

**SCRUM, A QUANTITATIVE ANALYSIS OF FUNCTIONAL VERSUS  
CROSS-FUNCTIONAL TEAMS IN DIGITAL COMPANIES IN THAILAND**



SCRUM, A QUANTITATIVE ANALYSIS OF FUNCTIONAL VERSUS CROSS-  
FUNCTIONAL TEAMS IN DIGITAL COMPANIES IN THAILAND

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This Independent Study Manuscript Presented to  
The Graduate School of Bangkok University  
in Partial Fulfillment

of the Requirements for the Degree

Master of Business Innovation

2020



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This manuscript Study has been approved by  
The Graduate School  
Bangkok University

Title: Scrum, A Quantitative Analysis of Functional Versus Cross-Functional  
Teams in Digital Companies in Thailand

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September 28, 2020

Garcia, N. M.M (Business Innovation), September 2020, Graduate School,  
Bangkok University.

Scrum, a Quantitative Analysis of Functional Versus Cross-Functional Teams in  
Digital Companies in Thailand (41 pp.)

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### **ABSTRACT**

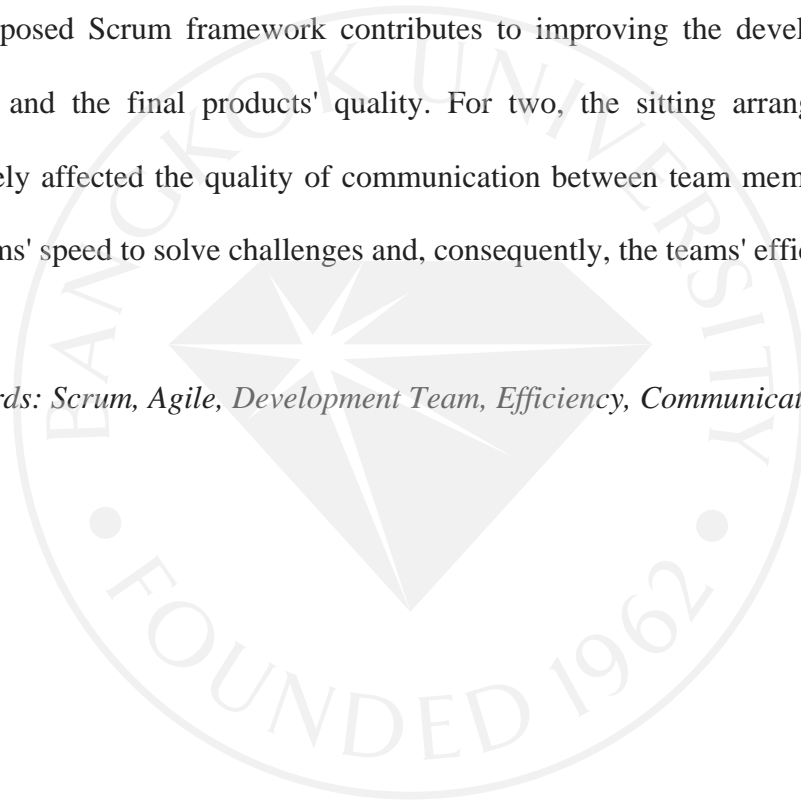
Software Development projects face diverse challenges due to the lack of adequate communication. The Agile manifesto spins between people and interactions and demonstrates how a good synergy between these factors results in value to stakeholders in complex and fast-changing environments. One of the most recognized Agile frameworks, Scrum, proposes different values and specific interactions between team members that are considered a solution for mitigating team challenges, with a consistent focus on communication.

Scrum focuses on creating value for stakeholders in the shortest time possible. This paper suggests different approaches to facilitate good communications in software development teams and demonstrates the influence of the workspace sitting arrangement on the quality and impact of intra-team communications. This study's motivation is to reduce existing research gaps in the relationship between the application of Agile methodologies, specifically Scrum, and the efficiency and quality of development teams by comparing the stated factors. The study collected and compared data from five software development teams, pre- and post-adoption of the proposed Scrum framework. The recommended Scrum framework suggests a new

sitting arrangement, intending to improve the team members' communications habits. The project lasted one year, included 5 Scrum teams, involved 50 people, and was distributed between two departments (Production and Support) of a software and website development company located in Bangkok, Thailand. Quasi-experimental research was carried out using a pretest-posttest research design for the comparison.

The study led to two main findings. For one, the evaluation results show that the proposed Scrum framework contributes to improving the development process quality and the final products' quality. For two, the sitting arrangement changes positively affected the quality of communication between team members, improving the teams' speed to solve challenges and, consequently, the teams' efficiency.

*Keywords: Scrum, Agile, Development Team, Efficiency, Communication*



## ACKNOWLEDGEMENT

I would first like to thank my supervisor, Professor Dr. Detlef Reis Ph.D., whose proficiency was beyond valuable in this dissertation journey. Your discerning feedback pushed me to sharpen my analytical thinking and brought my effort to a higher level represented in my work. Special thanks to Dr. Xavier Parisot, Ph.D., professor and Program Director of the Master in Business Innovation, and every teacher who made this experience exceptional.

I'm extremely grateful to my parents and brothers for their love, prayers, empathy, and sacrifices for educating me and prepare me for the future. You are always there. Eventually, I could not have completed this dissertation without the support of Lauren Feille, who provided inspiring discussions and pleasant distractions to entertain my mind outside of my research. Ultimately, I would like to thank my friends Pierre Matin and Matin, who represent lifelong friendships gained during the program.

