

## CHAPTER II LITERATURE AND THEORY REVIEW

### 2.1 Literature Review

Research from Raja & Nirmala, (2016) named “*An Extreme Programming Method for E-Learning Course for Web Application Development*”. In this research, they developed an online training system for C, C++ and Java with XP method. In development with XP, the process of development will be split into a few iterations and while in development, the application can be used in production. From the research concluded that agile methodology with XP method can increase quality of application while having short development period.

Research from Ghani & Yasin, (2013) named “*Software Security Engineering in Extreme Programming Methodology: A Systematic Literature Review*”. In this research, they reviewed software security developed with Agile development method which is XP in this case. They reviewed five criteria which are Population, Intervention, Comparison, Outcomes, and Context (PICOC) and reached a conclusion that XP has limitation in supporting secure software engineering practices. Pair-Programming, coding standards, and refactoring help secure coding in implementation phase.

Research from Mandel, (2016) named “*Japan’s App Economy*” discuss about the growth of app jobs in Japan. This paper examines the economic impact the growth of app in Japan. In this research, they use online job postings for workers with app related skill as a real-time measure of employment and concluded that

Japan has been able to generate over half of a million App Economy jobs since 2008, when the Apple App Store was introduced.

Research from Law, Schaik, & Roto, (2014) called “Attitudes Towards User Experience (UX) Measurement” state that UX, as a newly established research area, still have many challenges in defining scopes of UX in general. One of argument that continuously being argued in UX measurement is the implication of UX to redesign of system under evaluation. UX measurement often concluded can play an important part in sustainability of interplay between evaluation and redesign by pointing the changes required, but there are still debates whether it is more or less important than qualitative feedback.

Research from Niranjnamurthy, Nagaraj, Gattu, & Shetty, (2014) named “Research Study on Importance of Usability Testing/ User Experience (UX) Testing” also emphasize on how important UX in every design process. In this research, they stated that good UX will make better quality of a software, highly accepted by user and easier to learn to use. See Table 2.1 to conclusion of previous studies.

Table 2.1

*Conclusion of Literature Studies*

No	Researchers	Title	Conclusion
1	Raja & Nirmala	An Extreme Programming Method for E-Learning Course for Web Application Development	XP method is suitable for short development and ensure good quality products
2	Ghani & Yasin	Software Security Engineering in Extreme Programming Methodology: A Systematic Literature Review	XP method has some limitation especially in implementation phase where it need help from other methodology
3	Mandel	Japan’s App Economy	Japan job generation rate is fast

No	Researchers	Title	Conclusion
4	Law et al.	Attitudes Towards User Experience (UX) Measurement	UX measurement often concluded can play an important part in sustainability of interplay between evaluation and redesign by pointing the changes required, but there are still debates whether it is more or less important than qualitative feedback.
5	Niranjanamurthy et al.	Research Study on Importance of Usability Testing/ User Experience (UX) Testing	Good UX will make better quality of a software, highly accepted by user and easier to learn to use.

Based on the researched result of above studies, we know that Japan job generation rate is fast based on Mandel, (2016) conducted result. To make a front-end development of web-based job search, we will be using XP method which is proven by Raja & Nirmala, (2016) that XP method can ensure good quality of a system and suitable for short term development but according to Ghani & Yasin, (2013), this method still has some limitation in implementing phase. And not to forget that UX also play a big part in sustainability of interplay between evaluation and redesign in the research that has been done by Law et al., (2014). As stated by Niranjanamurthy et al., (2014), a good UX that implemented in front-end design will make better quality of system and will make it easier to use.

## 2.2 Theory Review

### 2.2.1 Extreme Programming

According to Anwer, Aftab, Shah, & Waheed, (2017), Extreme Programming is a software development model developed by Kent Beck in 1996.

This software development method is more lightweight, flexible and low risk

disciplined approach with ability to manage rapidly changing requirements. It is considered more suitable for small and medium size teams. There are five XP values which are focused while XP practices are applied: (Anwer et al., 2017)

1. *Communication*: XP uses active and continuous communication among team members, team-client and project manager to find more suitable and economical solution of the problem.
2. *Simplicity*: XP keep things simple like simple plan, simple design and simple code. It prefers on designing simple solution of the problem.
3. *Feedback*: XP uses feedback that span on different time scale from seconds to months. Unit testing and integration testing are performed on daily bases, provide quick feedback about system. Feedback and communication help to keep project on the right way.
4. *Courage*: XP practices need courage. Sometimes it is needed to refactor the code or design that was completed after great effort. It also means that making such decision that never been made before for the system.
5. *Respect*: Self-respect and respect for other members is equally important that make it possible to implement XP programming. Showing respect towards work can force the developers to do high quality work.

