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ADOPTION OF AGILE SOFTWARE DEVELOPMENT IN VIETNAM

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ABSTRACT

Agile software development method is considered as an essential for software companies, bringing critical benefits. The adoption and implementation of agile software development method enable organizations to adapt to the dramatically changing business environment.

This thesis aims at investigating the adoption practices of agile development methods in companies in Vietnam, with three main goals. The first one is to explore the reasons and motivations determining the adoption of agile development methods. Secondly, this study examines the adoption process within software companies in Vietnam. Lastly, the thesis identifies the obstacles associated with the agile development adoption process.

The deductive approach, the qualitative research method, and the semi-structured interview are employed to conduct the research on the agile development adoption of selected case companies in Vietnam. A comparison of empirical evidence and existing literature was made to find answers for the research questions. Also, new themes which emerged from the data were identified as the generalization for multiple cases.

The research results indicate the reasons for adopting agile software development, the adoption process, and the obstacles occurring during the adoption in software companies in Vietnam. The biggest motivation for the adoption is the limitations of the old development process of the companies. Besides, the most challenging obstacles are the staff knowledge, the team cooperation and communication, and the management issue. Additionally, the authors discovered the common adoption process of the companies in Vietnam, containing four stages, namely decision, planning, training and experimentation.

Key words: agile software development, adoption process, obstacles, Vietnam

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GLOSSARY

CEO	Chief Executive Officer
CTO	Chief Technology Officer
EU	European Union
ICT	Information and Communication Technology
N/A	Not Available
SME(s)	Small and Medium Enterprise(s)
WIP	Work In Progress
XP	Extreme Programming

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1 INTRODUCTION

1.1 Background information

According to the annual state of agile survey by VersionOne, one of the largest agile management tool providers, 88% of the respondents said that their companies were implementing agile development methods. The survey was conducted in 2013 with the participation of 3501 individuals from the software development community (VersionOne 2014a, 1). Agile development methods, which enable organizations to adapt to the dramatically changing business environment, prove to be the solutions to the limitations of traditional approaches (Highsmith & Cockburn 2001, 120-122). In recent years, agile software development has been increasingly adopted and continuously used in many organizations in the software industry worldwide.

Various practices of agile development have been introduced over the years, for instance Scrum, XP, and Lean software development (Habib 2013). Agile approaches aim at the common goal to equip project teams with the ability to quickly address the uncertainty of software requirements, despite different implementation methods (Omar, Syed-Abdullah & Yasin 2011, 12).

In Vietnam, the software industry has been growing at a rapid pace and becoming the outsourcing haven of many international companies (Maher, Kourik & Chookittikul 2010, 300-301). In order to adapt to the global trend, Vietnamese enterprises have made great efforts to advance their working systems and strengthen their competitive advantages (D. Nguyen 2011, 23-24). As an improvement, agile software development has been adopted with an attempt to achieve better project management and success.

During their collaboration with the Vietnam Agile Forum, the authors had the opportunity to discuss with many developers, whose firms are implementing or planning to employ agile approaches for their projects. At the same time, the authors recognized the limitation of the community's awareness and knowledge of agile software development. In other words, Vietnamese firms encounter some obstacles to apply agile development methods to real life software projects. These

obstacles result from the lack of in-depth research on the adoption of agile development methods in Vietnam. Consequently, the authors have strong desire to study the current practices of agile development in different software companies in Vietnam, aiming at providing the general overview of the agile development's adoption in Vietnam. Additionally, an analysis of obstacles occurring during the adoption process will be made with an attempt to provide some suggestions for the successful emergence of agile development in software companies in Vietnam.

As the primary goal is to provide an overview of the adoption process of agile software development and its obstacles, the target readers of this thesis are varied. They can be the companies' top managers, which are the CEO, CTO, Information Technology Head, and project director. In addition, this study can be used as a reference source for software engineers and developers, project managers, students and researchers, who are interested in agile software development generally, and its adoption in Vietnam particularly.

1.2 Thesis objectives and research questions

The aim of this thesis is to describe the adoption of agile software development in the software companies in Vietnam, identify the motivations of the adoption, and explore the obstacles to the adoption process. These objectives can be fulfilled by clearly defining research questions, which is one of the most crucial steps of a research (Yin 2009, 10). Furthermore, the research questions express the research problems at the initial stage, and shape the research design for the whole research (Eriksson & Kovalainen 2008, 27). Consequently, three research questions (RQ) have been posed in this thesis, including:

- RQ1: Why do software companies in Vietnam adopt agile software development?
- RQ2: How is agile software development adopted in software companies in Vietnam?
- RQ3: What are obstacles to the adoption of agile software development in software companies in Vietnam?

The research purposes of this thesis are the combination of exploratory, descriptive, and explanatory studies. To be specific, Robson (2002, 59) identified that an exploratory study is flexible design, focusing on discovering and gaining an insight into a phenomena. The objective of a descriptive study is to capture the phenomena. Meanwhile, an explanatory study aims at studying a problem or situation to explain different aspects of the phenomena. (Robson 2002, 59-60).

1.3 Thesis structure

The following figure demonstrates the structure of this thesis, which contains two main parts, namely the literature review and empirical study.

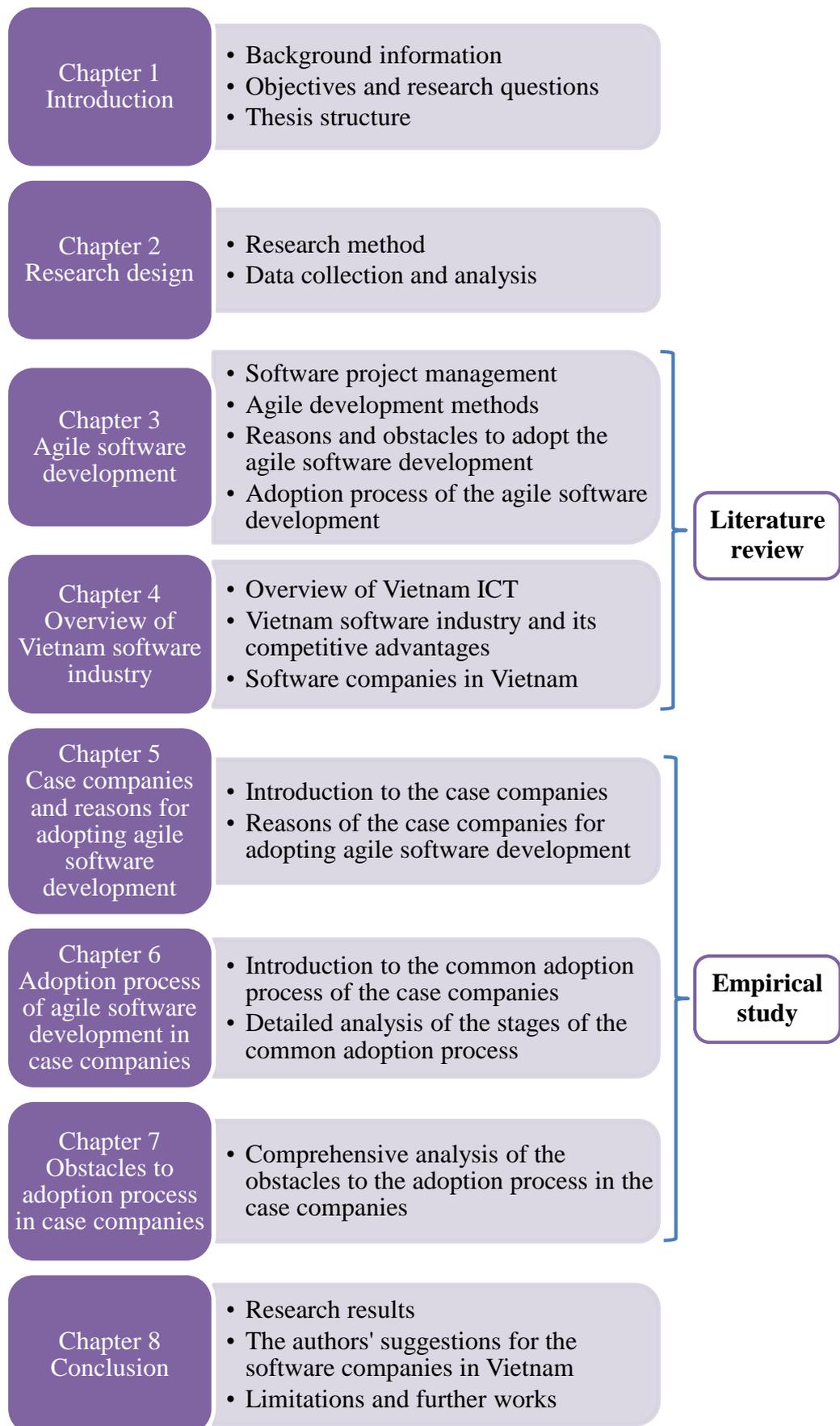


FIGURE 1. Thesis structure

The thesis begins with the introduction in Chapter 1, which concerns the background information, the authors' motivation, the objectives, the research questions, and the structure of this thesis. In Chapter 2, the authors present the research design, including the research method, the research approach, the data collection and the analysis. Next, Chapter 3 and 4 cover the literature review part of this study. Chapter 3 reviews the theory of agile software development in regards to the software project management, the agile principles and practices. These are followed by the reasons and obstacles to the adoption of an agile development method, and a theoretical adoption process. After that, in Chapter 4, the authors provide general information about the current circumstances of the Vietnam ICT and software sector. In which, the development, the competitive advantages, and the overview of software companies in Vietnam are presented.

Chapter 5, 6 and 7 constitute the empirical part of this study. To be specific, in chapter 5, the brief introduction to case companies is given together with their reasons for adopting agile software development. Continuing with Chapter 6, the authors provide the common agile adoption process of the case companies in this thesis. Subsequently in Chapter 7, the authors discuss about the obstacles that the case companies faced during their adoption processes. Within this empirical part, the analysis of case companies is organized based on the data collected from different interviews with the representative of each case company. As a result, the authors aim at answering the three research questions of this study.

Finally, Chapter 8 concerns the answers arising in the empirical part to address the research problems. In addition, the authors provide some suggestions for the managers of software companies in Vietnam, and this study's limitations as well as the further work possibilities included. In the end, Chapter 8 appears to make the summary for the whole thesis.

2 RESEARCH DESIGN

In this chapter, the research questions, the research methodology, and the actual data collection and analysis of this study are adequately defined, aiming at capturing the relevant research process and producing the applicable research outcomes.

2.1 Research method

Eriksson and Kovalainen (2008, 25-26) emphasized the importance of research method in a study, which supports and provides the authors with the techniques of producing an overall plan for the research. To be specific, the research method determines the approach and procedure to find the answers for the research questions. At the same time, the research method illustrate for the selection of the method, in order to fulfil the research objectives. (Greener 2008, 10). Breaking into components, there are two key factors composing the concrete research method, namely the research design and the collection of data.

The research design firstly concerns the determination of the research approach, which leads to the primary answer to the research question at the initial stage. Research approach is classified into three main categories, namely deduction, induction, and abduction (Saunders, Lewis & Thornhill 2012, 143-149). In essence, a deductive research begins with the introduction of a theory or hypothesis developed from the authors' background knowledge. Subsequently, a research strategy is formulated to test the theory or hypothesis. In contrast, if the data collection is performed in the first place and a theory is generated based on the analysis of the data, an inductive approach is applied. Meanwhile, abduction is the combination of deductive and inductive methods. In which, collected data is used to form a new or complement an existing theory, and then such theory is tested through additional collection of data (Saunders, Lewis & Thornhill 2012, 143-149). As driven by this thesis' objectives, the deductive approach is applied as the dominant guideline for the research. Figure 2 in the following illustrates the research design of this research.

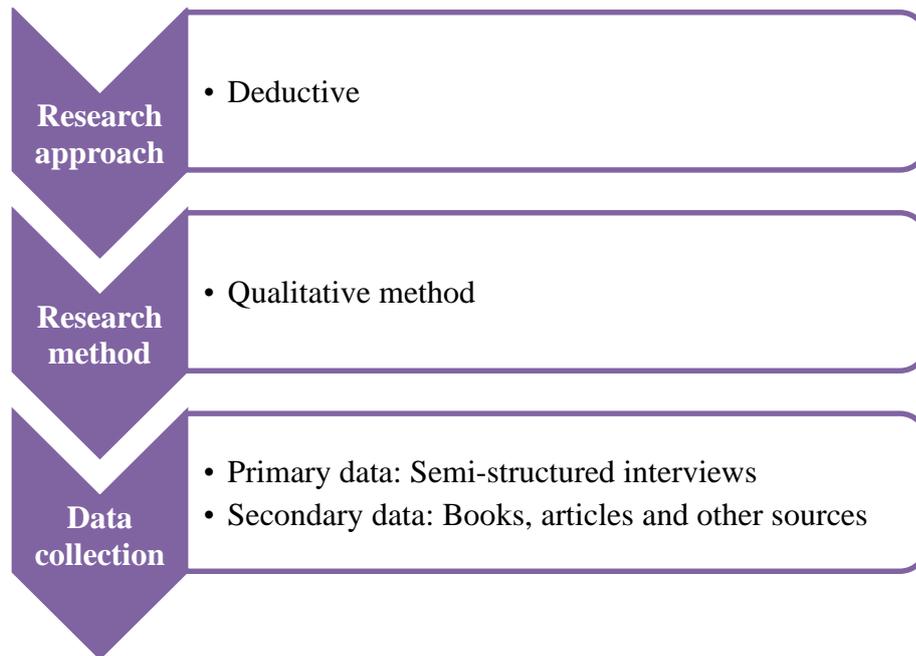


FIGURE 2. Research design

The nature of this study is the descriptive research with three main purposes. Firstly, it aims at describing the adoption process of an agile development method in software companies in Vietnam. Secondly, it is concerned with the explanation of the reasons for the adoption process. The third purpose is to explore different obstacles when a company determines to implement an agile development method. Therefore, the qualitative method appears to be the most appropriate approach for this research. The approach assists the authors to better understand the phenomena and gain comprehensive knowledge on the study of processes and participants (Rogelberg 2004, 162-164). Conversely, according to Arcidiacono et al. (2009, 166-168), quantitative method is employed to identify a phenomena or event by a hypothesis, which is formed by the researchers. As a result, the authors decide to employ the qualitative approach in this research.

In order to achieve this thesis' objectives, the authors pay attention to the choice of the research strategy among a variety of them, which can be named for example, case study, grounded theory, narrative research, action research, etc. (Eriksson & Kovalainen 2008, 7). The selection of a suitable research strategy is primarily driven by the research questions, the research objectives, and the research approach. Additionally, the authors need to consider their existing

comprehension of the subject, the amount of time, and the availability of resources accessed. (Saunders, Lewis & Thornhill 2012, 173).

Darke et al. (1998, 275-278) highlighted that the case study strategy is employed with the purpose of understanding the context of the research and the processes. In addition, it is suggested by Yin (2009, 8-14) that the research questions *why*, *how* and *what* of this research are usually followed by the utilization of case studies. Therefore, the authors employ case study as the main strategy for the qualitative research approach.

2.2 Research process

The research questions of this thesis are *why*, *how* and *what*, which are classified as the common category of descriptive research question to describe a phenomena (Saunders, Lewis & Thornhill 2012, 41). In order to find answers to this thesis' research questions, the actions illustrated in Figure 3 are taken in sequence.

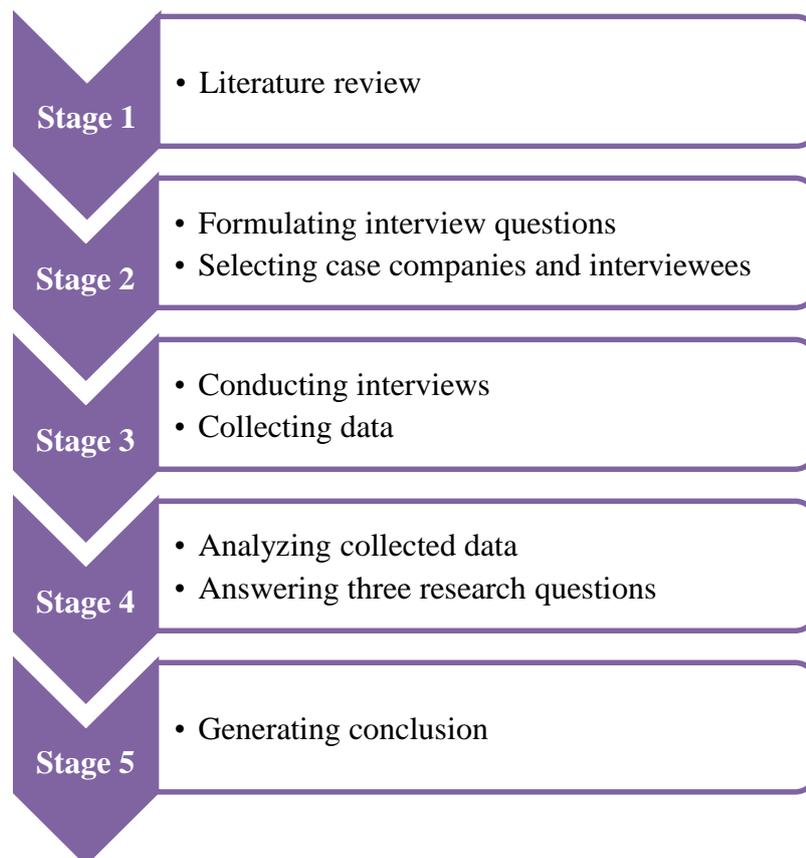


FIGURE 3. Research process

2.3 Data collection

In this thesis, the data collected from the interviews with the representatives of the software companies in Vietnam is the primary and critical source of evidence.