Nestor Javier Garcia Cantillo

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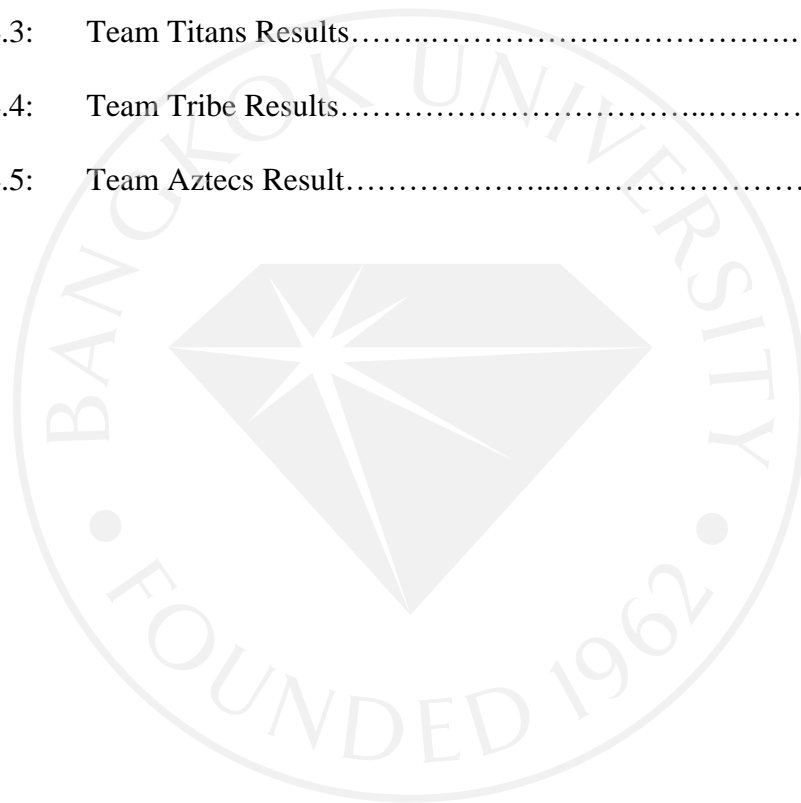


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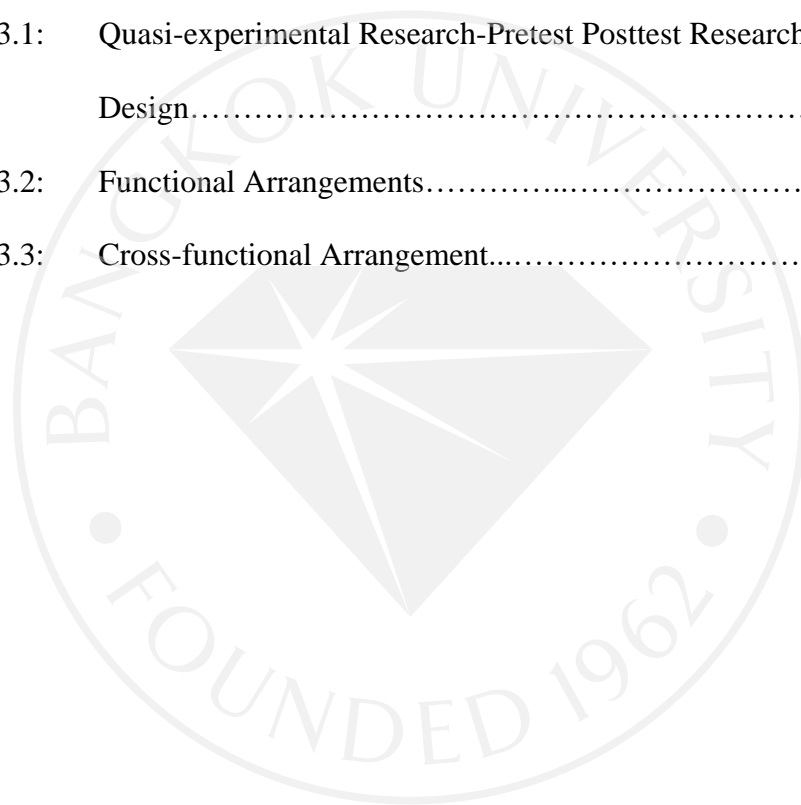
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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

The complexity of IT projects, the sudden changes in the context of the systems, and the changes in the requirements once a project has started generate an environment where planning, development, administration, and control of the project is difficult to evaluate. During the past 20 years, the development and execution process of IT projects has changed significantly, which has influenced project managers and team leaders to introduce and apply various new approaches, methods and tools to conduct this process more successfully and effectively.

The importance of complexity to the IT process is widely acknowledged for several reasons (Morris, 2002): (i) it influences project planning, coordination, and control; (ii) it hinders the clear identification of goals and objectives of major projects; (iii) it can affect the selection of an appropriate project organization form and experience requirements of management personnel; (iv) it can be used as criteria in the selection of a suitable project management arrangement; and (v) it can affect different project outcomes (time, cost, quality, safety, etc.). These types of complexities require methodologies that allow quick results.

Among the most important methodologies of this type is project management (PM) based on the Project Management Institute guidelines (Project Management Institute, 2004), and project management based on the Agile approach (Coram & Bohner, 2005). PM based on the Project Management Institute (PMI) guidelines provides tools, best practices, and networks for project managers and practitioners to

successfully manage their projects, programs, and portfolios with established roles and responsibilities to generate results that must reflect high-quality deliverables, in the agreed time, and with the budget and expected scope (Project Management Institute, 2004). The PMI has more than 500,000 certified members globally (Project Management Institute, New Zealand, 2019). Meanwhile, PM based on the agile approach is a set of methodologies for project development that require particular speed and flexibility in their process, with many of the projects related to software development.

In the 1990s, Agile already started to gain some traction. However, the real birth moment for the Agile concept was the posting of “The Manifesto for Agile Software Development” in 2001. Created by 17 software developers, the document channeled a discussion on the collection of lightweight development methodologies now known as Agile methods. The most outstanding and used Agile methodologies are Scrum, Extreme Programming (XP), and Kanban (Sverrisdottir, Ingason & Jonasson 2014). Agile methods primarily focus on people, teams, and interactions, as communication and leadership style are important factors in Agile project success. Kelle, Visser, Plaat and Wijst (2015) highlight that most projects do not fail due to technology, but due to social and organizational problems, a lack of (effective) communication, and unaligned teams.

