p.3):

- Windows 2003 (32-bit or 54-bit)
- Windows Vista (32-bit or 64-bit)
- Windows 7 (32-bit or 64-bit)
- Windows 8 / Windows 8.1
- Windows 10
- Mac OS X 10.8.5 or later

- Linux systems version 2.11 or later
- GB of Ram minimum (4GB is recommended)
- 1.5 GB available disk space

Figure 2. 7 9 Android Studio Logo

(Source: *Android Studio Development Essentials - Smyth,* 2015 p.3)

3. 2.3.3 Java Programming Language

Java is a full-featured, universally useful programming language that can be used to create vigorous mission-critical applications. Today, it is mostly used for Web programming, as well as for creating independent applications across platforms on servers, desktops, and cell phones (Liang, 2011, p. 8).
Java was utilized to build up the code to speak with and control the robotic rover on Mars. Many organizations that once viewed Java as more buildup than substance are currently utilizing it to make appropriated applications got to by clients and accomplices over the Web (Liang, 2011, p. 8).

4. 2.3.4 Firebase

Firebase provides a real-time database and backend as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored on Firebase's cloud (Farr, 2013). Firebase provides client libraries that enable integration with Android, iOS, JavaScript, Java, Objective-C and Node.js applications. The database is also accessible through a REST API and bindings for several JavaScript frameworks such as AngularJS, React, Ember.js and Backbone.js (Marshall, 2013). Developers using the real-time database can secure their data by using the company's server-side-enforced security rules (Darrow, 2012).

2.3.5 8 Golden Rule

- Strive For Consistency

    Predictable groupings of activities ought to be required in comparative circumstances; indistinguishable wording ought to be utilized as a part of prompts, menus, and help screens; and reliable shading, format, upper casing, textual styles, et cetera, ought to be utilized all through. Exemptions, for example, required affirmation of the erase order or no resounding of passwords, ought to be understandable and constrained in number (Shneiderman & Plaisant, 2010).

- Cater to Universal Usability

    Perceive the necessities of differing clients and plan for pliancy, encouraging change of substance. Amateur to master contrasts, age ranges, handicaps, global varieties, and mechanical assorted variety each enhance the range of necessities that aides plan. Including highlights for tenderfoots, for example, clarifications, and components for specialists, for example, alternate routes and speedier pacing, advances the interface outline and enhances saw quality (Shneiderman & Plaisant, 2010).

- Offer Informative Feedback

    For each client activity, there ought to be an interface criticism. For regular and minor activities, the reaction can be unassuming, though for rare and real activities, the reaction ought to be more significant. Visual introduction of the objects of intrigue gives an advantageous domain to demonstrating changes unequivocally (Shneiderman & Plaisant, 2010).

- Design dialog to yield closure.

    Arrangements of activities ought to be sorted out into bunches with a starting, center, and end. Useful input toward the finishing of a gathering of activities gives clients the fulfillment of achievement, a good feeling, a flag

to drop alternate courses of action from their brains, and a pointer to get ready for the following gathering of activities. For instance, online business sites move clients from choosing items to the checkout, finishing with a reasonable affirmation page that finishes the exchange (Shneiderman & Plaisant, 2010).

5. • Prevent errors

However much as could reasonably be expected, outline the interface with the goal that clients can't make genuine mistakes; for instance, dim out menu things that are not proper and don't permit alphabetic characters in numeric passage fields. In the event that clients make a mistake, the interface should offer basic, productive, and particular guidelines for recuperation. For instance, clients ought not need to retype a whole name-address frame on the off chance that they enter an invalid postal district but instead ought to be guided to repair just the defective part. Incorrect activities should leave the interface state unaltered, or the interface should give guidelines about reestablishing the state (Shneiderman & Plaisant, 2010).

6. • Permit easy reversal of actions.

However much as could be expected, activities ought to be reversible. This component mitigates nervousness, since clients realize that blunders can be fixed, and supports investigation of new alternatives. The units of reversibility might be a solitary activity, an information section errand, or a total gathering of activities, for example, passage of a name-address piece (Shneiderman & Plaisant, 2010).

7. • Support internal locus of control

Experienced clients firmly fancy the feeling that they are accountable for the interface and that the interface reacts to their activities. They don't

need amazements or changes in recognizable conduct, and they are irritated by dull information passage arrangements, trouble in acquiring important data, and powerlessness to deliver their coveted outcome (Shneiderman & Plaisant, 2010).

8. • Reduce short-term memory load.