Eriksson and Kovalainen (2008, 80) indicated three different kinds of the qualitative interviews, namely structured (standardized), semi-structured (guided), and unstructured interviews. By organizing semi-structured (guided) interviews, the researchers prepare a framework of themes and questions to guide the conversation, but additional questions can be raised depending on each interview (Saunders, Lewis & Thornhill 2012, 374-375). In this research, the authors selected the semi-structured interview with the open-ended questions to examine the participants' experiences about the adoption of agile software development in their companies.

The literature review, which depicts an implementation of an agile development method in a software company, is the foundation for the interview questions (Saunders, Lewis & Thornhill 2012, 384-385). The interview questions are divided into three categories, based on the three research questions of this research. The first category is concerned with the decisions of the participants' companies on migrating to the agile development method from their old development processes. The second category continued with the questions about the execution of the adoption in these companies. Last but not least, the third one ends with the obstacles to the adoption processes of the case companies. The authors organize the open-ended questions in order to encourage the interviewees to openly express themselves and their stories. Hence, the authors are capable of capturing the rich and extensive data for the analysis of this research (Darke, Shanks & Broadbent 1998, 281-284).

In order to get appropriate cases to the research's criteria, the interviewees are chosen purposively rather than randomly. In addition, the authors could acquire informative conversation as well as in-depth exploration. Therefore, the selection of participants was critical and demanding, which was based on their relation and contribution to the company's software development processes. According to such criteria, the company managers, developers and directors, who involved in the adoption process of agile software development, were invited. The interviews

were conducted personally via phone or video call at their best convenience. In each interview, the authors took advantage of utilizing both methods of audio-record and note-taking to maximize the value of data collection (Saunders, Lewis & Thornhill 2012, 394).

2.4 Data analysis

All the interviews of this research were conducted and transcribed in the Vietnamese language. The authors also made the analysis of the interviews in Vietnamese to prevent the loss of data's meaning when being translated to English in advance. Only the outcomes of the analysis were reported in English.

After producing the full interview transcripts, the authors used the coding technique to process the responses of the participants. The authors classified the responses into different categories, which are based on the three research questions and the objectives of this study (Patton 2002, 463-464). By carefully reading each transcript, these categories were labeled with different codes. In which, the codes illustrated the relation between each category and the research purpose. Afterwards, the authors highlighted all the critical key words, phrases and sentences, which were believed to answer the research questions.

Additionally, the comparison between the interview transcripts was organized to seek the similarities and differences between the case companies. In the end, the authors elicited the reasons for adopting agile software development, the adoption process, and the obstacles to the adoption of the case companies.

3 AGILE SOFTWARE DEVELOPMENT

Agile software development contains a collection of practices to manage software development projects. Being considered as the alternatives to the traditional methods, the agile development methods assist software companies to adapt with the uncertainty of software development. In this chapter, the background information concerning the software projects and the development approaches will be introduced, following by the reasons for adopting agile software development and its adoption process. In the end, the authors will identify the obstacles occurring during the adoption of an agile development method in the software companies.

3.1 Software project management

Some background information about project management and software development will be provided in order to understand the methodologies and the key success factors behind a software project.

3.1.1 Project management

Project Management Institute defines a project as “*a temporary group activity designed to produce a unique product, service or result*” (Project Management Institute 2014). For instance, a project can be the construction of a house, the setup of an IT infrastructure, and certainly the development of a software product. In order to obtain the success, a project definitely requires an expert control by the competent people, and hence the term *project management* was introduced.

Project management is defined as “*a branch of learning that deals with the planning, monitoring, and controlling of one-time endeavors.*” (Dinsmore & Cabanis-Brewin 2010, 5). In other words, it is the series of knowledge, skills and techniques, which are applied to lead a project to its successful outcomes (Project Management Institute 2014). The success level and quality of a project are determined by the time, cost, and performance, which are called the three constraints of a project (Kerzner 2009, 5). Thus, a project is successful once it is delivered on time, within budget, and meeting the expected quality (Kerzner 2009,

7). The below figure illustrates the relation between these constraints and the project management.

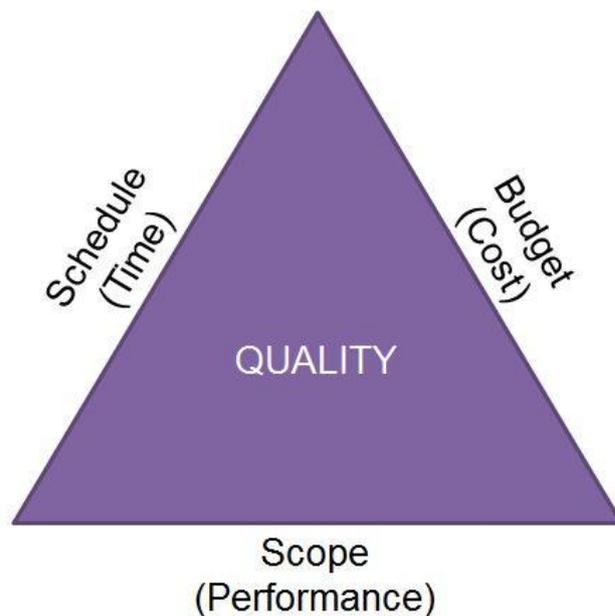


FIGURE 4. Project management triangle (modified from Kerzner, 2009, p. 7)

Schedule (Time)

The project schedule concerns the conduction of all activities by time to accomplish a project. Time is an important aspect of a project, which directly influences on the delivery date. A project schedule can be easily built beforehand, but there is no guarantee of the certainty of the resources availability or the project plan during the project. (Project Management for Development Organizations 2013, 3).

Budget (Cost)

The budget of a project is the total amount of money spending in the related activities to complete the project. Therefore, the budget control aims at managing the approved amount of money to deliver the project's outcomes. Poor management of the project costs will lead to the additional expenditure or failure. (Project Management for Development Organizations 2013, 3).

Scope (Performance)

The project scope reflects the limitations of a project, concerning the outcomes of a project. The scope of a project should be clearly defined within the stakeholders prior to the actual implementation to avoid additional works and unexpected costs. (Project Management for Development Organizations 2013, 2).

3.1.2 Software development

Sommerville (2007, 5) distinguished the term software as a collection of separate programs, configuration files for program setup, documentation to explain the system structure, and user manual. In other words, software consists of two main elements, namely computer programs and their related documentation. The software products can be classified into two fundamental categories:

- Generic software: They are developed by the software firms, and can be purchased on the open market (Sommerville 2007, 5). Adobe Photoshop or Microsoft Word are the examples
- Customized software: This type of software is solely developed based the need of a particular customer or organization. A customized software product is commissioned and controlled by the customer or the organization that places the order. (Sommerville 2007, 5-6).

Münch et al. (2012, 1) emphasized the importance of a software product in doing a business, which helps the business raise its competitive. The development of new software may involve a great deal of people and teams, expecting great efforts and many activities. Therefore, the good management of the development process is strictly required. (Münch, et al. 2012, 1-3). Due to the type of the software project, the management strategy is appropriately chosen to ensure the project success level. Sommerville (2007, 93) also indicates three main different points of a software project, leading to the difficulties in management. Such differences are summarized in the following table.

TABLE 1. Distinction points of software project (Sommerville 2007, 93)

Name	Description
Abstraction	<ul style="list-style-type: none"> • Untouchable and intangible product • Development progress can be only reviewed by documentation
No standard process	<ul style="list-style-type: none"> • Different from one organization to other organization • Impossible to forecast if the current process produces problems
“One-off” project	<ul style="list-style-type: none"> • Problems with large software projects • Difficult to anticipate errors • Nontransferable from previous project to new project due to the fast changing technologies

As a result of such differences, a great number of software projects are unsuccessful because of the delay or over budget. Conversely in many projects, such problems are well addressed to achieve the success. (Sommerville 2007, 93). In the following sub-chapters, the authors will present the management approaches of a software project in terms of the traditional and the modern agile development.

3.2 Traditional waterfall model

The waterfall model, or the software life cycle, is popularly known as the first model of the software development process, which describes the development as a linear and sequential process (Sommerville 2007, 66-67). In essence, the model consists of five phases, in which a phase is triggered once its previous phase is completed. The detail of waterfall model is expressed in the following figure.

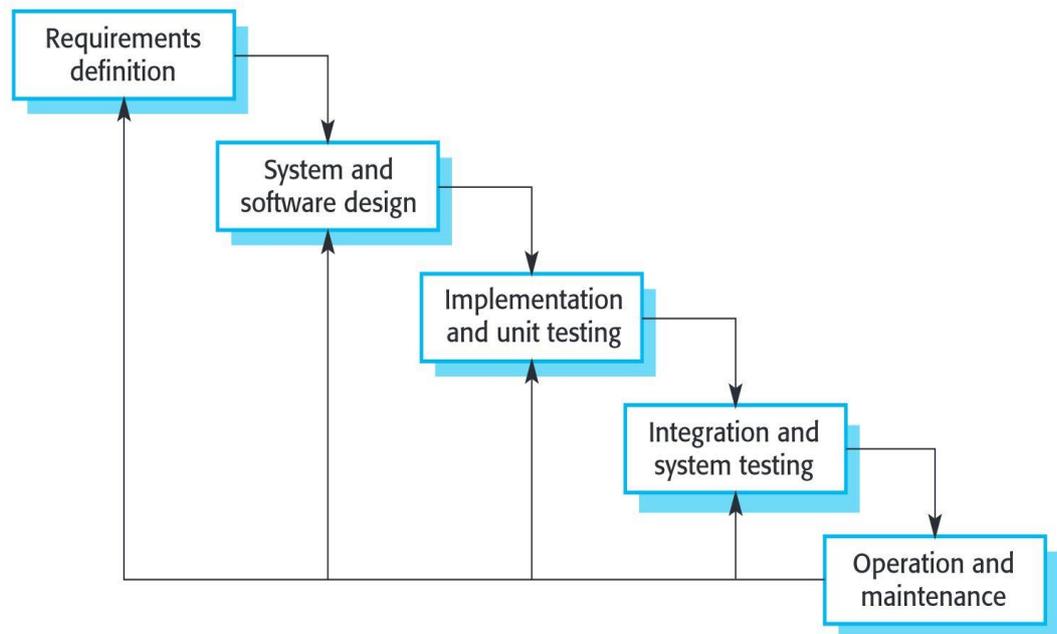


FIGURE 5. Waterfall model (Sommerville 2007, 66)

Requirements definition

The requirement phase is the initial step to a software development project, in which the list of requirements is collected. The main activities of this phase are the discussions and negotiation with the customers in order to study the customers' needs. Afterwards, these requirements are expressed in detail and documented to serve as a system specification. (Hughey 2009).

System and software design

Based on the outcome of the previous phase, the design phase aims at establishing the comprehensive system architecture in regards to the hardware and software. To be specific, the design documentation concerns the data, files, computer's structure, security and backup features. Additionally, the implementation and testing plans for the consequent phases are also produced. (Avison & Fitzgerald 2006, 33).

Implementation and unit testing

Following the design, the initial development commences based on the design documents. The phase concerns the coding of the program units, including the testing activities. Therefore, such program units are verified to work and match their specification. (Sommerville 2007, 67).

Integration and system testing

This phase refers to the assembly of separate program units, produced in the previous step, to finalize the whole product. In addition, the integration test will be performed so as to eliminate any errors and ensure the requirements matched. After passing the integration test, the new software can be delivered to the customers. (Sommerville 2007, 67).

Operation and maintenance

In this last phase of the waterfall model, the software is installed and moved to the practical uses of the customers. During their usages, there are possibilities of errors and system failure, which lead to the maintenance. The maintenance covers the activities of fixing such errors to enhance the system performance. (Avison & Fitzgerald 2006, 34-35).

3.3 Manifesto for Agile software development

Abrahamsson et al. (2002, 7) commented about the fast changing pace of the software development, and hence the commencement of various methodologies over the decades. Apparently, the developer community has witnessed many approaches to the software project management, which can be grouped into the traditional and iterative generations. However, the project success level still stays at a low level due to the continuation of exceeding implementation time, budget, and lower-quality products. (Ambler & Lines 2012, 25). To find a solution, a group of top experts in the software industry gathered to brainstorm for a better approach. Consequently, the Manifesto for agile software development was introduced.

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

(Beck et al. 2001)

The following figure visually illustrates the agile manner and methodology in a software development project.

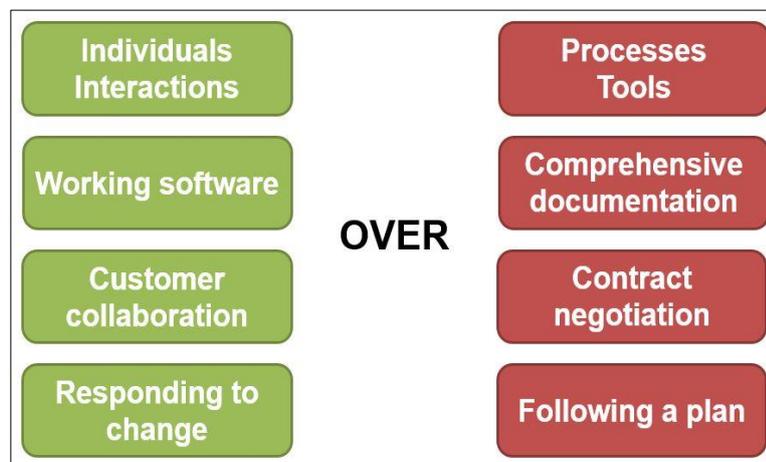


FIGURE 6. Manifesto for agile software development

3.4 Characteristics of agile development

It is undoubtable that the today's business competition stays at the very high level. Such situation keeps the software producers on their toes and allows the new technology and method to spread. Subsequently, the software products require to be delivered more quickly and be more flexible to adapt to the fast business' pace (Highsmith & Cockburn 2001, 120). Therefore, the agile software development was introduced to satisfy the needs of the business nowadays. The characteristics of the agile development are covered in this sub-chapter to understand more about the agile methodology.

Modularity and Iterative

A practice of the agile software development splits the development process into smaller units to be completed in many cycles, which are called the iterations. The agile methodology embraces the failure, and addresses it after many repeated iterations. The deliverables are refined after each iteration until all the software requirements are met. (Avison & Fitzgerald 2006, 139-140).

Adaptive

Unpredicted risks are dealt by the frequent activities of re-planning and making changes to the process if they are necessary. If the goal is not achieved after each

short iteration, the new activities are added to fulfill that goal. Similarly, there are possibilities to remove the unnecessary activities once the risk becomes irrelevant. (Miller 2001, 386).

Incremental

Instead of building a system in one big process, the agile methodology allows to gradually develop the system. In essence, the critical goal is to make a usable system as soon as possible. The additional functions and features are made incrementally and integrated into the system within each iteration. (Miller 2001, 386).

People-oriented

The agile development depends on the competence of the team members rather than the process or the technology. In a software project, the risks cannot be completely defined at the start and they unexpectedly arise during the implementation. Meanwhile, the adaption to such unpredictable risks is determined by the people who involve in the project. Therefore, the members of the development team play the vital roles in dealing with such risks. (Avison & Fitzgerald 2006, 143-144).

Collaborative

Since the agile development is people-oriented, the collaboration and communication between the project's stakeholders are the key success elements. Communication concerns the way of transferring information between people or team members to deliver a successful product. Undoubtedly, communication is a vital part of a software project. (Avison & Fitzgerald 2006, 144, Miller 2001, 387).

3.5 Agile development method

Over the decades, there has been a great deal of methods which are defined as the agile development to some degree. Taken as the examples, those methods are XP, Scrum, and Lean software development. In this sub-chapter, the authors provide an insight into the most popular practice of agile software development, namely

Scrum. In addition, the Kanban board, serving as the schedule management tool of the development team, is also presented.

3.5.1 Scrum

Scrum is an iterative, incremental framework for projects and product or application development. (Sutherland 2010, 6)

Emerged in 1993 by the first Scrum team and formed in 1995, Scrum is currently the most popular agile method according to a recent research revealed in 2014 (VersionOne 2014a, 4). Originally, the term 'scrum' was introduced in rugby football which relates to "a self-organizing (self-managing) team moves together down the field of product development" (Sutherland 2010, 7). In such manner, the Scrum approach in software development was born to perform the periodic management activities, in which any insufficiency or problems are identified at its earliest. To be specific, the development process is broken down into various shorter iterations, which are named sprints. After every sprint, the project is subsequently reviewed and re-planned. Therefore, the Scrum approach creates a developing environment, in which the list of requirements is inadequate at initial stage and can be adjusted rapidly during the development. (Schwaber & Beedle 2001, 106-108).

Scrum process

According to Abrahamsson, Salo, Ronkainen and Warsta (2002, 28), Scrum fundamentally consists of three phases, namely pre-game, development, and post-game. The following figure illustrates the detailed of the three phases of the Scrum framework.