## **1.2 Research Objectives**

To make an Agile project achieve the desired objectives, the project leaders’ communication must follow different principles based on the methodology and practices used. In this study, I aim to analyze the guideline, framework, and factors

that affect the communication of one of the most common frameworks: Scrum, based on Agile methods. Moreover, this study also investigates to what extent good communication practices in cross-functional work teams and arrangements have a direct impact on the efficiency of team members, reduce uncertainty, and deliver better quality results to clients.

### **1.3 Research Questions**

The study inquiries into three guiding research questions:

1.3.1 What frameworks and/or good practices improve the communication and resolution time of the project between cross-functional Scrum teams?

1.3.2 How does the Scrum communication approach impact the performance of the IT development teams?

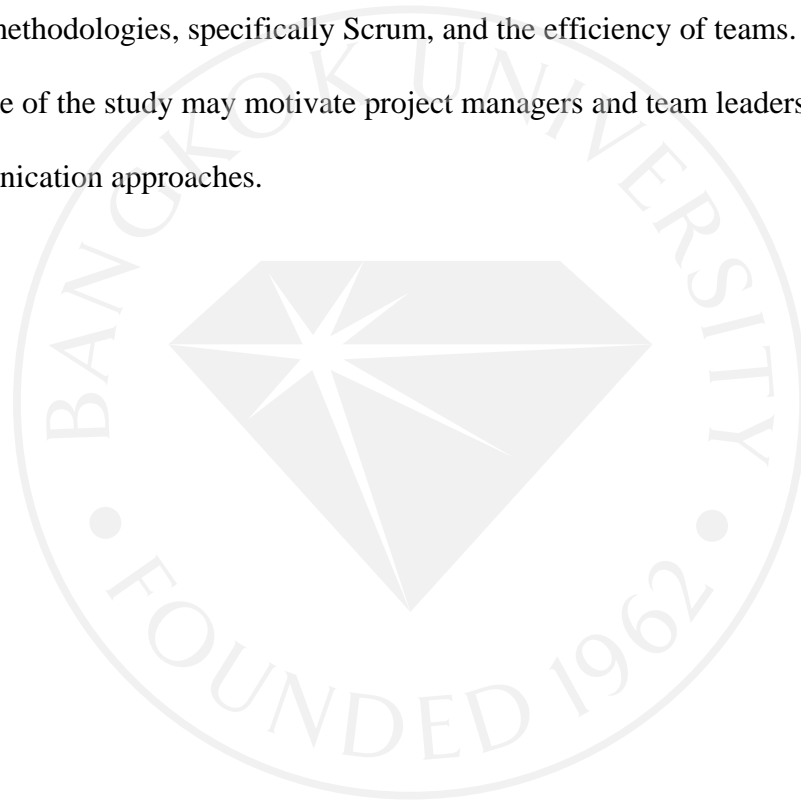
1.3.3 What factors influence the stakeholders' satisfaction in Scrum projects based on the agile method?

### **1.4 Scope of the Study**

This research should provide useful reading for academics and practitioners interested in furthering their project management knowledge and access to supporting frameworks. A new project management theoretical framework is developed that underpins a practical inquiring project management framework. The study will also serve as a guide to apply what has been proved through the research, exploring modern practices that aim to deliver quality products to the stakeholders.

### **1.5 Intended Contribution of the Study**

This study will contribute to the existing literature on project management and the role of communication in the success of a project by exploring to what extent communication and specific interactions contribute to successful project completion in complex, fast-changing environments such as Agile. Consequently, the study will reduce existing research gaps on the direct relationship between the application of Agile methodologies, specifically Scrum, and the efficiency of teams. In addition, the outcome of the study may motivate project managers and team leaders to reconsider communication approaches.



## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Communication in Project Management**

Communication and business leadership are two concepts that are intricately intertwined. A leader cannot be isolated; therefore, project managers need to communicate regularly and effectively with their teams. Communication is multidirectional; the information flows not only to internal teams but also to customers, suppliers, other leaders, and project stakeholders. Sverrisdottir, Ingason and Jonasson (2014) explored the different communication challenges of modern teams and listed the flow of information in a project

- 1) Internal: with the project team
- 2) External: with the client, users, and suppliers of the project.
- 3) Formal: through reports, presentations, and documents.
- 4) Informal: through emails and aisle or telephone conversations
- 5) Vertical: towards the different levels of the structure of the organization
- 6) Horizontal: among colleagues in an area or work team
- 7) Official: communication with official or internal company bodies
- 8) Unofficial: communication with colleagues and collaborators
- 9) Written: includes all kinds of project writings
- 10) Oral: includes all unwritten communication about the project.



11) Verbal: through the use of spoken language. In equipment where different languages or idioms are used, it is convenient to pay close attention to avoid misinterpretations

12) Nonverbal: communication includes body language in front of an interlocutor. We must take into account, attitude, posture, gestures, behavior, and distractions as these can be a barrier when communicating.