People's constrained limit with respect to data preparing in here and now memory (the general guideline is that individuals can recollect "seven give or take two lumps" of data) requires that creators keep away from interfaces in which clients must recall data from one show and afterward utilize that data on another show. It implies that cellphones ought not require reentry of telephone numbers, site areas ought to stay obvious, and protracted structures ought to be compacted to fit a solitary show (Shneiderman & Plaisant, 2010).

2.3.6 Firebase

Firebase provides a real-time database and backend as a service. The service provides application developers an API that allows application data to be synchronized across clients and stored on Firebase's cloud (Farr, 2013). Firebase provides client libraries that enable integration with Android, iOS, JavaScript, Java, Objective-C and Node.js applications. The database is also accessible through a REST API and bindings for several JavaScript frameworks such as AngularJS, React, Ember.js and Backbone.js (Marshall, 2013). Developers using the real-time database can secure their data by using the company's server-side-enforced security rules (Darrow, 2012).

2.4 Social Media

According to (Kaplan & Haenlein, 2010), Social media can be classified using social presence/media richness and self-presentation / self-disclosure. Combining both dimensions leads to a classification of Social Media which we have visualized in Figure 2.8.

| | | Social presence/ Media richness | | |
		Low	Medium	High
Self-presentation/ Self-disclosure	High	Blogs	Social networking sites (e.g., Facebook)	Virtual social worlds (e.g., Second Life)
	Low	Collaborative projects (e.g., Wikipedia)	Content communities (e.g., YouTube)	Virtual game worlds (e.g., World of Warcraft)

Figure 2. 180 Classification of Social Media by social presence/media richness and self-presentation/self-disclosure

(Source: Kaplan & Haenlein, 2010 p.4)

Social presence hypothesis (Short et al., 1976) states that media contrast in the level of 'social presence', characterized as the acoustic, visual, and physical contact that can be accomplished between two communication partners. Social presence is influenced by the closeness (interpersonal versus mediated) and immediacy (asynchronous versus synchronous) of the medium, and can be relied upon to be bring down for mediated (e.g., phone discussion) than interpersonal (e.g., eye to eye discourse) and for asynchronous (e.g., email) than synchronous (e.g., live) communications. The higher the social presence, the bigger the social impact that the correspondence accomplices have on each other's behavior.

Firmly identified to the idea of social presence is the concept of media richness. Media richness theory (Daft & Lengel, 1986) is based on the presumption that the goal of any communication is the resolution of ambiguity and the reduction of uncertainty. It states that media differ in the level of richness they possess, which is, the amount of information allowed to be transmitted in a given time range. Some media are more effective than others in resolving ambiguity and uncertainty.

Regarding to the social dimension of Social Media, the concept of self-presentation states that in any type of social interaction people have the desire to control the impressions other people form of them (Goffman, 1956). On the one hand, this is done with the objective of influencing others to gain rewards (e.g., make a positive impression on your future in-laws); on the other hand, it is driven by a wish to create an image that is consistent with one's personal identity (e.g., wearing a fashionable outfit in order to be perceived as young and trendy).

The main reason why people decide to create a personal webpage is, for example, the urge to present themselves in cyberspace (Schau & Gilly, 2003). Usually, such a presentation is done through self-disclosure; that is, the conscious or unconscious revelation of personal information (e.g., thoughts, feelings, likes, dislikes) that is consistent with the image one would like to give. Self-disclosure is a critical step in the development of close relationships (e.g., during dating) but can also occur between complete strangers; for example, when speaking about private matters with the person seated next to you on an bus stop.

Each social media represents different amount of social presence and media richness as well as amount of self-presentation and self-disclosure. Example is a blog presents high self-presentation and self-disclosure compared to collaborative projects where bloggers try to deliver an image of their personal to be acknowledge by other users compared to the contributors of collaborative projects which are anonymous. While comparing blogs and social networking sites that has different amount of social presence and media richness, blogs shows more text in the layout. Social networking sites are richer in media richness which allows user to upload contents such as text, pictures, videos, and files. These contents are also called as User-generated content. User Generated Content (UGC) can be seen as the sum of all ways in which people make use of Social Media. The term UGC, is usually applied to describe the various forms of media content that are publicly available and created by end-users.

1. 2.4.1   Social Networking Sites

As stated by (Kaplan & Haenlein, 2010), Social networking sites are applications that enable users to connect by creating personal information profiles, inviting friends and colleagues to have access to those profiles, and sending e-mails and instant messages between each other. These personal profiles can include any type of information, including photos, video, audio files, and blogs. Therefore, a social media can be categorized as social networking sites when it fulfils these two criteria:

- Medium social presence/media richness
- High self-presentation/self-disclosure

2.5 Gamification

Gamification manages applying gaming mechanics to non-gaming circumstances. Gamification has been utilized to reconstruct classrooms and to support learning, and, just like games, it too has been utilized to expand client and worker engagement (Dennis, Wixom, & Tegarden, 2015, p. 400).