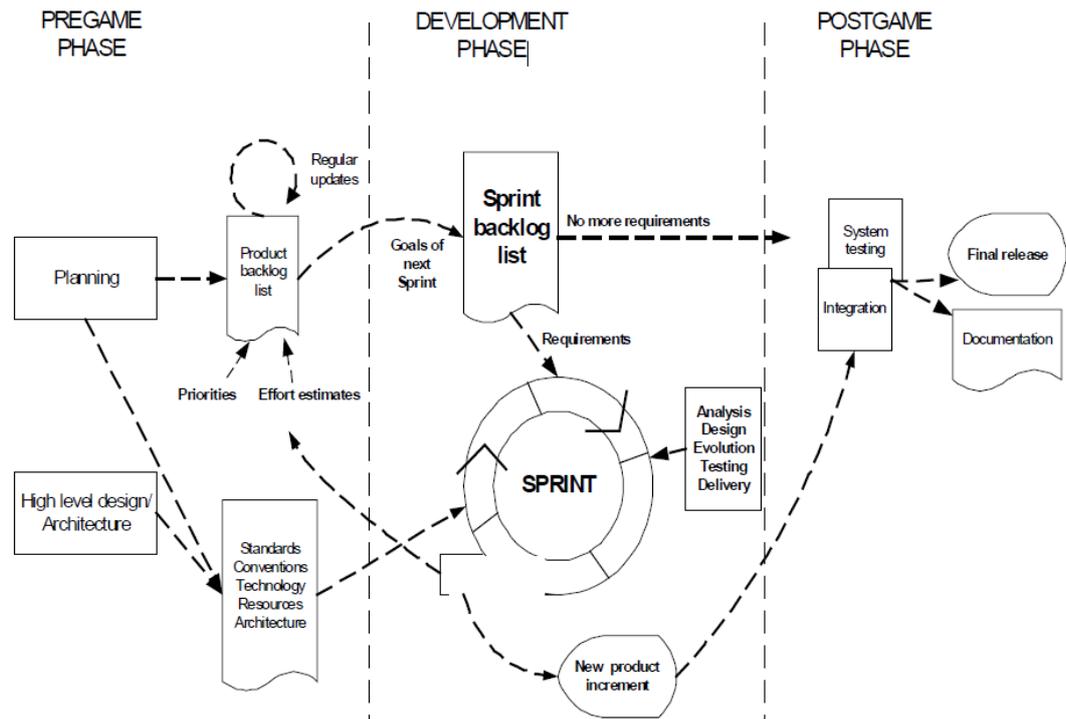


FIGURE 7. Scrum process (Abrahamsson, et al. 2002, 28)

Pre-game phase

The goal and output of this phase is to produce the plan of the developing system. In which, all the known requirements are described in the product backlog list, and are constantly updated with the more precise estimation during the project (Schwaber 2004, 10). Such requirements are created and prioritized by the customers along with the sales and marketing division, and the software developers. Additionally, the issues of the resources, tools, risks management are also included in the product backlog this planning phase. (Schwaber & Beedle 2001).

Development phase

Development is the main phase and the agile part of the Scrum framework, aiming at accomplishing the software product. Schwaber and Beedle (2001, 50-51) also insisted the possibility to identify the unpredicted changes of the requirements, resources, and quality within this phase. The phase consists of many sprints, in which each sprint typically lasts from one to four weeks (Sutherland 2010, 10). To be specific, Schwaber and Beedle (2001, 50-50) defined a sprint as “*the team*

works for a fixed period of time”, containing all the stages of the traditional software development.

Post-game phase

The development of the software products finishes once the product backlog is completely accomplished. Subsequently, there is no further increment required in the development, leading to the works of the integration, testing, and documentation. After such works are completed, the system is ready to release or delivery to the customers. (Abrahamsson, et al. 2002, 30).

Roles and responsibilities

Understanding the roles and their responsibilities is very important in order to have a good performance of the development team. According to Sutherland (2010, 14), there are three primary roles in Scrum, namely the Scrum Master, Product Owner, and Scrum Team.

Scrum Master

A Scrum Master, introduced in the Scrum framework, is usually misunderstood as the project manager or the manager of the team. However, Schwaber (2004, 16-17) stated and emphasized that the Scrum Master does not have any authority over the team. In other words, the Scrum Master plays the role of the guide to assist the team to implement Scrum successfully (Sutherland 2010, 16). A software project, which is carried out with Scrum, should follow the certain practices and rules to achieve the success. Therefore, the Scrum Master interacts with the team and the customer to ensure the project’s progress. (Sutherland 2010, 16).

Product Owner

Sutherland (2010, 14) defined the Product Owner’s responsibility for identifying and prioritizing the features of the software product. Such features are saved to the product backlog, which is used for each sprint. In other words, he has the authority to make the final decision of the tasks relating to the product backlog (Abrahamsson, et al. 2002, 30-31).

Scrum Team

The Scrum Team, who builds the software, is responsible for all of the development activities to achieve the goal of each sprint (Abrahamsson, et al.

2002, 31). There is no real leader in the Scrum Team because the team is self-organized and involves in the estimation of the work efforts for each sprint (Schwaber & Beedle 2001, 35-36). In consequence, the Scrum Team has the impacts on the creation of the sprint backlog, revision of the backlog, and adjustment of the backlog list (Sutherland 2010, 15-16).

Scrum flow

The Scrum flow is concerned with the product backlog, sprint, sprint planning meeting, daily Scrum meeting, and sprint review as well as sprint retrospective meetings. These concepts are explained as the following.

Product backlog

The product backlog contains the prioritized list of the product's features, which is created from the Product Owner's vision of the product. However, the other stakeholders of the project also contribute to the creation of the product backlog. (Schwaber 2004, 10). In the software project, this backlog will be remained and expanded during the product's lifetime, reflecting the changes in corresponding to the unpredictable needs of the customer (Sutherland 2010, 18-20).

Sprint

In the Scrum framework, the software product developed in many cycles, which are called sprints. A sprint, normally lasting from one to four weeks, aims at producing a new deliverable and usable increment of the software. (Sutherland 2010, 10). The sprint is planned to finish on a specific date without any extension even though the work may not be completed (Sutherland 2010, 20-24). The following figure illustrates the detail of the practices and inputs of a sprint.

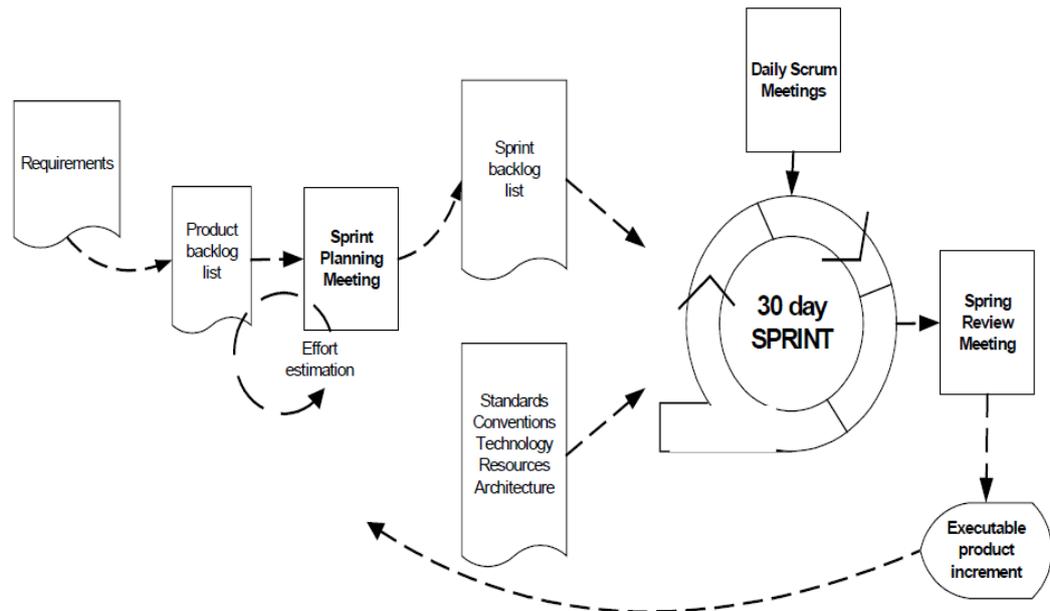


FIGURE 8. Practices and inputs of sprint (Abrahamsson, et al. 2002, 33)

Sprint planning meeting

At the beginning of each sprint, a sprint planning meeting is conducted by the Scrum Master, comprising of two phases with the different participants, respectively (Abrahamsson, et al. 2002, 33). Regardless the Scrum Master, the first phase involves the participation of the Product Owner, manager, and the product's users, focusing on the goals and the functionality of the sprint. Meanwhile in the second phase, the Scrum Master and the Scrum Team discuss about the implementation of the product increment during the sprint. (Schwaber & Beedle 2001, 47). Specifically, a sprint backlog, which consists of different tasks broken down from a selected item in the product backlog, is created. Such tasks in the sprint backlog list are accomplished by the Scrum Team during the sprint. Unlike the product backlog, the sprint backlog is certain until the sprint is completed. (Schwaber & Beedle 2001, 49-50).

Daily scrum meeting

In order to track the progress, the Scrum Team and the Scrum Master conduct a daily 15-minute meeting to discuss about the development tasks. Such meetings serve as the planning sessions, in which the team members check the list of the to-do and the done tasks. The information presented in the meetings helps to ensure

the team transparency and improve the development process. (Sutherland 2010, 24-26).

Sprint review and sprint retrospective

Once a sprint finishes, the sprint review and sprint retrospective meetings are organized with the participation of the Scrum Master, Product Owner, Scrum Team, and everybody who is interested. The purpose of the sprint review is to inspect what was accomplished, and discuss about what to do next. On the other hand, the sprint retrospective meeting is the chance for the team to present what is working and what is not and hence the agreement on the solution and the changes. (Sutherland 2010, 10).

3.5.2 Kanban

Basically, the agile methods form a cross-functional team, who involves in all the activities of a software project. Such activities are concerned with the entire development stages, ranging from the analysis and design to the coding and testing. (Shalloway 2011, 12). However, the software companies encounter the challenges to spread such team model to the whole organization. Furthermore, due to the prevention of the external intervention, the performance of the cross-functional team may be negatively affected by the work overload. (Shalloway 2011, 12). In consequence, the team is accidentally isolated from management.

Being a solution, the Kanban method was introduced in to order to address such problems of the team-based agile approaches. The word *Kanban* is derived from the Japanese language, which means *Visual Card* in English (Boeg 2011, 11). The method provides the visual look of the work progress, aiming at controlling the transition, management, and allocating the workload (Kniberg & Skarin 2010, 4-5). To be specific, Kanban limits the Work In Progress (WIP) to ensure the team's performance and prevent the team from the overload (Boeg 2011, 13). In other words, all the works are made visible and reflected by the workflow, illustrated on a board. In which, the states of the workflow are presented respectively by different visual cards placed on that board. Each workflow's state has a limited amount of in-progress items with the estimation of the accomplishment time.

(Kniberg & Skarin 2010, 4-5). The following figure illustrates an example of the Kanban workflow.

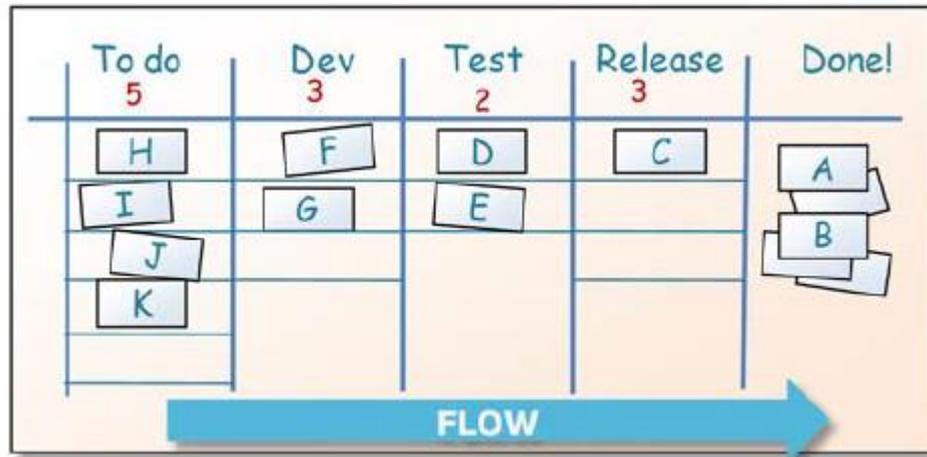


FIGURE 9. Kanban flow (Kniberg & Skarin 2010, 5)

Despite the simple concept, the Kanban method is believed to bring the huge improvement to the software development process, in particularly the incremental development (Boeg 2011, 14). Apparently, the WIP is limited so that a new activity can be started not until an in-progress one is delivered. The team's members can start with any activity with the agreement on time; understand the current process by inspecting the visual cards on board. (Shalloway 2011, 13). Whenever there is an available slot on the board, a new item can be added by the team's members. (Kniberg & Skarin 2010, 16).

Due to the limitation of the WIP, the project's stakeholders are encouraged to classify the importance of the tasks. Consequently, the most important and critical tasks are prioritized to execute and delivered earlier. (Kniberg & Skarin 2010, 16). Furthermore, Kanban assists to remain the team transparency and the predictable development process since the workflow is clearly shown on the board to everybody (Shalloway 2011, 14-15).

3.6 Reasons for adopting agile software development

In response to the need for a more advanced software development method, agile development appears to be a promising choice for companies. Hence, a vast number of software companies worldwide follow the trend to adapt this new

method, with different reasons and motivations. For years, many researchers have been studying such motivations behind the adoption of the new method. In which, Sutherland (2010, 12) mentioned the major drawback of the traditional software development method, which is the poor flexibility. That means the traditional method does not allow much revision and addition of the software requirements (Avison & Fitzgerald 2006, 38-42). Once the product comes to the testing stage, it is very difficult to make changes on the design and requirements. Meanwhile, the changes in business and technologies make software projects become considerably more complex with the involvement of many stakeholders (Hass 2007, 2). Consequently, it is a big challenge to anticipate the expectations of these stakeholders from the beginning. In addition, there is a likelihood that the software requirements have to be adjusted during the implementation in order to gain the product's competitive advantages. Rather than leading to additional costs, this might even be impossible to carry out. Therefore, Sommerville (2007, 68) recommended that the development team should employ the waterfall approach when every requirements are definitely clear and almost unchanged during the development.

The agile software development, in contrast, can address most of the problems with the waterfall model and quickly becomes popular within software projects. Especially, the agile development methods have been successfully adopted in many companies worldwide (Sutherland 2010, 7). In the Figure 10, the comparison between the agile and traditional development is demonstrated.

AGILE DEVELOPMENT VALUE PROPOSITION

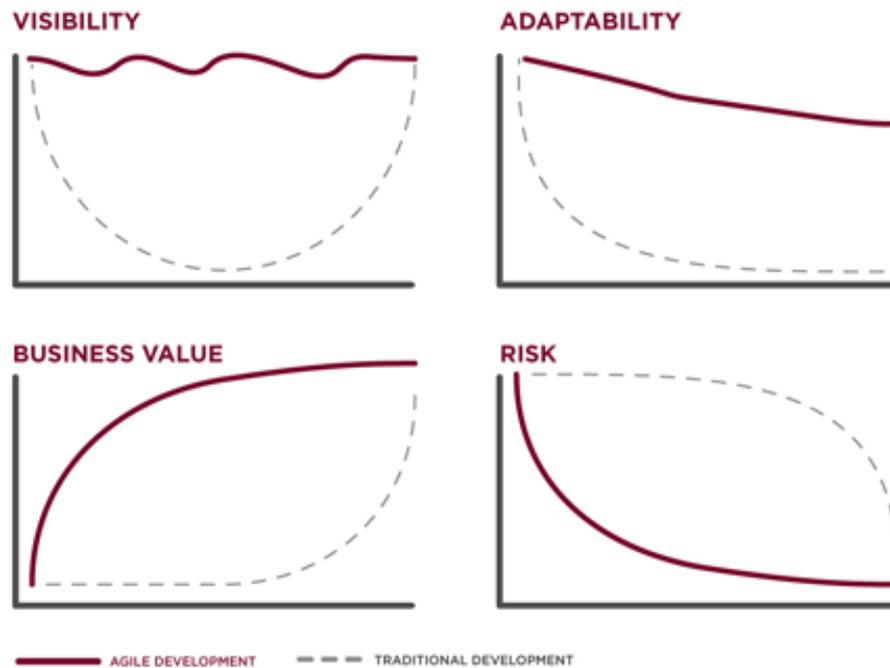


FIGURE 10. Agile development value proposition (VersionOne 2014b)

As can be seen from the figure, the agile development enables the maximization of the business value of the project progress. This is obtained by rushing the delivery of the initial business value, frequent feedback, and the adjustment of the software (Hass 2007, 4). Additionally, the adaptability is also high because of the iterative nature of the agile methodology. Any change can be detected in the early stage and it does not disrupt heavily on the current work flow (Hass 2007, 5). Furthermore, the progress of the project is maintained at a constantly high level because the software is deployable for early evaluation. The measurement is as a result better and more accurate (VersionOne 2014b). Last but not least, the risks are properly reduced because they are discovered immediately at the initial stages (VersionOne 2014a). The advantages of the agile development are discussed in more details in the following.