The overarching theme of Sverrisdottir, Ingason and Jonasson (2014)'s study is that communication is fundamental to align all stakeholders involved in a project with its main goal and underlying objectives. All these factors of communication processes provide a bridge between people and the information that is necessary for a project to succeed. In a project, communication management utilizes processes that guarantee that the generation, collection, distribution, storage, and final disposition of the information are adequate and timely (Conboy & Morgan, 2010). Effective communication is one of the key factors that determine the success rate of a project (Spundak, 2014). Communication gaps, along with the existence of misunderstandings, are the main reasons for project failure (Kelle, Visser, Plaat & Wijst, 2015). Specifically, informal communication helps to build trust, enables the creation of shared values, and stimulates the formation of strong interpersonal relationships (Sverrisdottir, Ingason & Jonasson 2014), which are considered crucial success factors in Agile. Besides, informal communication facilitates quick reactions to problems and changing requirements, which is particularly essential in continually changing environments. As a result, it is essential to note that the communication style is as vital as the communication frequency and that informal communication can enhance Agile project success (Taibi, Lenarduzzi, Ahmad & Liukkonen, 2017).

The similarity in values and goals is needed to be efficient and effective, and must strengthen interpersonal relationships (Kelle, Visser, Plaat & Wijst, 2015). When members of a group have differing visions concerning goals, timelines, and objectives, value diversity occurs. Therefore, this increases relationship conflict, decreases satisfaction of the team, and consequently, it negatively affects team performance (Sverrisdottir, Ingason & Jonasson 2014).

## **2.2 From Classic Development to New Methodologies**

The Waterfall model of development has been widely used in the IT industry for over 40 years. This model's origin can be found in the paper “Managing the Development of Large Software Systems” by Royce (1970). This development model was a visible improvement over the former model of “code-and-fix” regular at the software industry's birth. Waterfall methods work in a series of dependent phases that start with gathering extensive requirements upfront and executing a project based on those requirements (Boehm, 1988). It is common today to depreciate the Waterfall model for its ineffectiveness and the rigidity that the model implies, it is also true that tens of thousands of successful software were built using this basic model: first, understand the requirements; second, design a system that can address those requirements; and third, integrate, test, and deliver the system to its users.

Although the advantages of Waterfall remain undeniably applied, companies continue finding gaps in the method because of the core of its premise: Everything will work out exactly as planned. Team leaders discerned that it isn't always like that. The biggest concern is not that everything works as planned but how teams adapt to change, and that is exactly where Waterfall fails, there is no plan when the

requirements change. While a Waterfall approach may work well for manageable, simple projects, it doesn't work well for complex projects, especially digital projects, which typically contain many unknowns.

Figure 2.1 illustrates the traditional model of software development and its basic phases of requirements, design, coding and test, verification, and operations and maintenance.

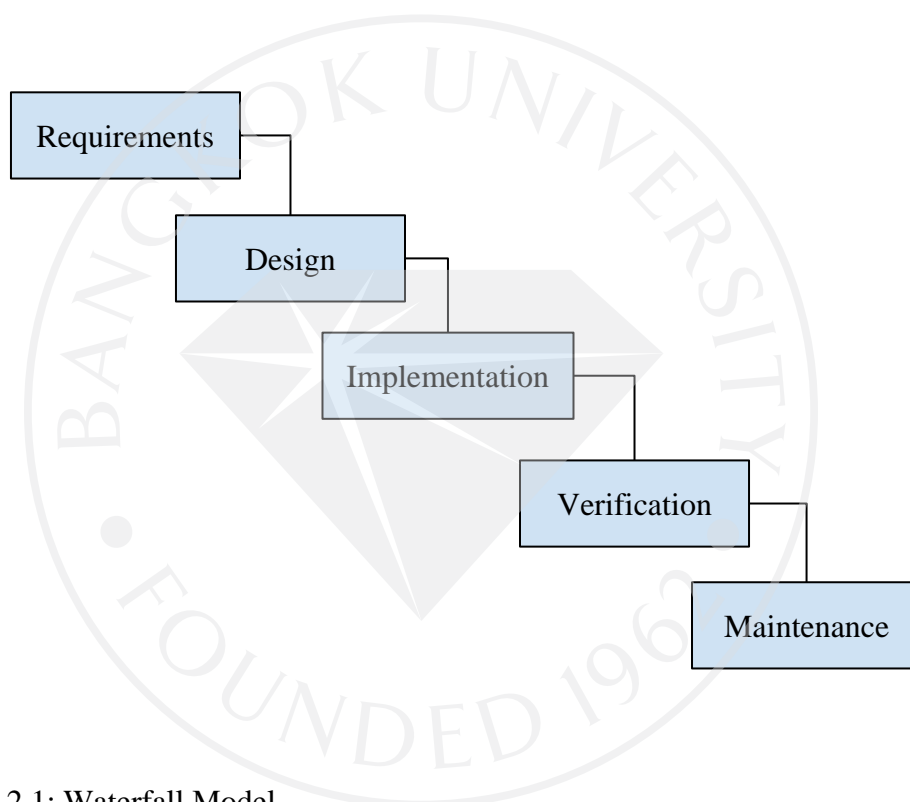


Figure 2.1: Waterfall Model

### 2.3 The Agile Method

The Agile Manifesto (Beck, et al., 2001) is a document that was created in 2001 by 17 programming experts who proposed a radical change in the way software was developed. Faced with traditional models (excessively rigid and far from the needs of customers), these gurus proposed four values that inspire the different Agile methodologies that had since emerged. Although it was born in the world of software,

the philosophy of the Agile Manifesto is adaptable to any cross-functional team working in the development of any other product or service.

### 2.3.1 Agile manifesto values

The values defined in the Agile Manifesto (in the context of software/IT development projects) do not focus on work practices, methodologies, or procedures, but instead advocate a change of mentality and a new organizational culture based on four pillars:

- 1) Individuals and interactions over processes and tools
- 2) Working software over comprehensive documentation
- 3) Customer collaboration over contract negotiation
- 4) Responding to change over following a plan

### 2.3.2 Agile principles

The previous four values are specified in 12 principles that define the framework of any agile team (Beck, et al., 2001):

- 1) Our highest priority is to satisfy the customer through the efficient delivery of valuable software
- 2) Welcome changing requirements, even late in the development. Agile processes harness change for the customer's competitive advantage.
- 3) Deliver working software frequently, from a couple of weeks to a couple of months, with a preference for the shorter timescale.
- 4) Business people and developers must collaborate daily throughout the project.
- 5) Build projects around motivated individuals. Give them the environment and support they need and trust them to get the job done.