In both practicing games and gamification, the key to achievement manages rousing the client as well as representative to stay engaged in with the business procedure. Despite the fact that conventional inspiration approaches have attempted to encourage representatives before, because of the way of the changing sorts of work performed, they no longer capacity in a productive or viable way (Dennis, Wixom, & Tegarden, 2015, p. 401).

2.6 Hoax

Hoax is an intentionally manufactured lie made to take on the appearance of reality. It is recognizable from mistakes in perception or judgment, gossipy tidbits, urban legends, pseudo sciences, and April Dolts' Day occasions that are passed along in compliance with common decency by believers or as jokes (Brunvand, 2002).

2.6.1 Types of Hoax

Hoaxes differ generally in their processes of creation, propagation, and entrenchment over time. For example:

- Academic hoaxes
- Religious hoaxes
- Hoaxes perpetrated on occasions when their initiation is considered socially appropriate, such as April Fools' Day
- Criminal Hoaxing. (Brunvand, 2002)
- Internet hoaxes became more common after the start of social media. Some websites have been used to hoax millions of people on the Web. (Phillip, 2014)

2.7   -State of Arts

1. QUESTDONE APPLICATION WITH SOCIAL NETWORKING FEATURES AS THE ACTUAL WORLD INTERACTION MEDIA ON ANDROID SMARTPHONE (2012)

    *   Social networking is a set of people that form a gathering in order to assemble and share a ton of information, similar to how to cook, brandish, occupation, business, and different themes. For a few clients, social networking can be applied as search engine and an advancement media that is more financially savvy and it can be seen by many individuals in brief time (Sutoyo, Yoshep, Susanto, & Kurniadinata, 2012).

    *   More or less, half social networking that exists as of now just depends on cooperation amongst client and virtual world interface. Because of that, the client can't specifically associate with nature and mingle altogether. This sort of association additionally happens on publicizing media, where ads just conveys data however can't make coordinate cooperation that includes client and the offered items (Sutoyo et al., 2012).

    *   QuestDone is a search-and-discovery service mobile application which gives indexed lists to its clients. It is similar to Foursquare, Clingle, Loopt, Brightkite, Wallit, etc. The application gives customized suggestions of spots to go to close to a client's present area in light of clients' "past browsing history, buys, or registration history. It is similar to Foursquare, Clingle, and Wallit.
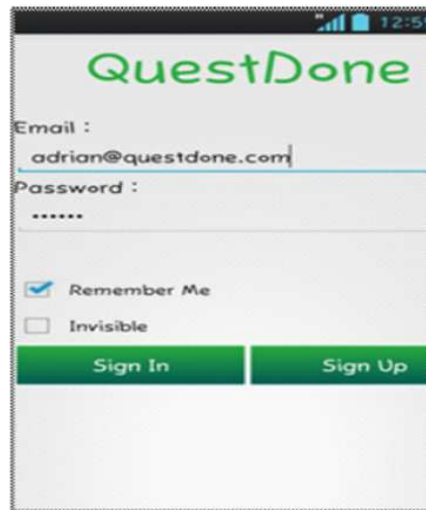
Figure 2.9 11 QuestDone Login Page

(Source: *Questdone Application with Social Networking Features as the Actual World Interaction Media on Android - Sutoyo, Yoshep, Susanto, & Kurniadinata*, 2012)

2. EFFECT OF SOCIAL MEDIA MARKETING ON CUSTOMER ENGAGEMENT AND ITS IMPACT ON BRAND LOYALTY IN CARING COLOURS COSMETICS, MARTHA TILAAR (2016)

- The advanced level of social media used by general society, particularly in Indonesia, is likewise the motivation behind why social media turned into an imperative device for enhancing engagement with clients, which then is anticipated that would make clients more faithful to the brand (Muchardie, Yudiana, & Gunawan, 2016).

- Based on the official website of the Ministry of Communications and Information of the Republic, the internet in Indonesia at present has come to 63 million. There are no less than 95% of them who get to social media. While Facebook and Twitter are the most generally accessed by the general population in Indonesia, Indonesia itself involves the fourth rank of Facebook clients on

the planet after the USA, Brazil, and India, with around 65 million active and dynamic Facebook clients brand (Muchardie et al., 2016).

3.