Meet the customer's needs

In the agile development projects, the customers are required to regularly participate in the development process (Avison & Fitzgerald 2006, 143-144). The

involvement of the customers assists the development team to clearly identify the requirements of the software products. On the other side, the customers can gain better understandings about the products and their actual needs (Hass 2007, 8). Consequently, the problem concerning the differences between the end product and the initial description can be addressed.

Realistic customer expectations

When dealing with the customers with no background knowledge on IT and the software development, the development team usually encounters unrealistic demands (Avison & Fitzgerald 2006, 81-82). For instance, the customers may falsely estimate the time and effort to develop a software feature, causing the disagreements between the customers and the development team (Koch 2011, 3). However in agile projects, the customers involve in the most important activities of the development process. Such activities are, for example, defining the high-level requirements, elaborating the details, providing the feedbacks on the products and possible changes (Koch 2011, 3-4). Thus, the customers gain deeper knowledge on the developers' works and keep their expectations reasonable and achievable.

Greater agility

During a software project, many changes may happen, such as the changes in the requirements, the customers, the developers or even the organization (Koch 2011, 2). The iterative nature of the agile methods makes easy adaptation to those changes. In other words, prior to the start of a new iteration, the detailed plan is made in corresponding to any change discovered. (Avison & Fitzgerald 2006, 139-140). In consequence, the development team is able to deal with the unpredictable request of changes in the software requirement. Nevertheless, with the traditional approaches, the less predictive problems arise within the stages that the changes are disruptive or even impossible (Koch 2011, 9). The situation results from the late discovery of the problems and the slow reaction of the development team and the customers to them.

Development team

The agile development team is self-organized, which requires no project manager or anyone who has absolute control over the project. In addition, the customer also

acts as a team member, contributing to the success or failure of the project. (Koch 2011, 4-5). Consequently, both the customers and the developers are responsible for the project, and hence a working environment with the mutual trust and respect.

Also, the iterative and increment characteristics of the agile development also enhance the team productivity, requiring the delivery of an executable piece of the product after each iteration (Coram & Bohner 2005, 367-368). Rather than being outsiders to the development team, the customers play the vital role in reviewing, giving feedback, and accepting the delivery. Each iteration is considered as a milestone from the customers' point of view (Avison & Fitzgerald 2006, 139). In the traditional approaches, the types of milestones are the requirements sign-off, the code complete, the testing complete, and the customer acceptance. Such milestones have no meaning to the customers, who has insufficient knowledge of the software development process. (Koch 2011, 8).

Another benefit of the agile software development is the retrospective meeting after each iteration. To put in a simple term, the meeting relates to the '*lesson learned*'. In which the team reviews what was done well and what was not, and subsequently the possible improvement. Therefore, the development process is refined regularly according to such retrospective meetings. (Koch 2011, 5-6).

Business value

When it comes down to the end product, the agile methods provide better outcome than the traditional ones (Highsmith & Cockburn 2001, 120). Specifically, such outcome fits the customers' expectations and needs since they involved more in the whole development process (Koch 2011, 2). As a result, the software is more applicable to the customers and the possibility of failure decreases.

One typical problem associated with the traditional approaches is the project delay and over budget. Sutherland (2010, 12-13) emphasized that once human is involved, more problems occur. He stated that when customers finally use the product, they think of a variety of ways to make it better. However, with the traditional approaches, any change is difficult and disruptive. Hence, it is expensive for a project to get back to work with such changes (Sutherland 2010,

13). Being the better approach, the agile methods make the timeline and cost inviolate, concentrating on building the high-risk or core features initially. The other features are able to be developed independently and even in parallel. (Hass 2007, 5-6).

3.7 Adoption process of agile development method

In this research, the authors define the term *adoption process* as the collection of actions in order to utilize a new thing. Thus, the adoption process of an agile development method describes all actions and attempts of a company to migrate an agile method to their software development process. As suggested by Sidky, Arthur, and Bohner (2007, 203-216), the adoption of an agile development method contains four stages, namely identifying discontinuing factors, project level assessment, organizational assessment, and reconciliation. This 4-stage agile adoption framework is illustrated in the following figure.

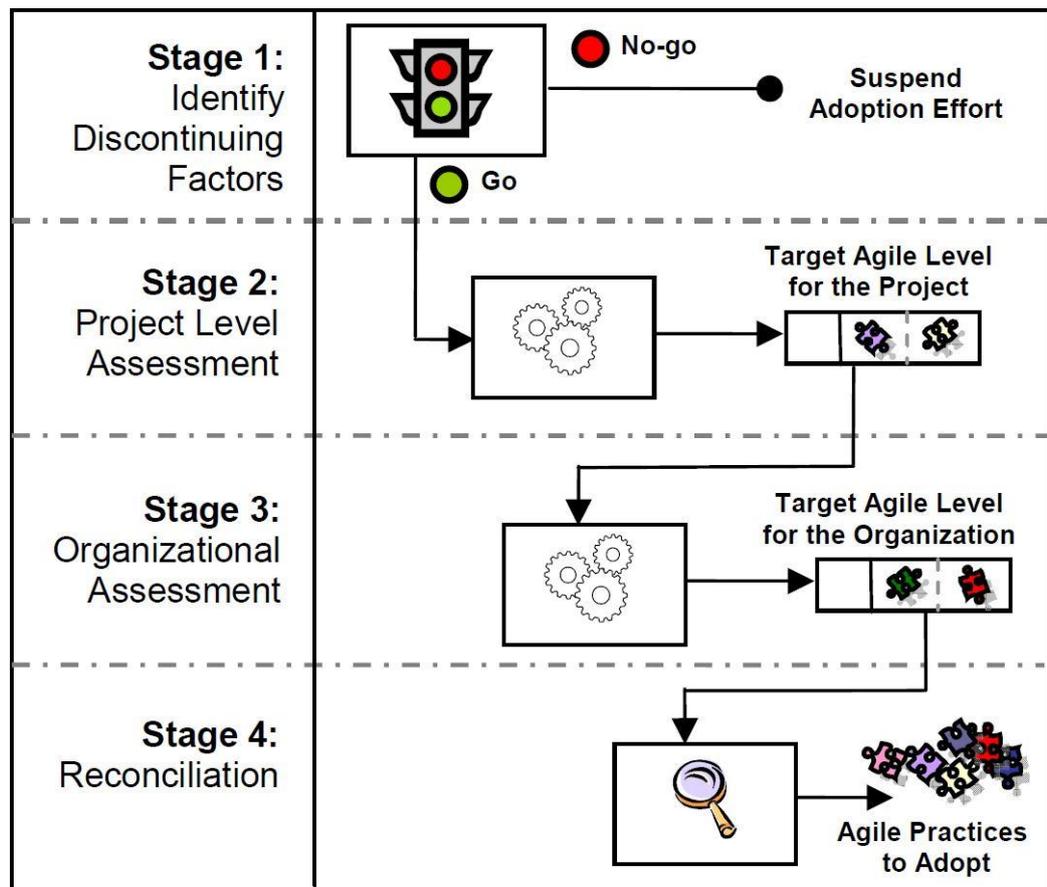


FIGURE 11. The 4-stage agile adoption framework (Sidky, Arthur and Bohner 2007, 204)

Fundamentally, the first stage of the framework concerns the decision whether or not to implement an agile development method. In other words, organizations are advised to perform a pre-assessment to identify the existing factors that potentially prohibit the success of the adoption process (Sidky, Arthur & Bohner 2007, 205). To be specific, these factors, described in this framework, are the shortage of funds, the unnecessariness to adopt an agile method, and the absence of the executive support. In order to prevent organizations from wasting their time, money and effort, these showstoppers must be eliminated prior to the second stage. (Sidky, Arthur & Bohner 2007, 209).

After avoiding the discontinuing factors within the first stage, the adoption process continues with *the journey of introducing agile practices into the development process*. This journey contains the stages 2, 3 and 4 of the framework. In which, the second stage refers to project evaluation in order to define a possible agile level of a project and make it as the project's agility target. (Sidky, Arthur & Bohner 2007, 210). Continuing with the third stage namely *organizational readiness assessment*, organizations perform a self-assessment. The self-assessment assists to determine if they are willing to implement an agile method and achieve the pre-defined target (Sidky, Arthur & Bohner 2007, 211). Following the third stage, the *reconciliation* stage addresses the differences between the project's target and the organization's readiness, identified in stage 2 and 3 respectively. The stage aims at deciding an appropriate agile development method to be adopted. (Sidky, Arthur & Bohner 2007, 211-212).

3.8 Obstacles to adopt agile software development

The agile software development has become a wave that many organizations cannot ignore. However, because of the big and critical differences between the agile methods and the traditional ones, companies encounter many significant obstacles occurring during their adoption of this new method. (Nerur, Mahapatra & Mangalaraj 2005, 74). The following table reveals the detailed differences between the two approaches.

TABLE 2. Differences between agile development and traditional approach (Nerur, Mahapatra & Mangalaraj 2005, 75)

	Traditional	Agile
Fundamental assumptions	Systems are fully specifiable, predictable, and can be built through meticulous and extensive planning	High-quality, adaptive software can be developed by small teams using the principles of continuous design improvement and testing based on rapid feedback and change
Control	Process centric	People centric
Management style	Command and control	Leadership and collaboration
Knowledge management	Explicit	Tacit
Role assignment	Individual, favors specialization	Self-organizing teams, encourages role interchangeability
Communication	Formal	Informal
Customer's role	Important	Critical
Project cycle	Guided by tasks or activities	Guided by product features
Development model	Life cycle model	Evolutionary-delivery model
Desired organizational form/structure	Mechanistic (bureaucratic with high formalization)	Organic (flexible and participative encouraging cooperative social action)
Technology	No restriction	Favors object-oriented technology

The traditional approaches focus on the constant plan and process prior to the development phase, guided by the life cycle development model (Avison &

Fitzgerald 2006, 31-32). The life cycle defines the tasks to be fulfilled, the phases with certain outcomes, and the roles to be assigned to the individuals, and hence the large and formal documentation (Sutherland 2010, 12). Furthermore, the customer participation is important at the beginning phase, but is minimal throughout the development process (Nerur, Mahapatra & Mangalaraj 2005, 74-75).

The agile development approach has the opposite concept, which relies on the people and their endeavors to cope with the unpredictability (Nerur, Mahapatra & Mangalaraj 2005, 75). To be specific, a project is broken down to many sub-projects, guided by the product features. In which, each of them contains the phases of planning, development, testing and delivery. (Avison & Fitzgerald 2006, 139). The result of every sub-project is tested with the customer in order to gather the feedback to enhance the development and prepare for the next cycle. In other words, Avison and Fitzgerald (2006, 143-144) believed that the customer serves as a team member, who involves in most of the development activities. On the other side, the project management is also different from the traditional approaches, in which the project manager's role is more of a facilitator (Nerur, Mahapatra & Mangalaraj 2005, 75).

In consequence, the two kinds of the development approach are different in many perspectives. In order to migrate from one to another, companies have to address their issues of the organizational structure, and the personnel. Also, they are required to reconsider their goals and the resources needed to successfully adopt a new methodology. (Nerur, Mahapatra & Mangalaraj 2005, 75). Due to the stability established for a long period of time with the old method, adopting the agile methodology is challenging.

Management and organizational issues

Organizational culture is the most influencing factor inside a company and is hard to change because it is the values and norms of the company (Sahota 2012, 7). Specifically, the organizational culture defines how people approach to their work, and the culture influences on their decision making, problem solving, and other routines (Nerur, Mahapatra & Mangalaraj 2005, 76). For instance in a culture that values stability and order, the extensive planning and clear processes

are valued higher than creativity or innovation (Sahota 2012, 7). Since the agile approach relies on people and their creativity, it defines and requires changes in the company culture.

Adopting an agile development method also means shifting the management style from command-and-control to leadership-and-collaboration. Therefore, the company has to find the right way maintaining the synergy within the organization as well as providing flexibility. Also, since the authority of project manager is changed to a facilitator, he has to adapt to the new role. (Nerur, Mahapatra & Mangalaraj 2005, 76).

Documentation is critical and a must-have in the traditional methods. In the agile methodology, the lean thinking is encouraged and such documentation can be neglected (Sutherland 2010, 12). This makes the company more dependent on the development team rather than the management. However, some companies cannot accept the lack of documentation because they rely on it for management purpose. Thus, such companies have to think of what to be documented and what can remain tacit. (Nerur, Mahapatra & Mangalaraj 2005, 76).

People related issues

The agile development is built on cooperation and mutual trust of members in a team. For the developers who normally just work with the designers and the analysts, new concepts like pair programming or collaborative decision making can be a hard pill to swallow (Nerur, Mahapatra & Mangalaraj 2005, 76).

Furthermore, the agile methodology seems to demand a certain level of competence, leading to the difficulties for companies to find adequately competent professionals to form the team (Abrahamsson, et al. 2002, 12).

Otherwise, they will have to deal with problems relating to the staff and morale.

In addition, an agile development team consists of people with diverse background knowledge. Thus, finding the common voice within such team in decision making process is a challenging task (Nerur, Mahapatra & Mangalaraj 2005, 76). In other words, it requires efforts and patience from the organization to solve this issue.

Customers have a vital role in a software project implemented with an agile development method. The customers are required to show a high level of commitment and activeness in order to gain the project success. (Highsmith & Cockburn 2001, 121-122). Nevertheless, the customers are usually familiar with and dependent on the traditional methodology (Nerur, Mahapatra & Mangalaraj 2005, 76). Hence, the customer collaboration is one of the great obstacles occurring to the companies.

Process related issues

Shifting from the traditional methodology to the agile methodology require critical changes to the process. Because of the differences in the focus, while agile is people-centric, traditional is process-centric; replacing a process that people in the company have been using for so long is horribly hard. It affects people mindset and their perception on the norm of the process. With traditional methodologies, the aim when solving a problem is to follow standardized processes, activities and measurement. On the opposite, the agile methodology stresses on assessing over measuring, bearing in mind that everything is uncertain, and adaptive changes are highly valued. Change in process model may be one of the biggest challenges in the migration because it alters the work procedure, problem solving strategies, and people roles. (Nerur, Mahapatra & Mangalaraj 2005, 77).

Technology issues

Tool is an important part of software development. When adopting agile, organizations have to find a tool that support iterative development with version management. An organization which relies heavily on their current technology may find it especially hard to replace it. Also, it is not only the tool but also the people. They have to train their employees to use the new tool effectively. (Nerur, Mahapatra & Mangalaraj 2005, 77).

4 OVERVIEW OF VIETNAM SOFTWARE INDUSTRY

4.1 Vietnam information and communication technology and software development sector

Since the Doi Moi in 1986, the Vietnamese economy has witnessed a simultaneous and vibrant growth (Le & Le 2000, Murray 1997, 24-26). Along with the economic development and the entry to World Trade Organization in 2007, the ICT sector has also been in the expansion era, in particularly the software segment. According to Chidamber (2003), Vietnam provides a strengthening climate for ICT and software services sector development via the positive macroeconomic changes and satisfactory results as well as the huge disbursements of investments from the government, domestic and international investors. Due to the great contribution that such sector could bring to the nation, this industry has been made the lead sector for Vietnam to build up a knowledge-based economy.

Over the last decades, Vietnamese software industry was said to be underdeveloped, particularly during the 1990s. However, from the 2000s, Vietnam made the very first but promising move into the global ICT (Chidamber 2003, 1). The strong need and demand for IT and software products and services determined the growth of this industry. In other words, it leads to a surge blooming of software industry in Vietnam. The proportion of ICT industry increased steadily from 1% in 1993 to 7% in 2012 of the total GDP of Vietnam (M. Q. Nguyen 2006, 1).

Despite of the economic recession in the past few years, the Vietnamese IT industry as well as the software development sector have been developing significantly. In 2012, the growth pace of this high-end sector was 86.3%, compared to the result of previous year. Particularly, the hardware – electronics continued to increase the export, earning a sum of over US\$23 billion, which accounted for 90.4% of the total industry. (NSCICT & MIC 2013, 7-8). According to the report by the International Telecommunication Union (2013,

24), Vietnam was ranked 88/157 in 2012 in terms of the ICT development index¹. It was a major breakthrough of Vietnam with a jump of 19 steps from the position 107 ten years ago (International Telecommunication Union 2009, 22).

To be added, the Vietnam's software market has developed swiftly. The industry has experienced a five-fold increase in revenue from US\$250 million in 2005 to US\$680 million in 2008 and US\$1.2 billion in 2012. (NSCICT & MIC 2013, 57-58, Nahar & Kuivanen 2010, 44). Furthermore, Vietnam was regarded as one of the top 100 outsourcing destinations in the recent report by the consultancy group Tholons Inc., (2013, 2-5). In the list, Ho Chi Minh City and Hanoi took the places 16 and 23 respectively.