6) The most efficient and effective method of conveying information to and within a development team is a personal conversation.

7) Working software is the primary measure of progress.

8) Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.

9) Continuous attention to technical excellence and good design enhances agility.

10) Simplicity the art of maximizing the amount of work not done is essential.

11) The best architectures, requirements, and designs emerge from self-organizing teams.

12) At regular intervals the team should reflect on how to become more effective, allowing for adjustment of its behavior.

## 2.4 Scrum

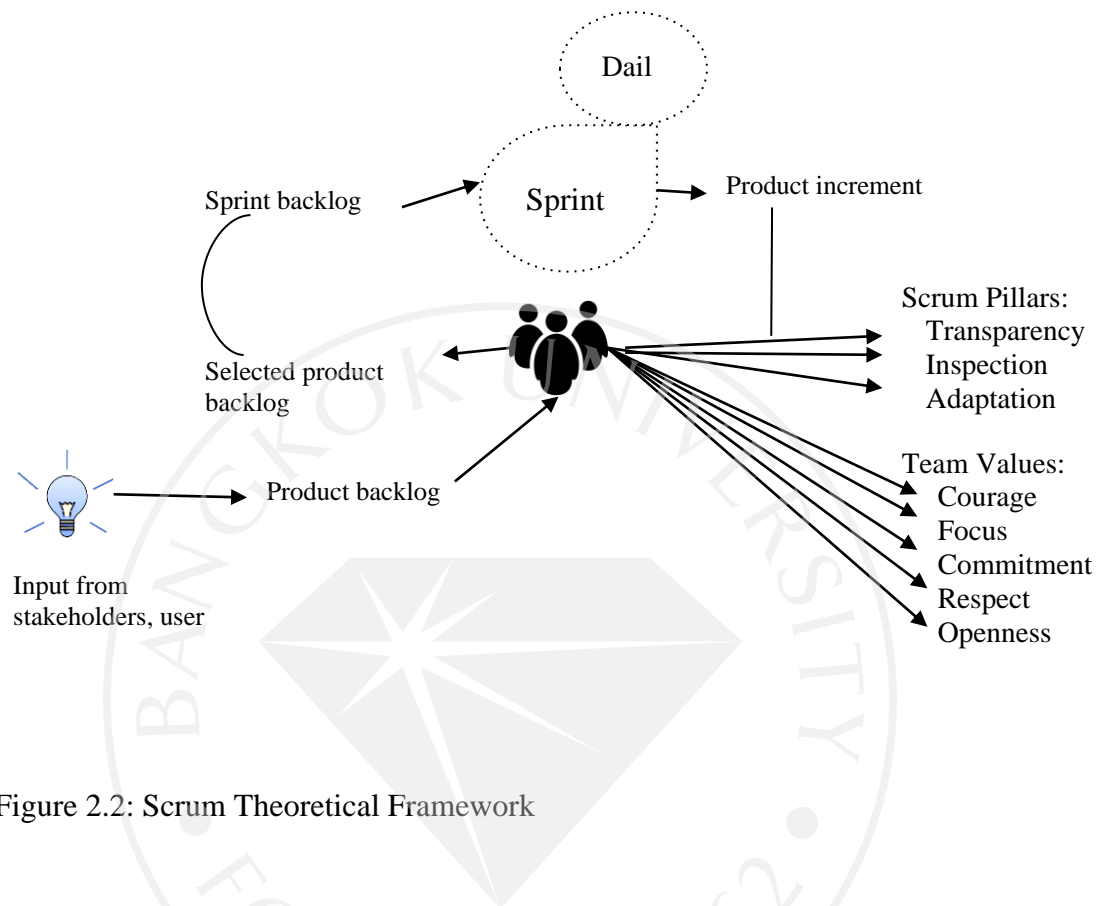


Figure 2.2: Scrum Theoretical Framework

Alaimo and Salias (2013) is one of the leading exponents of Scrum. His theories are based on the "Agile Manifesto" proposed by Beck, et al. (2001). According to Alaimo and Salias (2013) "Scrum is a framework that allows us to find emerging practices in complex domains, such as project management and innovation." The first reference to the term "scrum" appeared in Nonaka and Takeuchi's (1995) "The New Product Development Game". The authors adopted the name from the game of rugby to stress the importance of working as a *team* in complex product development. It indicates a holistic approach to flexible, autonomous and dynamic teamwork with six main characteristics, namely "built-in instability,

self-organizing project teams, overlapping development phases, ‘multi-learning’, subtle control, and organisational transfer of learning” (Hidalgo, 2019) It provides a complete and detailed description of how to perform the tasks of a project, generates a relational and iterative context of inspection and constant adaptation for those involved. Scrum is based on constant communication and flexibility to create its own process. This happens because there are neither better nor good practices in a complex context.

Scrum’s goal is to deliver as much quality software as possible within a series of short time boxes called sprints, which typically last about a month (Beedle, Devos, Sharon, Schwaber & Sutherland, 1998). A sprint is a fixed-length iteration of work that typically lasts between one and four weeks. During this time-box, the team builds and tests a clearly defined set of functionalities with the goal of completing a usable and potentially shippable increment of work as the sprint gets underway, scrum teams use a task board to manage their work. Progress is tracked using a sprint burn down chart. Each day the team meets for a short standup meeting, known as the daily scrum. They share what they accomplished the previous day, what they intend to do today, and any impediments blocking their progress. The sprint ends when the time-box ends, regardless of whether all stories are complete. A review meeting is held during which the team shows what they accomplished, typically in the form of a demo. The product owner and other key stakeholders provide feedback, and the product owner determines if the sprint goal has been achieved. (Hidalgo, 2019).