4.3. THE IMPACT OF SOCIAL MEDIA ON STUDENT LEARNING CASE STUDY: SMA YAPITA SURABAYA (2016)

- The growing learning environment is enabling students to learn at whatever time and anyplace. Those social media or social networking are ending up noticeably more popular and generally spread. According to The Wall Street Journal, Facebook users in Indonesia has reached 69 million people and keep escalating day by day (Isnaini & Rakhmawati, 2016).

- One of negative parts of utilizing online networking advancements is limit the dynamic support of the learner. Actually, such advanced technologies are created with the goal that they can work for any learner, despite the inspiration or the capacity of the specific learner (Isnaini & Rakhmawati, 2016).

5.4. RELATIONSHIP BETWEEN SOCIAL MEDIA FOR SOCIAL MARKETING IN FAMILY PLANNING (2013)

- The advancement of Information Technology (IT) generally and the internet has totally give impact to human behavior to communicate and interact to each other. Limits of space and time is not an obstacle in conveying and interacting, it is more conceivable through the rising wonder of Smartphone innovation to give internet access (Ardiansyah, 2013).

- This research journal is intended to see whether the source credibility altogether impact attitude, knowing whether brand mindfulness altogether impact attitude, knowing whether brand engagement altogether impact attitude and knowing whether word of mouth essentially impact attitude (Ardiansyah, 2013).

6.5. ELECTRONIC WORD OF MOUTH (E-WOM) FOURSQUARE: THE NEW SOCIAL MEDIA (2013)

- Traditional word-of-mouth (offline) plays an important role in customer purchasing decision. But along with the development of the Internet, WoM has

now grown to be Electronic word-of-mouth (e-wom). The motive of e-WoM itself is different from the motives of WoM as it is influenced by the dynamic social needs of the community, the development of information technology, the development of new media, and others (Hutomo, 2013).

Tipe-tipe	Frekuensi	Persentase (%)
The Gamers	25	42
The Existence	13	21
The Need Help	8	13
The Mayor	6	10
The Show-off	4	7
The Angels	4	7
Total	60	100

Figure 2. 1210 Foursquare Users

7.6. 'HOAX ANALYZER' WINS AT MICROSOFT SOFTWARE DEVELOPMENT CONTEST (2017)

- The Hoax Analyzer application is a web-based application that aims to combat the proliferation of hoaxes (fake news). This application is claimed to be able to identify hoaxes on certain information sources.
- On the site, www.hoaxanalyzer.com, user basically needs to duplicate the content being referred to a paste it on the content box of the application. The application then assembles occurrences of the content or the possibility of the content (the application utilizes characteristic dialect preparing advancements) found in different sites. The last stride measures the destinations or the sources on which the content shows up. In the event that over half of the sources are named "actuality" then the content is announced as "certainty" by the application. Something else, it's pronounced a "trick." (Chua, 2017).
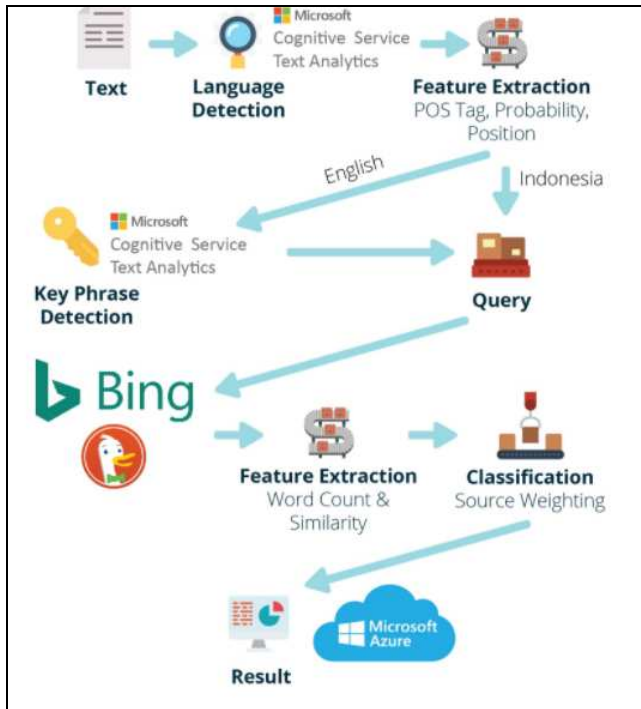
Figure 2.11 ~~13~~ Hoax Analyzer Methodology

(Source: *Chua, K. 03 Mei (2017). Hoax Analyzer Wins at Microsoft Software Development Contest. (Online). Diakses 01 Juni 2017 dari* http://www.rappler.com)