4.2 Key aspects of software industry development in Vietnam

4.2.1 Role of government

The Vietnamese government has made a definite and dedicated attempt to develop socioeconomic condition of Vietnam by investing in ICT (Chidamber 2003, 1-11). The Policy Directive #58, issued in 2000, has been considered as the primary document that readjusted and repositioned the IT industry. The directive aimed at building a better environment for and the usage of IT, by reinforcing the human resource capacities and IT infrastructure. Establishing a software industry is the most important factor revealed by the strategy, in order to supply for the domestic and international demands. (Elmer 2002, 1-8)

Following the Directive #58, the Vietnamese government has put great effort to maintain a sustainable development of the IT and software industry by the investment plan of US\$53 million in 2009 (Vietnam Outsourcing Portal 2014). The plan aims to enhance the quality of IT human resources, infrastructure as well as the competitive advantage of software outsourcing services. The Prime Minister of Vietnam, Mr. Nguyen Tan Dung (2013), also insisted the significance

¹ The ICT Development Index (IDI) is a composite index combining 11 indicators into one benchmark measure that serves to monitor and compare developments in ICT across countries (International Telecommunication Union 2013, 15).

of IT and software industry as “*one of the most important drivers of development, being able to make big changes to the economic, cultural and societal life*”.

As a part of the state's plan for software industry's growth, there have been many software parks put into operation in the major cities of Vietnam. Such infrastructure are Quang Trung Software Park established in March 2001 in Ho Chi Minh city, Hoa Lac high-tech Park established in 1999 in Hanoi, and Danang Software Park in Da Nang opened in 2000. At the moment, three software parks in Ho Chi Minh city are supporting over 160 enterprises with hundreds employees.

The encouragement for the development of ICT and software sector has been taken in form of the laws and regulations for newly-formed software enterprises. Such enterprises are granted a four year income tax exemption, including exemption from value-added tax and exemption from import tariffs (Runckel 2008). Also, regarding the companies located in Ho Chi Minh and other software parks, they are able to take advantages of the subsidized rent and low tax rates (Chidamber 2003, 4).

4.2.2 Presence of multinational enterprises

Acknowledging the potential of Vietnam, many multinational companies have established and built their facilities in Vietnam (Breu, Dobbs & Remes 2012). Some big players in Vietnamese software production market to be mentioned are Microsoft, Oracle, IBM, Gameloft, EA, Samsung, and Sony. Not only creating the "high tech culture" within Vietnamese software companies, such multinational enterprises also play important role in decreasing the risks and encouraging the followers in this market to follow their footsteps by sharing and educating them about their experiences (Chidamber 2003, 4).

4.3 Competitive advantages of Vietnamese software industry

Even though ICT and software industry is a leading sector in Vietnam, the domestic demand for software production is still low. On the other hand, the international or external demand of software products implies positive signal,

which makes Vietnam a potential software exporter. Recently, Vietnam is becoming a promising offshore outsourcing destination (Nahar & Kuivanen 2010, 40).

According to research generated by PricewaterhouseCoopers and Duke University's Offshoring Research Network (Laughlin 2010, PricewaterhouseCoopers 2010), demand for outsourcing keeps growing around the world. Similarly, in Vietnam, the software outsourcing industry has registered significant growth over the past few years. The outsourcing orders that Vietnamese software enterprises are receiving are mainly from Japan, the USA and Europe. More importantly, the Japanese firms have shifted a vast number of their orders from China to Vietnam. In addition, the recovery of the USA, French and Germany economy has resulted in the stability of the local software outsourcing production (Vietnamnet Online Newspaper 2013).

The other competitiveness of the Vietnamese software industry to be mentioned in this study is the human capital, young population, high literacy and low labor costs which are considered the key success factor of software development in this developing country (Gallaughar & Stoller 2004, 3). With 60% of the population under the age of 30, Vietnam provides a strong labor pool for IT companies' employers. Such youngsters in Vietnam are claimed to be among the most hardworking employees, in comparison to Indian, Chinese and Philippines (Mukherjee 2012). In addition, the literacy levels in Vietnam are considerably high, with 97 percent literacy rate and about 20000 technical engineers graduating annually (Gallaughar & Stoller 2004, 3). Highly educated population is likely to go along with high level of scientific and technical literacy. As a result, Vietnam is an outstanding country for offshore software outsourcing.

4.4 Software companies in Vietnam

Software and IT service industry has proved to be a leading sector in Vietnam in recent years. The number of Vietnamese software and IT services companies has increased significantly over the years. Such rise is reflected by the increase in the number services of the Vietnam Software over years and the establishment of IT Services Association (VINASA). While the VINASA established in 2002 with 50

company members, there are 235 Vietnamese software and IT enterprises acting as their frequent members. (VINASA 2014).

As Vietnam appears to be a promising software outsourcing destination, after India and China, there is a huge number of software outsourcing companies at the moment. To be specific, software outsourcing alone involves 3000 companies and 15000 IT engineers (Mukherjee 2012). Many of them are Foreign Direct Investment (FDI) companies or Official Development Assistance (ODA) companies. The biggest software outsourcing companies in Vietnam are FPT Software, TMA Solutions, Tinhvan Group, QSoft Vietnam Corporation etc. These companies contributed the most to the revenue of Vietnamese software industry (NSCICT & MIC 2013, 8).

5 CASE COMPANIES AND REASONS FOR ADOPTING AGILE SOFTWARE DEVELOPMENT

In recent years, the number of companies worldwide implementing agile software development has been increasing significantly. The situation is the same in Vietnam, where the local software companies also follow the trend. In this research, the five software companies were chosen for the authors to discover the adoption process of the agile software development in Vietnam. To begin with, the authors provide the brief introduction of the five case companies and their adopted agile development method. It will be followed by the explanation why the case companies decided to adopt the new software development method.

5.1 Case companies overview

This thesis was conducted within five software companies, which are classified as SMEs. These companies were founded from 2008 to 2011 in two major cities of Vietnam, namely Hanoi and Ho Chi Minh city. The staff size of each case company is less than 200 and most of them are Vietnamese.

5.1.1 Company A

Company A, which was established in 2008, is an outsourcing firm focusing on providing software solutions to various areas, for instance finance, healthcare and media. Having the expertise in .NET, PHP and Java, the company delivers a wide range of services, namely mobile application, website design/development, and particularly offshore software development. The primary customers of A are businesses overseas, mainly from the United States of America, Australia and also other Asian nations.

Company A is classified into the category of SMEs according to the Vietnamese law and legislation. Currently, there are 56 software developers in the company, and it is expected to increase in corresponding to the development of the company's markets. The company has main office located in Vietnam, and one representative in Australia.

Since the commencement of business, the company had employed the waterfall approach to their projects for about four years. However during the time, they found the drawbacks of the traditional method, which affected their project's success. Consequently, the company's director decided to adopt a new software development methodology, and hence the migration of Scrum. Additionally, the company also started to use the application named Redmine² as their project management tool. In this thesis, the analysis of the adoption of Scrum in company A will be presented.

5.1.2 Company B

Company B offers the all-in-one software solutions and services for business and individual customers. The complete software package assists the company's customers to manage all of their business activities, such as sales, marketing or customer services. The company has two offices located in Canada and Vietnam. Established in 2009, the Vietnam branch has currently employed 45 employees, making the company a SME. Based on the high expertise and experiences, Company B aims at being the pioneer supplier of the business software on the market. With no hesitation for changes and learning from mistakes, Company B has arisen a great number of revolutionary ideas and innovative solutions to enhance the products' quality.

Company B concentrates on providing the high quality software solutions according to the customers' needs, following the customer-oriented conception. More importantly, the company pays high attention to the customers' satisfaction, and marks it as the main target. Working closely with the end-users and understanding their requirements have been prioritized in the company's business strategy. Therefore, Company B has invested greatly on the customer services in order to provide their customer with the best supports. In which, the customers are able to request supports via the live chat tool, telephone, help desk, and training sessions.

² Redmine is a web application used for project management. The application is written in Ruby on Rails framework and can be retrieved at <http://www.redmine.org>.

In order to obtain higher customers' satisfaction, Company B has been aware of the importance of offering the friendly, innovative and adaptive software products to the customers. However, the waterfall approach showed its limitations, which prevented the company's development process from reaching the flexibility and optimization. In order to address the problems, the CEO did many research to seek for an optimal working model, and he found Scrum and the agile methodology. In this study, the authors will discuss about the movement of Company B from the waterfall approach to Scrum, including the migration to the agile methodology.

5.1.3 Company C

In the start of 2008, Company C was founded as the subsidiary in Vietnam of a Japanese firm. The prime mission is becoming the offshore outsourcing center for C's parent company located in Tokyo. The company concentrates on web development, which are implemented with PHP and its related technologies. In addition, the company's market has been expanded in recent years so that they also develop mobile applications in the iOS and Android platforms. Company C belongs to the SMEs group with the staff of 63.

Likely many companies, Company C employed the waterfall approach for the software development process. When demanding a more modern approach, the CMMI model was introduced in several projects, beside the implementation of the waterfall model. However, both approaches had showed weak points so that the leaders would like another optimal process, and Scrum appeared to be the solution. After succeeding in several probable projects, they decided to employ Scrum for the software development process. In addition to the adoption of Scrum, Company C also started to use the Kanban method to serve as their scheduling system. Within the empirical part of this research, the authors will present the analysis of the Scrum adoption and the combination with Kanban within Company C's projects.

5.1.4 Company D

In the first quarter of 2011, Company D was founded with the mission to be a top brand name in web application design and development. At the moment, the

company has been successful with two e-commerce products aiming at worldwide customers. In which, one system provides web design and development services, and the other is freelancer platform for project bidding. The company concentrates on open-source development with the implementation of PHP and MySQL. As a part of the SMEs community, there are 47 enthusiastic employees currently working in the company.

At the commencing time, company D attempted to adopt to Scrum but they experienced the failure at the adoption process due to the lack of helps and background knowledge. Afterwards, the company employed a new branch manager, who convinced the director of the benefits of the agile methodology. Therefore, the company decided to make another attempt to steeply implement the Scrum approach. Likely Company C, the Kanban method has also been employed in the company's projects. To some degree, the adoption process has been successful in Company D, which has assisted the company to gradually gain great benefits. This thesis will provide the detailed analysis of the Scrum and Kanban adoption in Company D, in particular the company's failure experience.

5.1.5 Company E

Company E, founded in 2008, is the subsidiary of a Swiss international organization. The company specializes in providing outsourcing services based on the model of Offshore Development Center (ODC). Generally, ODC is a customer-oriented approach, in which a team of Company E's developers is formed to work toward the needs and goals of the customers. In other words, the team can be considered as the outsourcing IT department of the customers' businesses. The target customers of Company E come from the EU.

Vietnam was chosen by the Swiss organization mentioned above to establish Company E due to the advantages of the cost efficiency and the talented labor force. Evidently, Vietnam has been ranked as one of the top ten outsourcing destinations with a large number of young developers and a stable business growth. For nearly 6 years, Company E has been one of the leading brands in the software outsourcing business in Vietnam. Also, the company has been one of the pioneers in organizing the events of agile software development for the Vietnam

developer community. The company has the head office in Ho Chi Minh City and the branch office in Da Nang City, which totally employed nearly 150 software developers and trainees. The programming languages Java, C#, and Objective-C have been used by the company to develop the software products.

Although the initial plan was to adopt Scrum, Company E was forced to implement the waterfall model because of the inadequate human resources. Nevertheless, the waterfall approach was temporarily used in several small and simple projects within a very short time. Until the competent personnel was sufficiently employed, the Scrum framework was officially adopted in the company. In addition, the software applications, namely Jira³ and Redmine, have been utilized to support the management of tasks and projects.

5.1.6 Summary of case companies

In this part, the authors briefly introduce the five software companies in Vietnam, which are chosen for this research. Also, the adopted agile method of the case companies is presented. In general, the case companies have been adopting the Scrum framework to their software development process. The following table reveals the summary of the case companies with their old development processes as well as the adopted agile method.

TABLE 3. List of case companies and adopted methods

Company	Old development process	Adopted agile method	Support application
Company A	- Waterfall	- Scrum	- Redmine
Company B	- Waterfall	- Scrum	N/A
Company C	- Waterfall - CMMI	- Scrum - Kanban	N/A

³ Jira is a software application developed by Atlassian, which is used for bug and issue tracking, and project management. The application is written in Java language, and was initially introduced in 2002. More information can be retrieved at <https://www.atlassian.com/software/jira>.

Company D	- Waterfall - Failed adoption of Scrum	- Scrum - Kanban	N/A
Company E	- Waterfall (very short time)	- Scrum	- Jira - Redmine

5.2 Reasons for agile development adoption

The case companies in this research used to struggle with the old software development process, which directly led to the adoption of an agile method. They consider this as the root and the most important reason for the adoption. In addition, the authors also discovered the other reasons, which concern the aspects of customer, management and team. To some degree, these reasons are related to the limitation of and troubles with these companies' old working model. Within this section, the authors aiming at providing the comprehensive analysis of such reasons which caused the transformation of the case companies.

5.2.1 Limitation of old development process

The software development process has strong influences on the outcome of a software project and the quality of the product. Particularly, a good development process consequently leads to a good result of a project and vice versa. In which, the process affected the three constraints of a project, namely schedule, budget and scope, which were stated in Chapter 3. In this thesis, the case companies had experienced the weak project management and the limitations of their old development process.

“When using the waterfall model, we used to face the very common problems of a software development project, namely project delay, overtime, more costs, and lower product’s quality than the expectation.”

(A Senior Developer – Company A)

When employing the waterfall approach, Company A had experienced the failure in estimating the project duration. The implementation phase was longer than the developers' expectation, which led to late product delivery. The reason for the

delay was the hierarchy of waterfall model, which only allowed a phase to begin once the previous one had ended. To be specific, the developers were unable to write the code once the complete design of the software had not been produced yet. It was the same in the testing phase, meaning the software was not ready for testing when the developers still stayed coding. Thus, when one phase missed the deadline, the delay continually occurred in the sequent phases. However, despite the longer development time, bugs and errors kept appearing in the final product during its operation. These bugs and errors lowered the product's quality and were not definitely accepted by the customers.

“We used to receive report of 16 to 20 bugs in each delivery to the customers. Remarkably, some of them were serious and required much work efforts to fix.”

(CEO – Company C)

As the consequence of late delivery and low product quality, the costs for the software development increased. From the authors' perspective, such costs were concerned with not only the money but also the time wasting on the correction of the software. To be specific, the companies had to spend time to fix the bugs and errors, discovered by the customers during their usages of the software.

Consequently, the works required more working hours of the developers, which directly required the additional salary payment. Moreover, the extra works also cost the customers more expenses on monitoring activities. For instance in some outsourcing projects of Company A and Company C, their customers had experienced unexpected travels to Vietnam to solve the problems. More importantly, the customers might lose their advantages on the market due to the time waiting for fixing the software.

“We realized that both the waterfall and CMMI models had caused troubles. The waterfall was wasted our money, time and work efforts while the CMMI was too complex and time-consuming. Also, our customers were affected by these problems.”

(CEO – Company C)

In order to address the limitations, the demand of an optimal software development process had increased within all the case companies. According to the different research and consulting activities, the case companies highly appreciated the agile development as the solution to their problems. As a result, the agile methodology and Scrum were chosen to be adopted.

“I had earned experiences on agile and Scrum before working in the company. I am very interested in the methodology and understand its advantages bringing to an organization.”

(Branch Manager – Company D)

“By reading, I knew about Scrum and the great advantages which it has brought to many companies. I thought that my company had to make the change by migrating to the agile methodology.”

(CEO – Company B)

5.2.2 Uncertainty of software requirements

In software development projects, the requirements for software production are usually huge in quantity and complicated in content. They could be gathered by various discussions between the project's stakeholders. In the waterfall model, the customer's requests and expectations toward the software product are captured by the company's system analyst. Then, all of them are transferred to the developers, who are responsible for the design and code implementation phases. Before delivering to the customer, the software product are tested in order to find and fix the bugs or errors. Finally, it is the maintenance phase concerning the repair of further bugs or errors during the operation.

In the case companies, it was not always insured that the list of software requirements was created correctly, based on the customers' expectations. Yet, the customers were not always certain about their needs and expectations on the new application. In terms of the technical aspect, the developers were not always confident that they were implementing the design and code in a proper way. In other words, the developers were also not certain that they are building the software correctly according to the customer's order. Therefore, the outcome of requirement phases was usually the mix result, in which the uncertainty remained

in all phases of the development process. In detail, the uncertainty could not be always addressed because of lacking communication and checking between the development team and the customer.

“Sometimes, we had to deal with customers who could not specifically list what they wanted or even did not actually know their own needs. At that time, we had to accept the fact and started to develop the product.”

(A Senior Developer – Company A)

Within the case companies, the software projects used to follow the traditional waterfall model, which was plan-oriented. Specifically, the development process followed strictly the hierarchy model of software life cycle. In which, when the information was added, it must be remained until the end of the development phase. In other word, the list of software requirements could not be adjusted once it was obtained. Furthermore, the project’s stakeholders sometimes had to deal with unknown requirements, which were incapable to be captured at the very initial phase. And certainly, such requirements could not be added during the later phases. As a consequence, the uncertainty always remained uncertain during the development process because of weak information flows, which was caused by the poor customer care and communication.

“The development teams could not deal well with changes in the list of software requirements. We found it very difficult or sometimes impossible to loop back to previous stages to make a change.”

(CEO – Company B)

“We realize that we need a flexible business strategy to maximize our profits. Therefore, our products have to be adjusted to fit the market’s demand and preferences and our development teams are required to make lots of changes. As a result, we cannot produce a concrete list of requirements and remain it all the time.”