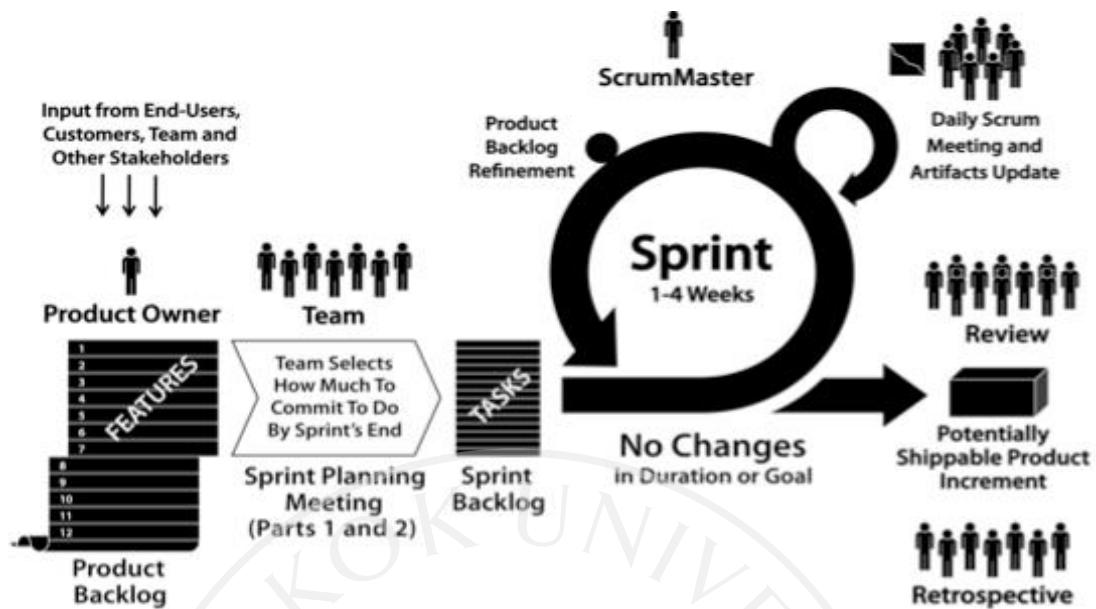


Figure 2.3: Scrum Process

Source: Beedle, M., Devos, M., Sharon, Y., Schwaber, K., & Sutherland, J. (1998).

*SCRUM: An extension pattern language for hyperproductive software development.* Retrieved from [http://jeffsutherland.org/scrum/scrum\\_plop.pdf](http://jeffsutherland.org/scrum/scrum_plop.pdf).

#### 2.4.1 The Roles of Scrum

The roles of Scrum are carried out by the development team, the product owner, and the Scrum master, and they include:

- 1) The development team consists of the necessary staff for the successful development and delivery of the product. The team is responsible for its construction and the quality of a defined end product, and generally consists of cross-functional members. For instance, software projects include software engineers, project managers, programmers, quality analyst experts, and designers.



2) The product owner who determines the vision and expectations, collect requirements, functional characteristics, and priorities is the person responsible for the success of the product from the stakeholder's point of view.

3) The Scrum Master is the team coach who helps the team reach its maximum possible level of productivity. He is considered the facilitator of everything the development team requires to fulfill its commitments (Spundak, 2014). One of the characteristics of Scrum is that its teams are self-controlled; individuals are encouraged to think out-of-the-box, consider different perspectives and come forward with novel ideas, which leads to transparency in decision-making and more flexibility during the process.

The framework refers to continued audits through the development process, which are intended to improve the products and work methods with the changing environment (Sutherland & Schwaber, 2012). Furthermore, knowledge and all decisions are considered to be based on involvement and previous experiences. These fundamentals are deemed appropriate to complex software development. However, they can also be applied to other projects with a different dimension since Scrum adapts to the needs of the organization, teams, and individuals. This is where Scrum uniquely differs from traditional project management techniques, where the practice is to document most of the material in the beginning and to minimally change the plans.

#### 2.4.2 Scrum Elements

Based on the research of Alaimo and Salias (2013), the elements of Scrum are as follows:

1) Backlog Product: Refers to a list of elements that contains the requirements of the client, commonly known as stories of the user, which are ordered according to the client's priorities.

2) Sprint Backlog: It is the set of stories from users that are selected to be performed during a sprint, which has been estimated and analyzed by the work team.

3) Increment: Corresponds to the result of the running sprint, that is, the target output expected by the client in the iteration, which should be functional, new or modified, and with quality enough to be delivered.

Based on the research by Alaimo and Salias (2013), the flow of work in Scrum includes the following activities:

1) Sprint (Iteration): This corresponds to a cycle of work defined by the team, which generally ranges between one and four weeks, when one commits to making a certain amount of user stories

2) Sprint Planning Meeting: It is the initial meeting of each sprint, where the product owner decides the user stories that are analyzed and estimated according to their priority.

3) Daily Scrum: It is an agile meeting of monitoring, which should not last more than fifteen minutes, where each team member relates their progress with the development of user stories engaged in the planning. The following three questions are answered: What was accomplished since the last meeting? What will we work from the moment until the next meeting? What problems or impediments are we having?

4) Sprint Review: It is a meeting that is performed at the end of the sprint to evaluate the functional increase potentially deliverable built by the team. In

addition, it is to determine whether the stories of the user who got engaged and selected for the sprint were completed in time by the development team, as previously planned during the sprint planning meeting. This meeting focuses on reviewing "what" one did during the sprint

5) Retrospective: It is a closing meeting of the sprint that reflects on the work done and the events that emerged in the sprint. The meeting focuses on a search to identify weak points, correct them, and to encourage continuous improvement and team happiness. This meeting focuses on reviewing the process executed during the Sprint, which is the "how."