In research of Anwer et al, (2017), whole development process consist of

six phases:

1. **Exploration Phase**  
This is the first phase of XP life cycle which deals with requirements and architecture modeling of the system. A meeting among customer, users

and developers is arranged to plan user requirements, architecture, tools and technology. Customer writes user stories in stories card that provide requirement about software. This phase can last for weeks and even months.

## 2. Planning Phase

In this phase is aimed to find the answers of two questions basically; what can be built within due date that have business value and what is the plan for next iteration. During planning phase, tasks are drawn from user stories and written on task cards. Decision about team size, code ownership, schedule, working hours are taken.

## 3. Iteration to Release Phase

This phase incorporates the basic development activities like designing, coding, testing and integration. Function in this application is released into small release with continuous integration. This is an iterative phase in which each iteration can span over one to four weeks.

## 4. Productionizing Phase

This phase is about deployment of the software in small releases. To check, whether the software is ready for production, acceptance testing, system testing, and load testing is performed. During this phase, programmers slow down the rate at which system evolves. As the risk become more important whether a change should go to next release or not.

#### 5. Maintenance Phase

In this phase new functionality is built while keeping the old one running. New architectural design and technologies can be introduced however XP team has to do more care as the system is in production also. The changes that cause production problems are stopped immediately.

#### 6. Death Phase

There are two possible situations in which a software system reaches to death phase. In first case, if the developed software has all the needed functionality and customer is satisfied and has no more stories, then it is time to finally release the system. In other case, customer may require a set of features that cannot be developed economically. In such situation, it will be better to close the software development which is called entropic death of system.

### 2.2.2 Information System

Information System is created from collection of information. Diversity of information play a role in categorizing the information forming an information system (Bajdor & Grabara, 2014). According to Sidh, (2013), information system consists of a few component as stated below:

1. Hardware, physical tools that can be used to collect, input, process, store and output data in form of information.
2. Software, collection of programs that used to run applications in computer.

3. Brain ware, human resource.
4. Procedure, chain of activity that running recursively with same method.
5. Database, an organization, collection of related data to make information searching easier.
6. Computer network and data communication.

Benefits in information system implementation are as stated below (Bajdor & Grabara, 2014):

1. Facilitate work performance
2. Access real time data changes.
3. Increase service quality of company
4. Ability to store information in large quantity
5. Ability to operate 24x7 globally
6. Create new job opportunity

According to Vatsa & Kumar, (2016) research, information system deployment activities are methods that assure clean installation of product during deployment. In information system deployment, quality is very important in any software development. To maintain quality and easy deployment, software quality assurance is used. This process ensures software need quality requirements for end-user. IT organizations are moving toward continuous integration, especially development with agile environment. To maintain continuous deployment is difficult and needs a movement from a traditional development. To overcome this barrier, the strategy called “The Stairway to Heaven” is followed by IT industry.

The path consists of five stairs (Vatsa & Kumar, 2016):

1. Traditional development
2. Agile R&D organization
3. Continuous integration
4. Continuous deployment
5. R&D as an experiment system

This stairs led to software development procedure to involve customer in development procedure and functions are delivered in short time with continuous feedback. This movement leads to IT organization to an ideal development procedure.

### 2.2.3 Database

According to Fibriany, (2017), database is collection of information systematically saved in computer to get information that related to each other to fulfill needs. Benefits of using database are:

1. Ease and fast, ability to selecting and output information fast.
2. Shared usage, can be used by everyone without recreating database on local system.
3. Centralized and controlled data, even though having multiple users, only 1 database needed.
4. Lower cost, lowers cost of hardware and software because only 1 server is needed to serve all user.
5. Data security, having user management with multiple access rights that adjustable based on user positions.

Easier development, make developing new application easier when having good database structure because no restructure needed.

According to Kumar & Azad, (2017), in relational database, normalization is a process to organize data to reduce redundancy. This process usually splits a database become multiple tables and then decide the relation between tables. The goal is to isolate data to ensure changes in another table applied to other tables.