(Branch Manager – Company D)

On the other hand, the agile methodology and Scrum approach concentrate on the adaptation of requirement uncertainty. In particular, the development based on

Scrum allows many short iterations, which are called sprints in the framework. The goal of each iteration is to deliver a working software to the customers after a short time of implementation. As a result, the list of requirements can be adjusted and the unknown requirements are explored.

5.2.3 Team performance

All the case companies noticed that their staff's skills and competences had not been efficiently utilized with their old working models. It was discovered that the amount of dead time was relative high sometimes, in which the work flow halted in order to wait for the completion of previous phases. In other words, the companies acknowledged that the working tasks and their schedules were not controlled and managed in a proper way. Therefore, they had experienced the continuation of the overtime and the project delay while their staff still had free hours on their schedules.

“The fact that we were incapable of managing the work flow and tracking our work progress. Thus, we could not maximize the staff's ability and utilize the working time.”

(CEO – Company C)

Furthermore, another striking problem put in consideration was the poor collaboration and communication between members of a project's team. In general, the level of interaction between developers used to remain low, which led to the difficulties in information flows. The authors noticed that the case companies had perceived the inefficient interaction and its negative effects to the team's performance. Among those effects, the most crucial one was that the developers were not provided with the transparent duties, goals and work progress. For instance, Company D witnessed the misunderstandings and disagreements between the members in terms of task's duties. Sometimes, the tasks were not verified before implementing and clearly delegated to each individual, which resulted in the confusion of each member's duty. In other words, the team members were unaware of their responsibilities and work contributes to the company's projects.

Meanwhile, Company B considered that the communication needed to be improved in the organization. As stated from the CEO, good communication provides the ease in information exchange, work cooperation and assistance between the members. However, the CEO also recognized that the company's working process did not create an active environment to inspire and encourage the employees. In which, the knowledge sharing remained at low level, which led to the difficulties in the training, the alignment of staff's capacity and the knowledge accessing. In addition, the developers felt that they were working individually rather than in a team.

“Good communication allows easier information flow between members. However, it was not good in our company before. It was difficult for a developer to help and train others because they did not collaborate much.”

(CEO – Company B)

5.2.4 Customer satisfaction

The project management aims at delivering high quality product and gaining satisfaction of the customer. In this thesis, the authors considered that the achievements are determined by the process of dealing with customers, which consists of communicating with customers and understanding their needs. Nevertheless, the waterfall model employed in the case companies, which is considered as a plan-driven model, did not address well these issues.

In the old development process of the case companies, the process of dealing with customers was executed by the system analyst and project manager. Afterwards, the development plan was developed and verified with the customer before passing to the developers. More often than not, the developers did not collaborate directly with the customers, and hence possibility of misunderstanding the needs. As the result of lacking collaboration, the delivered software product did not satisfy the needs of the customers. In other words, the products might contain errors or be different from the requirements, which required more work efforts to fix and extra costs. However, the customers usually refused additional payment and blamed the company for the faults.

“When delivering a product’s version, many times we received change requests. However, the customers usually disagreed with additional payment because they assumed that we were responsible for all changes.”

(A Senior Developer – Company A)

In contrast, the agile methodology prioritizes the importance of customer collaboration. By implementing Scrum, the companies have been able to organize various meetings between the customers, Scrum Master and the developer team before each sprint. In such meetings, the customers are able to communicate directly with the developers to discuss about their needs and expectations. Therefore, the development plan of each sprint, which is served as the product backlog, is agreed with and verified by the customers, developers and Scrum Master. Consequently, the misunderstandings or errors of the requirements can be addressed immediately.

“We had raised our awareness of a better cooperation with customers. Then, we moved to the Scrum framework and the interaction with customers have been enhanced. At the moment, we give product demo to customers every week and if there is anything requiring to be changed, we can do it immediately in the next sprint.”

(A Senior Developer – Company A)

In addition to the decrease in incorrect delivery and extra payment, the customers have the opportunity to understand the development process of the software in terms of technical aspects. To be specific, because of direct discussions, the developers have the opportunity to explain about the technical concepts to the customers. By the explanation, the customers are aware of the optimal solution to their software technically. Meanwhile, the developers also comprehensively understand the customers in order to execute efficient implementation works.

5.2.5 Following global trend

It is undeniable that the agile development methods have been increasingly employed within more organizations worldwide. Certainly, the case companies in

this study could not be out of the trend. To some degree, the trend has encouraged the movement of software companies.

“I did some research and found out that the agile development and Scrum has been implemented in many other companies in the world. At first sight, I thought that they are good so as many organizations start to use them.”

(CEO – Company B)

“Also, many companies in the world are moving to agile so that we would follow in order to gain more benefits.”

(Branch Manager – Company D)

“The director read about Scrum and its growth in its implementation within software companies. They felt that the model would be more beneficial, and consequently they decided to use in the company.”

(A Senior Developer – Company A)

In addition to the interest of the company’s director, another reason for the agile method adoption in Company A came from the new customers and new outsourcing projects. In which, the customers preferred a modern and flexible software development process that could fit their business situation and working styles. In other words, those overseas customers required adjustable software products which could adapt to the possible changes of their business strategies. Moreover, one of the customers recommended to carry out the projects with the implementation of Scrum because of its agility and popularity. Also, it was noted that those customers had gained experiences from other Scrum projects so that they were willing to employ the method. As a consequence, Company A perceived the need for adopting the agile methodology and particularly Scrum in order to follow projects and working styles of other international partner companies.

Unlikely the other case companies, the critical and only reason for the adoption of Company E was the request of its Swiss parent company. In fact, the Swiss organization was expert at Scrum and worked with the framework for years. With the aim of building an offshore development center, the organization had

comprehensively prepared for its emergence in Vietnam, including the plan for a working process. Therefore, Scrum was initially chosen to be the development process at the very first days of the company in Vietnam. Nevertheless, due to the lack of personnel, Company E was unable to start with the implementation of Scrum. As a solution, the waterfall model was used as the approach to several small and simple software projects. Until the competent personnel was adequately employed, the Scrum framework was officially adopted in the company.

6 ADOPTION PROCESS OF AGILE SOFTWARE DEVELOPMENT IN CASE COMPANIES

6.1 Common adoption process

After conducting the qualitative analysis on the five case companies, the authors discovered a critical and interesting fact that they followed a common adoption process. Regardless the case of Company E, which already had the complete strategy to adopt Scrum since the start, the other companies began their adoption from the scratch. Consequently, the companies A, B, C, D encountered more issues during their adoption processes than Company E did. In this sub-chapter, the authors provide the detail of the adoption process, concentrating on the experiences of the case companies.

6.1.1 Process description

Although it may vary among companies, the process consists of four fundamental stages. They are classified into two main phases, namely the preparation and practice phases. The following figure illustrates this common process of the agile adoption.

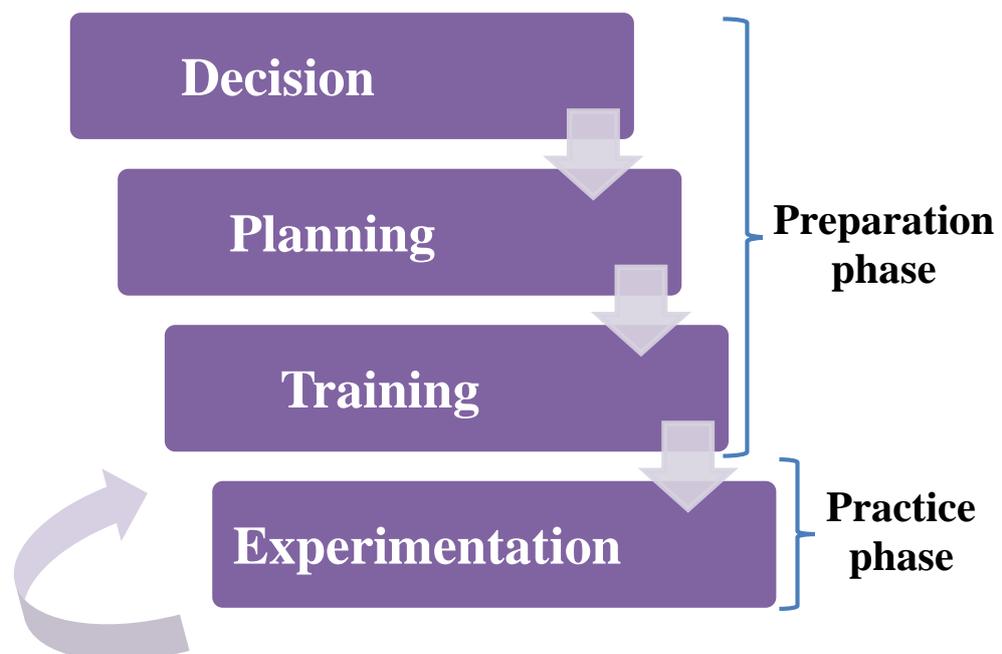


FIGURE 12. Common agile adoption process of case companies

6.1.2 First stage – Decision

The initial step of the adoption process is the decision of transforming to an agile development method, usually made by the board of directors. Due to various experiences on project failure, the demand on an optimal development process had arisen within the companies in order to gain better project outcomes. Additionally, the decision of agile migration may be caused by other reasons, which was mentioned in the previous chapter. In this research, the authors detected a similar story of the decision stage among the companies A, B, and C. On the other hand, the ones of the companies D and E were different.

On May 2013, Company A obtained more outsourcing contracts from overseas businesses. In order to produce better performance in these upcoming projects, the director decided to make improvement in the development process. He conducted research and evaluated various project approaches to seek for a suitable and optimal process for the company. After consulting several competent professionals, he was very interested and encouraged to adopt the Scrum framework in the upcoming projects.

Unlike the other case companies, Company D experienced quite a different decision making process. Since its infancy, the company attempted to employ an agile approach, but due to some reasons, it was unsuccessful. Consequently, they were forced to get back to the traditional waterfall model. After that, a senior developer joined the company as a manager of the new branch in Hanoi. Especially, he is well acquainted with the agile development and had worked with Scrum for several years. Being enthusiastic about adopting an agile method to the company's projects, he endeavored to convince the board of directors to adopt the Scrum framework. However, because of the bad experience and suspicion of the possibility of success, it was not easy for them to accept the adoption plan.

In particular, the agile software development was pointed to be the strategy and target of Company E since its foundation. The decision was made by the Company E's parent company in Switzerland prior to their emergence in Vietnam. Until now, the parent company has been very successful on their projects with the practice of the agile methodology and the Scrum framework. Apparently, they

were very confident to introduce Scrum as the standard software development process of Company E to continually gain more success in Vietnam.

6.1.3 Second stage - Planning

If the first stage refers to the decision making, the journey of preparing for the adoption of an agile practice starts in the second stage. The preparation contains the selection of an agile development method and a feasible adoption plan, which is well-matched to the company's actual situation. In this research, the authors explored that the Scrum framework was immediately selected by all companies due to its popularity. Therefore, the remaining issue in all the case companies was to produce an appropriate transformation strategy.

“On May last year, the board of directors realized the advantages of Scrum and decided to move to Scrum. However, at that time nobody had experiences and almost all employees did not know what actually Agile and Scrum are.”

(A Senior Developer – Company A)

“All members in the company had no idea about agile or had very limited experience on Scrum practices. It was really difficult for us to start the adoption.”

(CEO – Company C)

The companies A and C had encountered the major problem of lacking the knowledge about the agile methodology and the competent employees. The insufficient knowledge and experience abandoned an immediate implementation of Scrum in the projects of these companies. Therefore, both companies organized different meeting to discuss about an efficient adoption plan, and they ended up with two options. The first one was to provide the key employees some training courses conducted by external agile experts and institutes. Meanwhile, the second option was hiring a Scrum Master to work with the company's projects and also train the staff. Due to the distinction of project status, the two companies selected different strategies to follow.

The first alternative was abandoned in Company A because of the upcoming outsourcing projects. Their Australian customers preferred to start as soon as possible. Also, the projects were required to be implemented with an agile approach, particularly Scrum, to achieve the flexibility and satisfy the nature of the customers' business. Therefore, the director was afraid of the project delay and inefficiency when some employees left for training sessions. In consequence, hiring a Scrum Master was evaluated as a feasible and well-matched solution based on the Company A's situation. On the other hand, Company C could not afford the expenditure on a new contract with a Scrum Master. The project's status was moreover not as urgent as Company A's so that the second option was the best choice for the company.

Conversely, Company B, Company D and Company E did not encounter this problem because they had the experts already. As stated in the decision phase of Company D, the new branch manager had had the background knowledge and experience on the software projects with Scrum. In terms of Company B, the CEO was interested and enthusiastic about the agile software development. He spent time to study and attend training courses to improve his knowledge and experience on agile development generally and particularly Scrum. With Company E, they owned the group of highly skilled and competent professionals coming from its parent company. Obviously, those experts were the key members of Company E, who contributed to the foundation and development of the company in Vietnam. As a result, to some extent, these companies did not spend much time on the second stage and moved to the training phase.

6.1.4 Third stage – Training

In this stage, the term “training” is considered as the learning and teaching of the agile methodology and the practice of Scrum. It was a huge challenge to every company to equip their members with the knowledge of the agile methodology and Scrum. In essence, the underlying causes were the hesitation and suspicion of the staff, leading to the neglect of learning and adapting to the method. Additionally, the staff was dependent on the traditional development model, which had been used for a long period and the.

The solution of Company D was a learning environment for the staff to encourage every member to participate in daily group discussion. To specific, they started to discuss the fundamentals of agile software development, and continued with the details of Scrum. Most importantly, the company attempted to keep the study as a daily routine and habit of every member.

“We had begun by reading every single line of the Agile Manifesto in both English and Vietnamese every morning for few weeks. We did the same with the Scrum primer. We had discussed about Scrum on a fixed time every day for about 2 months to help everybody understand clearly.”

(Branch Manager – Company D)

Similarly in Company B and Company E, the board of directors made great efforts to build a friendly learning atmosphere for their employees. In which, every members were encouraged to read books, practice the method, and especially ask and answer related questions. The companies believed that raising a question and attempting to find its answer were improving the communication and interaction between their employees. Also, both companies conducted various casual events for the employees to share their knowledge and experience.

“Reading, practicing, sharing, and interacting with the colleagues and other ‘agile’ people will help. I asked my employees to ask questions regardless of the time and their position. As you know, questioning helps us gain valuable knowledge and improve our skills.”

(CEO – Company B)

“We have organized the monthly Scrum breakfast or other events to discuss about the method. Such events greatly help us to share our knowledge and experience. Remarkably, these events also attract the developer community, and we have invited them to join.”

(Scrum Master – Company E)

In addition, all the case companies responsibly supported the employees to enhance their understandings as well as the practical training. They offered them short training courses organized by expert institutes or invited certified

professionals. Especially, the companies prioritized the active learning and self-study. Therefore, their employees were motivated to be involved in open conversation to learn from other people. Last but not least, participating in public activities and open events organized by the Vietnamese agile community was also highly recommended.

“We would like our team members to talk about agile, explain what they know, and help others with their own troubles. Sometimes, we organized training sessions in our company. Some agile experts were invited to share their experiences, help us solve the problems, and inspire our team. I felt that we have learnt many things from this method.”

(CEO – Company C)

6.1.5 Fourth stage – Experimentation

After the employees were trained in the fundamentals of agile development, the adoption process moves to the fourth stage. This fourth stage is called experiment, aiming at applying an agile development method to some trial projects. Also, the companies still trained and studied of the agile development during this stage. In other words, the authors detected the occurrence of the third and fourth stage of the adoption process at this point.

Specifically, the companies A, B and C moved to the experimentation stage by implementing Scrum within several trial projects. During the time, the companies integrated experimentation with the learning since they believed their employees would know more from hands-on experience. In addition, the agile experts were invited to give lectures, guide the team, and provide some recommendation on the companies' adoption.

“We highly appreciate the idea ‘learning by doing’. Therefore, we decided to start trial projects to gain hands-on experience. For about 6 months, we had created two Scrum teams to work on two trial projects.”

(CEO – Company C)

“My company started new projects immediately after the Scrum Master arrived. He explained about agile and Scrum and worked with us in the projects. If there is any problem, I can ask

him directly or my colleagues. After three months, everyone felt quite OK with the new method.”

(A Senior Developer – Company A)

Unlike Company A, B and C, Company D took a different approach to the fourth stage. By learning from the failure experience, the company begun by applying partly the Scrum framework to their projects. The Company D's employees were told to organize different review and retrospective meetings to discuss about their works. Additionally, they also used the Kanban board as a tool to manage their development schedule. The practice of these techniques took place in the company for months. As a result of iterative practice, everyone had gradually been familiar with Scrum and recognized the strong points of this approach.

The experimentation stage of Company E was relatively different from the other companies. Having adequately the agile development professionals, the company started to implement Scrum in a wide scale. In essence, they did not have any trial project but the concrete practice of Scrum in all of their projects. By those project, the company organized the training plan for their striking employees to be the new Scrum Masters of the company. They were the key members of the company, who contribute to the development and expansion of Company E in Vietnam.