6) Product Backlog Refinement: It is an activity where priorities are reviewed and the completeness of user stories is evaluated.

#### 2.4.3 Pillars and Values of Scrum

Dalton (2019) suggests there are three pillars and five values of Scrum. These three pillars only work if they are utilized together. It is useless to be transparent if there is no inspection in place. Nor does it serve an inspection, if afterwards, the team continues the same behavior. Changes are also of no use if the team does not make them public or indicate the positive and negative effects of the said changes.

According to Dalton (2019), the three pillars of Scrum are:

1) Transparency: Openness about what you do, how you do it, and how you fail. It is the only way to improve.

2) Inspection: The product, methodology, and tools should be inspected frequently. The sooner a small problem is found, the higher the chance that the problem will amplify.

3) Adaptation: The team will minimize defects by making small changes that help improve daily work, and therefore, the final product.

A Scrum team is successful when it is based on the above pillars. It is the Scrum Master who encourages the change of mentality among the team in order to achieve a solid foundation when establishing these pillars. To install the pillars, the five Scrum values must be incorporated into the team. When the team abides by these values, the pillars materialize and foster the confidence of everyone. (Conboy & Morgan, 2010). These values include:

1) Courage: To do things right and work on difficult problems, leaving the comfort zone if necessary.

2) Focus: The work of the sprint and the objectives of the team.

3) Commitment: To successfully complete each iteration according to the team's goals.

4) Respect: Both among the members of the team and outside the team, the professionalism of others is granted and everyone's opinions are respected in order to become more capable and independent.

5) Openness: From the team and interested parties to all the work and the challenges that are presented to them during the process.

When a team endorses all the points of the pillars and values, it can achieve a maximum level of self-organization, and thus facilitate the incorporation and evaluation of small, periodic changes that aim to seek continuous improvement from the team (Conboy & Morgan, 2010).

#### 2.4.4 Communication: The key success factor of the Scrum framework

The major characteristic of the Scrum methodology that sets it apart from other methodologies is its emphasis on the method of communication (Abrahamsson, Salo, Ronkainen & Warsta, 2017). Scrum places much emphasis on one-on-one communication, which is consistent throughout the development team and project stakeholders. Since effective communication is one of the most vital requirements for the success of projects, with poor communication being the primary cause of most project failures, Scrum is designed to improve communication among cross-functional teams.

Scrum teams engage in standup meetings every morning before all the stakeholders begin their daily tasks. The standup meeting is intended to last for about 15 minutes, with the members required to remain standing during the meeting. The standup meeting promotes one-on-one communication among the team members, whereby they share the progress of their work, their achievements, and any challenges they are undergoing in the implementation of the project.

However, face-to-face communication has many advantages. First, the team members can observe any non-verbal cues and signs from their colleagues. Second, face-to-face communication during standup meetings also enables the team to show empathy to each other (Taibi, Lenarduzzi, Ahmad & Liukkunen, 2017). Last but not least, the meetings create a sense of belonging and teamwork among the team members. Meanwhile, members can ask for help from colleagues concerning the challenges they face.

Cross-functional teams accommodate professionals from various sectors and work specialization. Effective communication and coordination are necessary for the

collaboration of these professionals in order to achieve a milestone. Scrum applies various strategies to achieve effective communication among the stakeholders, which include emphasizing the following: transparency, clarity, visual communication, a trusting environment, and promoting the use of diplomatic and non-violent modes of communication. In addition, some other Scrum strategies are facilitating interactions and advocating that team members consider each other's feelings and ideas (Abrahamsson, Salo, Ronkainen & Warsta, 2017 and Hron & Obwegeser, 2018). The Scrum framework favors random verbal exchanges for the quick implementation of functionalities over time-consuming work on documentation and official reports.

The Scrum master coordinates communication sessions in a Scrum, regulating the nature of communication among the team members and the type of information shared (George, Scheibe, Townsend & Mennecke, 2018). If the conversation gets too argumentative, the Scrum master resolves the situation. Furthermore, Scrum uses visual communication, which makes it possible for people to obtain additional information through observation and passively listening to colleagues, a type of communication known as osmotic communication (Render, 2019). The communication approach allowed during Scrum meetings is non-violent, diplomatic, and free from biases such as hurtful/offensive jokes and sarcasm. The Scrum master maintains professionalism and discipline among the members to prevent the team from deviating from the primary purpose of the communication.

Scrum values the input of every stakeholder, including product owners, developers, financiers, and users. An efficient communication channel must be put in place to make it possible for all the stakeholders to share their input with the cross-functional team. Scrum teams achieve real-time communication by employing

communication channels such as video teleconferencing, video recording, online chat conversations, and telephone conversation (Haryono, Kholid & Nikmah, 2019 and Stray, Faegri & Moe, 2016). The Scrum framework makes use of modern, sophisticated communication technologies such as Skype and Zoom to facilitate real-time visual communication, even for remote and distributed teams.

Another way in which Scrum improves communication among cross-functional teams is by enhancing transparency among the team members. A Scrum team works as a family by showing empathy and helping one another to remain on track, assisting members of the team in case they fall behind due to some technical challenges (Taibi, Lenarduzzi, Ahmad & Liukkunen, 2017). The transparency in the team creates trust among the members and encourages them to share information without fear of criticism or judgment. Direct communication among Scrum members removes lengthy communication channels present in hierarchical office structures, which promotes a bloated, rigid bureaucracy that hinders innovation. With open communication and innovation being a key factor in the process, Scrum allows for random changes during the whole development period.

## **CHAPTER 3**

### **RESEARCH METHOD**

#### **3.1 Participants**

This study follows the single case study method, which was conducted at a software and website development company based in Bangkok, Thailand. Meanwhile, a quasi-experimental research was carried out using a pretest-posttest research design. The research method involved an up-close, in-depth, and detailed examination of the teams using the Scrum framework on a daily basis. The sample consists of 50 people. Five Scrum teams were analyzed, each team consisting of 10 people.