In enterprise, data analytic involve data analytic queries involve aggregating big mount of data. In order to know the trend and make decision from it. Because of that, DBMS for handling such analytic queries is very important. In this case, DBMS will be applied as a data warehouse to handle data analytic queries.

(Maor, 2016)

#### **2.2.4 Website**

According to Suhartanto, (2012), website is one of applications consists of multimedia documents (text, image, sound, animation, video) using HTTP (Hyper Text Transfer Protocol) protocol and to access it, a software called browser is needed. All document will be displayed by translating HTML (HyperText Markup Language) files. HTML is one of many format used to create document and application that runs on web pages.

HTML5 is developed by join efforts of WHATWG (Web Hypertext Application Technology Working Group) and W3C (World Wide Web Consortium). Compared to HTML, there is two main difference of HTML5:

(Garaizar & Guenaga, 2014)

1. An emphasis on semantics HTML markup using new semantic elements and attributes on existing elements.
2. A growing set of JavaScript APIs that turning a web page into web apps. This APIs is not supported in all web agents. Therefore, there are convenient features detection libraries on polyfills that can covers a feature not provided natively by browser with a performance downside. (Garaizar & Guenaga, 2014).

User Experience or UX is everything that happens when users interact with your business or organization via application or online communication which is website whereas includes everything as they watch, hear, and as well as their emotional reactions. (Niranjanamurthy et al., 2014). The goal of UX design is to improve satisfaction of customer using utility, pleasure and ease of use provided in the process of interaction with product.

JavaScript is an object-based and dynamically typed programming language with higher-order functions. JavaScript offers flexible semantics which will make writing codes harder and more difficult. In order to use JavaScript in large project, Typescript often used to add optional typing for JavaScript to address this inefficiency.

Typescript is a superset of JavaScript developed and maintained by Microsoft in 2012. The main purpose of TypeScript is to enrich JavaScript with a module system, classes, interfaces, and static types like other programming language. TypeScript compiler will checks TypeScript program and produce equivalent JavaScript code to be run in run-time. (Nath & Bhattacharyya, 2016)

### 2.2.5 Angular

Angular is the leading framework developed by Google which is for building JavaScript heavy applications and often used to build Single Page Apps (SPA) which instead of reloading whole page, it is only reload the view whose content is requested. A SPA keeps track of history like when user navigates using back and forward buttons, the application is reasserted in the right state which provide a fast and fluid experience for the user. (Lim, 2017).

The survey result and analysis by Valente, Terra, & Santos, (2016) towards 460 developers, the answer for the features and key characteristics of Angular are as follow:

1. Pre-defined components for code organization: Angular has different components to modularize code, which may help in separation of concerns.
2. Dependency injection: this design pattern is used by Angular to manage dependencies between components, to reduce coupling and increase testability.
3. Use of POJOs in model components: Angular models are implemented using Plain Old JavaScript Objects (POJOs) which is no need to extend proprietary classes.
4. Templates in HTML: Angular uses DOM-based templates to simplify data binding operations, event mapping and updating large interface components.

5. Support to custom components: Angular custom directives can be used as a DSL to define reusable UI components.
6. Ease of writing tests: Angular provides the ngMock module to simulate logging operation, HTTP requests, etc.
7. Two-way data binding: Angular provides synchronization between data in the view and model.
8. Use of HTML to declare UI behavior: UI and its behavior is defined in standard HTML document in Angular.
9. One solution to manage many problems: Angular handles common decisions related web apps.
10. Supported by Google: This support may guarantee the evolution and constant maintenance of the project.

### 2.2.6 Heroku

Heroku is a cloud platform that supports several programming languages and being used as a web application deployment model. At first, Heroku only support Ruby programming languages, but now its support Java, Node.js, Scala, Clojure, Python, PHP and Go. Heroku is “platform as service” (PaaS) that may develop web application using a variety of software development tool. Heroku web apps are hosted on Heroku’s server, eliminating the need for developer to locate and/or maintain the server. (Solheim, 2015).

Heroku acts as a middleman for developer and AWS where Heroku tries to abstract DevOps complexity by offering PassS software to unsure user

experience with web interface and CLI in developing their application. Heroku deploys many different apps on what they call “web dynos” which are AWS shared instance. Because other apps is deployed in isolated container alongside with other apps, these dynos might experience variability in performance but in not the way that can affect an app workflow. (Stapper, 2017)