6.2 Assessment of case companies

Following the experimentation of carrying out a project with the implementation of Scrum, the case companies were able to assess their adoption processes. To be specific, the assessment of the trial projects was performed in order to evaluate the advantages, drawbacks, and possible improvement of the adopted agile development method. In this thesis, despite different criteria taken, the case companies agreed that they had achieved success to some degree. Nevertheless, the authors explored that only Company E has been capacity for completely implementing Scrum in all projects. Meanwhile, the other case companies have still been in the adoption process, in which they have been able to follow the standard guideline of Scrum yet. Within this sub-chapter, the authors will present the case companies' assessment of their adopted agile development method, respectively.

6.2.1 Company A – After 10 months

“After about 10 months, our works are easier to accomplish. We divided the whole task into smaller pieces, which can be done quickly. I feel less stressful than before and my skills have been improved by learning from my colleagues. We can fix the bugs or change the features of product immediately after receiving feedback from customers. We do not have to spend much time and effort like before.”

(A Senior Developer – Company A)

The Senior Developer of Company A also insisted the possibility to work on two projects at the same time when using Scrum. In fact, he has been able to manage his development tasks in one Java project and one C# project. Although he considers his works as *“a slightly complex, distracting and tired routine”*, he admitted that this is a huge enhancement, compared to the waterfall model.

Furthermore, the authors noticed that the adoption process of Company A is still happening. Yet, they have not been able to carry out all projects with the implementation of Scrum. To be specific, the implementation of Scrum is clearly carried out within their outsourcing projects with foreign customers. These projects are usually huge C# applications, which require the long implementation time and request for further requirement change. Notwithstanding that, Company A has been aware of the non-standard Scrum used in their projects because of the inadequate practice and knowledge. According to the Scrum Master, some features of the framework has not been performed properly. The company expects to the further improvement of the process, for instance the work estimation or the daily meeting. On the other hand, their PHP web projects have continuously used the waterfall model as the company recognized the unnecessary of the Scrum’s implementation.

“In our PHP web projects, the implementation of Scrum is not appropriate. These projects are small, short time and belong to individual customer so that we do not have to put much effort. Also, the list of requirements is clearly defined within one meeting with the customer.”

(A Senior Developer – Company A)

Furthermore, the authors also discovered that Company A is using a web application to serve as the project management tool. This free application assists the developers to administer their development issues and control bugs or errors. The supported burn down chart feature enables the developers to track their working tasks. Nevertheless, the application is considered as a temporary solution and Company A prefers a more professional tool in the years to come.

6.2.2 Company B – Higher satisfaction

At the turn of the year 2011/2012, Company B started the adoption process of Scrum. For about two years, the company has gained a great deal of benefits from the new development process. Particularly, the CEO highly appreciates the significant improvement of the customer's satisfaction. Specifically, the customers receive the first working version within a clearly shorter period of time. More particularly, the company has been able to illustrate a product sample to their customers beforehand.

“We are currently able to give a demo to customers prior to project start. Thus, our customers do not have to imagine what the product will be. It is definitely a huge improvement of us.”

(CEO – Company B)

Another striking benefit bringing to Company B is the higher business value of each iteration of the development process. In other words, a product released from every development cycle is usable and shippable to the customers. As a result, the implementation of Scrum enabled Company B to reduce useless works and achieve the optimal project management.

“After completing a sprint, we can report to our customers that we have finished a product version that works. Although the release may not work perfectly, it is still useable and can bring some benefits. Within more iterations, the product's perfection can be increased.”

(CEO – Company B)

In regard to the work performance, the development team of Company B have enhanced their work outcomes and communication. In general, they are able to

deal with their tasks within a shorter time and less effort. More importantly, all members have understood the importance of good cooperation, in which everyone contributes to the team's common goal, as stated from the CEO.

6.2.3 Company C - Initial success

For more than one year implementing the agile development, Company C has agreed that they have been more flexible to adapt with the uncertainty. Most importantly, the company has gained higher customer's satisfaction and enhanced the product quality. In each delivery, the number of software bugs and errors has been reported to reduce significantly by about 50%. Also, they are less serious than those in the old process, and hence less effort to fix. Furthermore, it was noted that the developers have gained more chances to improve their skills by actively interacting with the colleagues.

Notwithstanding that, the CEO conceded that their current development process still has weak points and is incompletely agile. In other words, the company has not been able to fully control and follow the standard Scrum framework because of inadequate practice, competences and skills. Additionally, the CEO realized that his employees tend to maintain the waterfall approach to their development tasks.

“Regardless mobile application projects, we have Scrum for more than half year. In mobile projects, there are usually 2 or 3 developers working in short time. Therefore, we are not sure if Scrum is suitable.”

(CEO – Company C)

Company C has been unable to implement Scrum within all projects, particularly in the mobile application projects. The CEO explained that they are still uncertain about the Scrum's compatibility with this type of project. They assumed that within these projects it is unnecessary to implement Scrum because of the short time and the involvement of small team. The company has consequently employed the Kanban method or waterfall approach to manage these projects. However, the percentage of projects implemented with the waterfall model was reduced because the company planned to eliminate it. To conclude, the CEO

showed his belief and motivation for continuing with the adoption to perfect the company's development process.

6.2.4 Company D – Valuable experience

“My company has not been agile yet! We are still in the adoption process. It is quite difficult to answer the question when my organization completely adopt the new method.”

(Branch Manager – Company D)

Although the adoption process is still happening, Company D has achieved a great number of advantages from the transformation. Among the benefits, the Branch Manager insisted on the better communication and cooperation between employees, the better schedule planning and management, and particularly the great decrease in overtime working. Furthermore, the product's quality of the company has gradually become higher in corresponding to the reduction in the number of bugs and errors. To the business, the company experienced a great fall in the amount of money paid back to the customers. Also, the satisfactory feedbacks on the products increased greatly.

It was fortunate that Company D received the great supports from the Branch Manager, who has valuable hands-on experience in the agile software development. By his competences and skills, the board of directors was persuaded to start the adoption process. More importantly, he helped the company flexibly utilize the Scrum and Kanban approaches to reach the optimal performance and good results.

“I considered thoroughly how to implement Scrum. Also, our projects were not too complex so that it was unsure whether or not Scrum was appropriate approach to all projects. Therefore, we utilized both the Scrum and Kanban methods depending on each project. Our development process might be called ScrumBan.”

(Branch Manager – Company D)

Remarkably, Company D experienced the failure on adopting Scrum, and hence the suspicion and impediment to try again. Notwithstanding that, the company

learnt the useful lesson so that they introduced the more appropriate and efficient approach to the adoption. In essence, the company's failure primarily caused by the lack of knowledge, the misunderstanding of the methodology, and the inadequate preparation. Besides, the company underestimated the importance of the comprehensive study of the agile methodology and the external help from the experts or the community. The authors, therefore, considered these reasons as the major obstacles to the adoption of the agile software development, which will be discussed further in Chapter 7.

6.2.5 Company E – Great success

Since the success of the parent company, Company E consequently gained the dominant achievements with Scrum. Their projects have been accomplished successfully in regards to the time, budget, quality, and the satisfaction of the customers. Correspondingly, for nearly six years, the company has been developing steadily and became one of the top outsourcing service providers in Vietnam.

The development team cooperated efficiently and performed very well in their projects. Every team worked directly with the customers in order to comprehensively study the products' requirements. During the time, the team members were encouraged to keep in touch with the customers to receive the feedbacks on their works. Consequently, Company E have ensured the on-time feedbacks and comments of the customers on the software products.

Furthermore, Company E plays a vital role in the agile community in Vietnam. The company has been the pioneer in introducing the agile methodology to the Vietnamese developer community. By organizing various agile development events, the company attempts to attract more developers to the modern development methodology. Also, the company provides the short training courses and helps other organizations to get familiar with the Scrum framework.

6.3 Summary of adoption process

In conclusion, the common adoption process of agile development method is described within this section of the thesis. The process was generated by the study of different case companies in Vietnam. From the authors' perspective, this adoption process of these companies was relatively simple, which can be considered as a practice-oriented model. In essence, they attempted to move to the practical phase as soon as possible, and hence less concentration on the preparation phase.

Sidky, Arthur and Bohner (2007, 203-216) suggested that the adoption process should start with the assessments of the company and its project. However, the case companies did not concentrate much on such issues. Specifically, the authors discovered that the case companies did not consider whether or not the organizations were ready for the agile adoption process. In other words, the others attempted to accomplish the adoption within the shortest period of time.

Additionally, the compatibility of an agile practice and each project had not been assessed comprehensively prior to the start of the implementation. As a result, when implementing Scrum, the companies had found the unnecessariness of the approach in some projects, and hence the alternative methods. For instance, Company A decided to continue with the traditional waterfall model, whereas both the Kanban approach and the waterfall were employed in Company C.

To some degree, the situation was better in the cases of Company B, D and E, in which they received supports from the competent professionals prior to the adoption. In Company D, the Branch Manager assisted the company to avoid time-wasting by introducing the optimal combination of Scrum and Kanban. Meanwhile, the CEO of Company B spent time and effort to explore the Scrum framework before his adoption decision. Thus, he was able to plan an adoption process. On the other hand, Company E inherited the group of experts from its parent company, who greatly contributed to the adoption of agile development. Certainly, the implementation of Scrum was successful and appropriate to the all the projects of the company. However, regardless the efficiency of Company E, the authors recognized that the case companies still lacked of the thorough

organizational self-assessments. To some extent, the omission of this activity caused the different difficulties in the adoption process of the case companies.

7 OBSTACLES TO ADOPTION PROCESS IN CASE COMPANIES

After analyzing thoroughly the five case companies, the authors concluded that there were different obstacles occurring during their adoption of agile development. Those obstacles, classified as the internal and external ones, were influencing the project management in a very negative way. They will be presented in this chapter according to the authors' priority classification of the most common and serious obstacles.

7.1 Internal obstacles

Adequately defined, an internal obstacle is an aspect happening inside the company, which prevents the company from successfully adopting an agile development method. In this study, such obstacles are the staff knowledge, management and team cooperation.

7.1.1 Staff knowledge

The agile methodology represents a modern and beneficial method for software development, which has been employed in considerably more companies worldwide. However, in Vietnam, agile software development is still new concept to the developer community. Although the number of software companies employing agile method has increased in recent years, the Vietnamese developers' awareness of the agile methodology still remains low. As a negative effect, software companies in Vietnam have faced the obstacles to equip their staff with the idea and the knowledge of agile development.

“The company’s developers did not have any background information on agile development, in particular new comers.”

(A Senior Developer – Company A)

“The staff did not know well about agile and Scrum. Some of them even had serious misunderstanding of the methodology.”

(Branch Manager – Company D)

The case companies noted that their developers had very limited or even no knowledge of agile and Scrum before. Unfortunately, the study materials and information were very limited in the Vietnamese language. Furthermore, a vast number of Vietnamese developers do not speak any second language, in particular English. Therefore, it has been a barrier for them to access such materials in foreign languages. Despite the establishment of the Vietnam agile and Scrum community in 2011, the resources of knowledge are poor and inadequate. Beside the limited number of workshops and training sessions offered by the community, the developers are unable to acquire the knowledge in other channels.

“Almost developers did not have any experience on agile software development before joining our company. However, they were trained and helped by our company’s seniors to get familiar with Scrum. In my point of view, Scrum is not too difficult to work with.”

(Scrum Master – Company E)

From the opinion of the Scrum Master of Company E, Scrum requires a standard alignment of techniques in a team. In which, the team members are required to own equal technical expertise and knowledge. The Scrum Master also believes that the ability to adapt quickly to new things is demandingly expected from the developers. He consequently noted it as the huge obstacle to the employment and working processes of the company. Furthermore, the lack of foreign language skill of Vietnamese developers has been the major challenge to the company when seeking for new employees. Particularly, Company E demands to hire talented software engineers, who are fluent in English, in order to communicate with foreign customers. Nevertheless, the language skill has been the serious barrier concerning the Vietnamese developers joining such international company.

During the analysis, the authors also recognized the developers’ confusion about the agile methodology and its practices. For instance, the Senior Developer of Company A has misunderstood that Scrum is just one practice of agile development. To be specific, he assumed that Scrum was an alternative name of the agile software development, and hence the unawareness of the other practices. As a result, the misunderstandings and the lack of materials and workshops have together contributed to the obstacles of the adoption process.

Another striking issue should be taken in consideration was the passive attitude of the developers. In particular, such attitude disabled their inspiration to learn and adapt to a new thing. Also, the developers were familiar to and dependent on the old development model so that they were afraid of migrating to the agile methodology. In this thesis, the case companies experienced this problem.

“The largest obstacle was the passive attitude of the employees. Many developers were not interested in the transformation at the first times. Thus, they were not proactive and motivated in learning and adapting to agile and Scrum.”

(CEO – Company C)

Moreover, because of lacking the knowledge, the benefits and flexibility of the agile development were not recognized and understood comprehensively. Therefore, the developers tended to avoid the adoption of the agile method. Also, the leaders did not have the sufficient knowledge so that it was very difficult to convince and encourage the team members. Especially, persuading was even more difficult to accomplish when the adoption process failed once. For instance, it took the Branch Manager of Company D a great deal of time to convince the board of directors and the developers.

“I had to be very patient to explain the concept of agile development and its advantages to them. If there was any unclear term, it was necessary to explain again. Afterwards, they realized the pros, and consequently changed their minds.”

(Branch Manager – Company D)

7.1.2 Management

The key factor in succeeding in the adoption process of an agile method is a good strategy management from the company's managers. In which, the managers are responsible for making the decision and also encouraging the staff to adapt to the new development process. An appropriate adoption's strategy efficiently motivates and inspires the company's employees to proactively participate and vice versa. However regardless Company E, the other case companies encountered different problems in the management of their adoption's strategies.

Obviously, the managers are mainly responsible for the projects of the companies. The important task of the managers is to ensure the most optimal performance of a project in regards to schedule, budget and product. In other words, the goal is to optimize the development process to achieve the best project's outcomes. Therefore, the manager are always afraid of missing the deadline and delivering a low quality product.

“The second obstacle was the management. We were usually afraid of project delay when trying Scrum because Scrum was very new to us. Also, it requires high concentration of the team members on their tasks. Therefore, the doubt used to happen in the company.”

(CEO – Company C)

The authors found out that the management concerns with not only the issues of project. Moreover, the obstacle of management includes also the human aspects, which relate to the employees and the customers. While the employees only care about their individual tasks, the managers are responsible for the overall work performance and result. In other words, the managers face the challenges to motivate all members and ensure a good quality of teamwork. Meanwhile, dealing with customers is another problematic issue, which demands the managers' competence and skills. Consequently, the management of the agile adoption process also becomes challenging to be managed.

“I used to encounter the problem of management's thought. I used to be afraid of the performance of my employees and always wanted to control and revise their tasks. Therefore, the idea of moving to new method firstly made me afraid that the works might not be done well.”

(CEO – Company B)

Furthermore, due to higher responsibility and wide range of concerns, the managers are always conservative to make a decision. In the case companies in this research, the managers were suspicious of the feasibility and the success of the adoption process because of their insufficient knowledge. To be specific, the managers were unsure if the agile software development could bring benefits to

their companies. As a result, the suspicion created a barrier to the decision of an adoption plan in the case companies.

In particular, such suspicion and barrier were even more serious in the case of Company D. The company experienced the failure of adopting to the Scrum framework. Due to the bad experience, the company's managers and the board of directors consequently demanded a strict and comprehensive management strategy for the adoption. Such strategy needed to address the root causes of the failure and provide the appropriate approach to eliminate the employees' doubt.

“I did not force everybody to adapt to the agile method. It is obvious that the consecutive faults will lead to bad result. After several unsuccessful times, everybody could realize the weak points of their approach. As a result, they decided to change, and hence the movement to the better method.”

(Branch Manager – Company D)

To conclude, the proper management proved to be the second most crucial challenge to overcome, beside the knowledge-related problems. As an outstanding and valuable example, Company D revealed that the weak management caused the negative influences on the adoption. Moreover, the employees' experience and working efficiency were also affected.

7.1.3 Team cooperation and communication

Due to the typical Vietnamese personality, the team cooperation seems to be an obstacle to the adoption process of a company. The situation results from the fact that Vietnamese employees are keen on working independently rather than in a team. Consequently, the agile adoption process of software companies in Vietnam is facing the problems of team cooperation as well as team communication.

Not only in the software industry but also in many others, Vietnamese employees are working on a hierarchy basic. In other words, they tend to do what they are told to do by the managers and feel safer that way. Therefore, the communication between the employees and the managers are not well established. Furthermore, the communication between the employees, who are in charge of different paths of a project, is also limited when the waterfall model is employed. Specifically,

the waterfall project management method forms quite an inactive working environment for the employees.

Taken as an example, the website projects of Company A used to be divided into two different parts, namely front and back ends development. Such division was made in one meeting between the relevant developers, who were responsible for the tasks of front and back ends development. After accomplishing the tasks, the developers had another meeting for the integration and testing of the product. Thus, the interaction and communication between the developers were not much active during the development.

Despite the inheritance of the management culture and helps from the parent company, Company E still suffered this problem at the early days. In which, the Vietnamese developers had to spend time adapting with the new working culture, coming from a Western country. Such working environment required the proactive collaboration and good communication, which were not familiar with the Vietnamese working style. Therefore, Company E put great efforts to motivate and encourage their employees to overcome this problem. Also, the company concentrated on providing the staff with the intensive training events and the information sessions. Such events concerned with the enhancement of soft skills, and sharing the knowledge and experience.

“We organized many information sessions, which encouraged the development teams to talk about their own experience. Also, we built the wiki platform for the developers to share their knowledge to others.”

(Scrum Master – Company E)

In addition, it is not the nature of Vietnamese people to make direct comments on the works of their colleagues. They tend to concentrate solely on accomplishing their own tasks and neglect to offer helps to the others. On the other hand, receiving comments or questions from the colleagues can make an employee uncomfortable and uncertain about his work. In other words, such employee may feel that he is not doing a good job. As a result, the attitude leads to negative effects on the cooperation and knowledge sharing between the employees.

“The work exchange and helps between the developers were quite inactive. They felt unfamiliar and uncomfortable when being asked questions or when someone showed his concerns with their works.”

(CEO – Company B)

The weak communication and cooperation of the team members in the projects are one of the critical reasons for the failure of Scrum. The members cannot be aware of their own responsibilities as well as the common goal of the project. Moreover, the contribution of a member is not clearly recognized so that he does not know how his work contributes to the project. Consequently, it is far to reach the team transparency, and hence the success of the implementation of the Scrum framework.

7.2 External obstacles

The external obstacles detected by the authors in this research concerns with the compatibility of a project with the agile development method and the perspective of customers on the agile methodology. In the following sub-chapters, these obstacles will be discussed.

7.2.1 Project compatibility

There are various methodologies of software development which can be applied to a software project. The choice of an appropriate approach is partially determined by the project's characteristics. In other words, the consideration of the compatibility of a project and a development approach is important. From the authors' analysis, it can be concluded that the evaluation of the project compatibility with the agile methodology is an obstacle to be addressed.

Depending on the customers' requests, the projects are different from the deployment length, implemented technologies and human resources. Some projects are large, requiring the long implementation time, the complex coding techniques, and the involvement of many developers. These projects are ideally carried out with the implementation of an agile development method, allowing many iterations to deal with the complexity. In contrast, there are small and

uncomplicated projects that can be delivered after a short time. Usually, such projects require less work effort of the developers and less meetings with the customers. Therefore, an agile development method with many iterations seems not to be the optimal alternative.

To be specific, Company A decided to employ the Scrum framework to manage all of their software development projects. Notwithstanding the success of the new development process, Company A continues to make use of the waterfall approach in the suitable website projects. In which, the customers only concentrate on the layout design of the web pages. Likely, Company D recognized the necessity of using another approach in combination with Scrum to suit their projects' situations best.

“Usually, we firstly agree the design of web layout with customer, then build the website using our own framework. After one or two demonstrations, we can deliver the website to the customers. If there is any change request, it is easily done but usually we do not have to fix anything.”

(A Senior Developer – Company A)

“I carefully evaluated if Scrum was appropriate approach to all of our projects. Due to the simplicity of the projects, it was unsure that Scrum was completely suitable. Hence, we have used also Kanban to manage some projects.”

(Branch Manager – Company D)

Consequently, it can be concluded that the compatibility of a project and an agile development method needs to be considered prior to the implementation. Such consideration about Scrum is additionally required, as from the experience of the case companies. This will help the company to classify their projects better in terms of the approaches.

7.2.2 Customer's perspective

In this study, the agile adoption of the case companies also encountered the difficulties caused by the customers. The case companies' customers were too familiar with the traditional approach so that they hesitated to change. From the

analysis, the hesitation mainly came from the worry of the customers about the work progress. In other words, the customers did not have experience on the new development method so that they were afraid of the project delay. To some degree, the inactive attitude of some customers also contributed partially to the prevention of the movement. In consequence, remaining the old working process would make the customers feel safer.

“Convincing the customers was not easy. Before, we gave the demo to the customers after few days or one week. However, in Scrum, the delivery of demo product is done after each sprint, which lasts from 2 or 4 weeks. Therefore, the customers are afraid of missing the deadline because of longer waiting for each delivery.”

(CEO – Company C)

In the agile software development, the collaboration of the project stakeholders are very important, making one of the key success factors. The collaboration is concerned with the involvement of the customers to the project progress. To be specific, Scrum requires different meetings between the customers, the Scrum Team and the Scrum Master to create product backlog of each sprint together. The success of such meetings is determined by the collaboration of all the stakeholders, in which the requirements of each sprint are well defined. Notwithstanding that, Company A experienced the obstacles to achieving this goal in all of their projects. While the collaboration is very good in the outsourcing projects, some of the customers have shown their reluctance to participate. Those customers are not interested in many meetings or concerning the development progress too much.

“The work is easier to do with the customers who know about Scrum. Sometimes, they come to Vietnam to join the work with us. However, I feel that some customers are too lazy to join the sprint meetings. We do not have good cooperation with such customers.”

(A Senior Developer – Company A)

In addition, the issue of customers is also concerned with their feedbacks on the product. The critical purpose of the feedback is to fix bugs and errors, and

improve the product's quality. In the Scrum framework, the feedback also affects the creation of product backlog for each sprint.

“The customer's feedback is the key success. It is needed for the improvement of not only the product but also the development process.”

(CEO – Company B)

Nevertheless, the feedbacks of the customers are not always valuable to the product development. In other words, the customers do not provide informative, constructive and comprehensive feedback to the developers. The customers only share their experiences on using the product in regards to the product's functionalities and performance. Consequently, they put their concentration on seeking for and reporting the bugs and errors of the software.

Another point should be taken in consideration is the problem of working with the foreign customers. Vietnam has been the popular destination of software outsourcing so that many companies worldwide have appeared in the country. Apparently, the number of outsourcing projects taken in Vietnam has greatly growing over the years. In consequence, working with the foreign customers has been the daily routine of many software companies in Vietnam. Regardless the language barrier, the issue of cultural distinctions has increasingly been a major concern. Obviously, the culture of an Eastern country is greatly different from a Western nation, causing the differences in the working styles and communication. Specifically in Company E, the main customers are the companies and organizations from the EU. Both the company's teams and the customers encountered the problems of the cultural distinctions, in which they had to adapt to the other's working style.

8 CONCLUSION

8.1 Research outcomes

This thesis aims at providing the readers the study of the adoption of the agile software development in the software companies in Vietnam. The study concerns the reasons for the adoption of the agile software development, the adoption process of the software companies in Vietnam, and the obstacles occurring during the adopting. In order to fulfill the study's objectives, three research questions were formed and answered by the analysis of the five case companies. In this chapter, the authors review the research's outcomes by answering the three research questions.

8.1.1 Research question 1 - Why do software companies in Vietnam adopt agile software development?

The authors discovered that the motivations behind the adoption were similar to most companies worldwide. The main motivation was the flaws in the traditional development methods, such as the issues of late delivery, over budget, and being unadaptable to changes. In contrast, the agile development methods have the capacity for addressing such issues, and hence, are chosen as the optimal solution by most companies.

In this study, the case companies experienced the limitations of their old development processes. As a striking example, Company A had problems with the project delay, leading to the late delivery and poor product quality. In the case of Company C, the developers acquired many reports on bugs and errors from the customers, which unfortunately required huge efforts to fix. Apparently, such limitations consequently led to the negative influences towards the companies as well as their customers. For instance, they caused more costs and work efforts, longer implementation time, and unfavorable affected the businesses.

Dealing with the customers' uncertainty was another issue that the case companies had to face. The traditional waterfall model worked best if the list of software requirements were clearly defined and fixed. However, the customers usually did

not comprehensively know their expectation. Even if the companies cannot sustain or acknowledge such expectations, they had no choice but to start the implementation phase. It was because waiting for the defined and complete list of requirements might take very long time. Subsequently, the waterfall model revealed its weakness when the customers requested to include new requirements or adjust the existing ones. It was a huge challenge to the developers because the hierarchical waterfall model did not allow to back to the previous phases.

Additionally, the collaboration and work efficiency were the problematic issues to be dealt with. In other words, the case companies experienced the poor performance of their development teams. The dead time remained high because of the halt in the work flow, the weak tasks management and delegation, and the low team transparency. In details, the employees were unable to understand well their responsibilities and contribution to the projects. The troubles resulted from the fact that the employees worked individually rather than in a team. As a consequence, the communication and sharing between them were insufficient.

Another reason for the adoption of the agile software development was the customer satisfaction enhancement. After all, the customers were the ones who used the software products and assessed the success level of the projects. Thus, the dominant target of the case companies was to deliver the good products to satisfy their customers. In the old process, by the time the customers could use the software, it was nearly impossible to make changes if the product did not meet the expectation. Also, the changes requested more work efforts of the developers, and apparently additional costs to the customers. Nevertheless, they refused to pay and blamed the companies for the mistakes. In consequence, it was obvious that the customer satisfaction could not be achieved.

Last but not least, the adoption of agile software development has increasingly been a big wave in the global software industry. Meanwhile, Vietnam appears to be one of the top software outsourcing destinations in the world. Correspondingly, software companies in Vietnam have raised their awareness of adapting to the current trend to achieve better project management and become more internationally competitive.

8.1.2 Research question 2 - How is agile software development adopted in software companies in Vietnam?

As presented in Chapter 6, the case companies have experienced a common adoption process of four stages, fundamentally recognized in two phases, preparation and practice. The preparation phase consists of the decision, the planning, and the training stage. They are followed by the last stage, experimentation, which belongs to the practice phase. From the analysis, the authors concluded that the common adoption process of the case companies was significantly different from the literature, found by Sidky, Arthur, and Bohner (2007, 203-216). To be specific, the adoption process of the case companies is a practice-oriented, in which the preparation phase is not well concentrated. In other words, the practice of the agile development method was acknowledged within a short period of time.

The adoption process of the agile development began with the decision making, which was executed by the board of directors. The decision was made upon the demand for an optimal development process in the case companies. In this stage, there could be the selection of the most suitable agile method to be adopted. Following the first, the second stage of planning was designed to produce a feasible adoption plan according to the companies' situations. The plan was characterized with the choice of an agile practice and the strategy to obtain the knowledge of the agile methodology. Specifically, there were two options for the adoption plan discovered by the authors. The first one was to hire a competent professional to work for the company. On the other side, the second one was to provide the key members with the professional training courses. Afterwards, they were capable of training the other employees. In consideration to the real situation of each company, one of these options would be selected to wisely suit with the company's projects. Thus, the advantages of the agile development can grow and its problems can be solved.

Continuing with the training stage, the companies attempted to equip their employees with the fundamentals of the agile methodology and the Scrum framework. In essence, the case companies highly appreciated the open and friendly learning environment, in which their employees are encouraged to

participate actively and freely. Such environment was formed by the daily routine of reading and practicing the method, asking and answering the related questions, and joining different training courses. Finally, the fourth stage related to the experimentation of the Scrum framework on several projects. The purpose was to explore the extent of the success before applying to all of the companies' projects. During the experimentation, the third stage of training was also integrated to consolidate the employees' understandings and their hands-on experience.

To conclude, the assessment of the adoption process was also performed in the case companies. The case companies analyzed their trial projects to find the pros and cons of the adopted agile method. The improvement points were explored and enhanced to achieve better project management. Although the adoption process still happens in the case companies, they have gained success with the implementation of the new development process.

8.1.3 Research question 3 - What are obstacles to the adoption of agile software development in software companies in Vietnam?

Based on the analysis of the five case companies, the obstacles to the adoption process of the agile development in Vietnam were adequately identified. Breaking into components, such obstacles include the internal and external ones. Specifically, the internal obstacles surround the organizational issues, namely the staff knowledge, the management, and the team cooperation and communication. Meanwhile, the external obstacles defined in this study are the project compatibility and the customer's perspectives.

The most common internal obstacle to the adoption process are the lack of knowledge. Since agile software development is a relatively new concept to the Vietnamese developer community, the issue of lacking knowledge is more or less understandable. Not only the developers but also the companies expressed their concerns towards the problem of inadequate literature and skills. Meanwhile, people in the study process of an agile development method encountered many difficulties in the case companies. The situation mainly emerged from the inadequacy of competent professionals and language skills to access the study materials in the English language. At the same time, the lack of information

sessions, professional training courses and Vietnamese materials has worsened the situation.

In the authors' point of view, the management plays a vital role in the success of the adoption process, which the managers introduce the optimal plan to motivate their employees and help them overcome the difficulties. Besides encouraging the staff, the manager is also responsible for the execution of a project as well as dealing with the customers. Hence, the achievement of a good management strategy requires great effort and skills from the managers. Notwithstanding that, the management issue is not easy to deal with in all companies. So, the case companies experienced various management troubles in their adoption, and particularly Company D was unsuccessful in adopting Scrum.

Together with the inappropriate management strategy, the inactive characteristic of the Vietnamese people also brings negative effects to the companies. Due to the fact that Vietnamese are keen on working individually rather than in a team, the communication and collaboration cannot be sufficiently exploited. Moreover, the Vietnamese employees feel safer when working on a hierarchy basics, in which they do the tasks assigned by the managers. In other words, they are afraid of taking more responsibilities because it may risk their work performance.

From the research, the issues of project compatibility and the customer's perspectives were discovered and classified as the external obstacles. The authors believe that the Scrum framework is not always the best approach to every project. Similarly, an agile development method does not insure the success of a software project. According to the characteristics of the project, a suitable and optimal development approach is employed. Such approach may be the waterfall model in the simple and small projects, while agile development is appropriate in the large projects. Taken as the example, Company A has illustrated the benefits of the waterfall model in some web development projects. Meanwhile, Company C and D have only used the Kanban method in an optimal way.

Furthermore, the customers are important in the projects because they are the end-users of the software products. Satisfying the customers is the dominant goal of every software company in order to keep their development rates. Nevertheless,

dealing with the customers is not an easy process for all companies. In the situations of the case companies, their customers were familiar with and dependent on working with the traditional method. Therefore, changing the customers' habit of working was quite a challenge to the companies. The customers hesitated to change because they doubted their success in their projects. In addition, the customers had not gained any knowledge and experience on working with an agile development method. In consequence, the customers' participation in the development process was not active and well-performed. Also, their feedbacks on the software products were not informative and constructive enough to help the developers build good software. Furthermore, the cultural distinctions were also problematic issues to address when working in the outsourcing projects with the foreign customers.

8.2 Suggestions for software companies in Vietnam

From the study, the authors develop some suggestions for software companies in Vietnam in addressing the adoption of agile software development. These suggestions were concluded from the authors' analysis of the obstacles to the adoption processes of the case companies. As a result, these suggestions can be valuable to not only the managers but also the staff of the companies.

The most important element of successful adoption is the active participation of the staff. Agile software development prioritizes the collaboration and communication between the project's stakeholders. Therefore, the authors advised the company to pay more attention to this issue. As dealing with people is not easy, the companies' managers should stimulate their employees with a motivated and active working environment. Once the employees are inspired, they will have better interaction, easier knowledge sharing, and optimal cooperation.

Furthermore, the organizational self-assessment should be taken into consideration prior to the adoption. From the authors' perspective, the assessment concerns the company's readiness and projects. The company should be aware of the current situation in order to be prepared for the adoption by eliminating the existing barriers. Meanwhile, the Scrum framework is not always the most optimal approach for every project. In this case, the company should analyze the

project and software requirements to decide whether Scrum is appropriate. Possibly, the waterfall model sometimes is a good approach in such projects, which contain a clear and certain list of requirements.

8.3 Limitations and further research

The authors detected two limitations of this thesis. First and foremost, the research was involved with only five software companies in Vietnam, which belong to the group SMEs. Thus, the outcomes might not be generalized as the overview of all software companies in the Vietnam software industry. Secondly, the case companies only adopted Scrum and Kanban so that the study was only concerned with the adoption of these methods. Notwithstanding the limitations, the thesis outcomes still guarantee the validity and reliability of the research. The reasons for the adoption of agile development, the adoption process and the obstacles occurring during the process prove to be relatively similar to and adequately confirm the existing research mentioned in the literature review of this study.

The study of the adoption of agile software development in Vietnam has suggested the possibility of a further study. Within the scope of the SMEs in Vietnam, the further works may involve the adoption of the large enterprises in Vietnam. Taken as examples, they are FPT Software, CSC Vietnam, Gameloft, and Harvey Nash Vietnam. Such enterprises are the top software companies in Vietnam, having large staffs and more complex working models. Therefore, their adoption to agile software development is more complicated and challenging.

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APPENDICES

APPENDIX 1

Semi-structured interview guide questions

Interviewee's name:

Position:

Company:

General information

1. Would you tell briefly about your company?
2. What are your target customers, software projects, and outsourcing services?
3. What was your old software development process?

Decision making

4. Who did propose the idea of adopting the agile software development?
5. Who did involve in the decision making process?
6. What were the reasons for adopting the agile software development?

Description of the adoption process

7. Which agile development method was adopted in your company? How was it selected?
8. When did the adoption start in your company?
9. How did your company's members involve in the adoption process?
10. Did the developers of your company understand or have any experience on the agile software development? How did your company manage to gain the knowledge?
11. How did your company plan to adapt to the adopted agile development method?

Evaluation of the adoption

12. What was the result of the adoption process?
 - a. If the adoption was successful, why?

- b. If the adoption failed, what were the main reasons? Would your company attempt to adopt the agile development in the future?
- 13. What were the benefits that the agile software development brought to your company?
- 14. What were the obstacles occurring during the adoption process?