The initial concept of the study was combining both quantitative and qualitative techniques and then using the results together to reach a conclusion. However, due to the COVID-19 outbreak currently impacting the world, the office has been closed since the beginning of Q2.2020. Moreover, the scrum teams have not been working as proposed in this study anymore. Furthermore, due to the uncertainty during this period, some teams have been dissolved and staff has been laid-off. For the aforementioned reasons, a qualitative analysis could not take place as interviews of the Scrum teams and its members were not possible. Hence, I used the quantitative data collected over a period of one year (March 2019 to March 2020) and focused on the analysis of the available quantitative data.



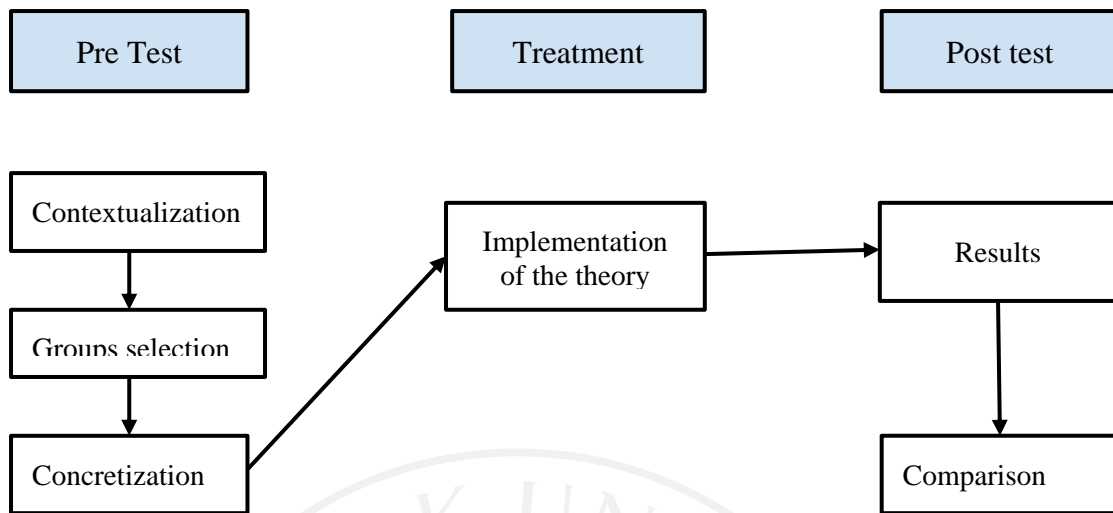


Figure 3.1: Quasi-Experimental Research-Pretest Posttest Research Design

To apply the mentioned research design to the efficiency of each team, a comparison took place between the resolution time of the projects and communication practices to a Scrum framework before changing the sitting arrangement and when the teams were sitting in a cross-functional arrangement. The same approach was used to conduct this design to the quality of the products, a comparison between the stakeholder's satisfaction of each project before changing the sitting arrangement and the stakeholder's satisfaction of the projects when the teams were sitting in a functional arrangement. Cross-functional team is a team that is organized around a product, a defined portion of a product, a service, or a customer value stream, and must include all competencies needed to accomplish their work without depending on others that are not part of the team. Whereas functional teams are composed of organizational members from several vertical levels of the organizational hierarchy who perform specific organizational functions.

To measure the projects' quality, a customer satisfaction (CSAT) survey was conducted for each one of the 40,183 projects examined. This is a commonly used measure for products and services to rate how happy customers are with what they purchased. The Information gathered from customer satisfaction surveys provides valuable insight for the teams to stay relevant and it plays an important role in understanding customer needs and wants. The survey question to collect this feedback was, “How would you rate your overall satisfaction with the quality of the [product/service] you received?”. The ordinal scale has an innate order within the variables along with labels. It establishes the rank between the variables of a scale but not the difference value between the variables, it offers a Likert scale question type between 1-5 with 5 being “highly satisfied” and 1 being “highly unsatisfied”.

Key:

X = Treatment

T = Pretest

T<sub>2</sub> = Posttest

R = Randomization

Table 3.1: Groups Pretest-Posttest Study

| Efficiency         | Quality            |
|--------------------|--------------------|
| W X W <sub>2</sub> | W X W <sub>2</sub> |
| V X V <sub>2</sub> | V X V <sub>2</sub> |

(Continued)

Table 3.1 (Continued): Groups Pretest-Posttest Study

| Efficiency         | Quality            |
|--------------------|--------------------|
| T X T <sub>2</sub> | T X T <sub>2</sub> |
| L X L <sub>2</sub> | L X L <sub>2</sub> |
| A X A <sub>2</sub> | A X A <sub>2</sub> |

### 3.2 Procedure

For the purposes of this research, the efficiency and quality of 5 teams were measured during a period of one year. During the first six months of the study, all teams were sitting in functional groups, with a table for designers and another for developers, etc. After six months, the teams were rearranged, and they moved to sit as cross-functional teams. Furthermore, these cross-functional teams are also called squads.

A total of 40,183 projects were analyzed and documented in the software Zendesk, which captures and stores all relevant information of each project. During the first part of this study 20,615 projects were analyzed while the number of projects captured and analyzed in the second half was 19,568 projects. The variation in the number of projects between the first and the second periods was 5.08%.

The purpose of this new arrangement was to allow everyone to easily collaborate with squad/teammates within cross-functional teams. The arrangements were structured following three main criteria as follows:

- 1) All squads should sit in the same pod or adjacent pod.

- 2) Within each pod, members of the same functional team should be grouped together.
- 3) All managers should have semi-private seats to handle confidential work.

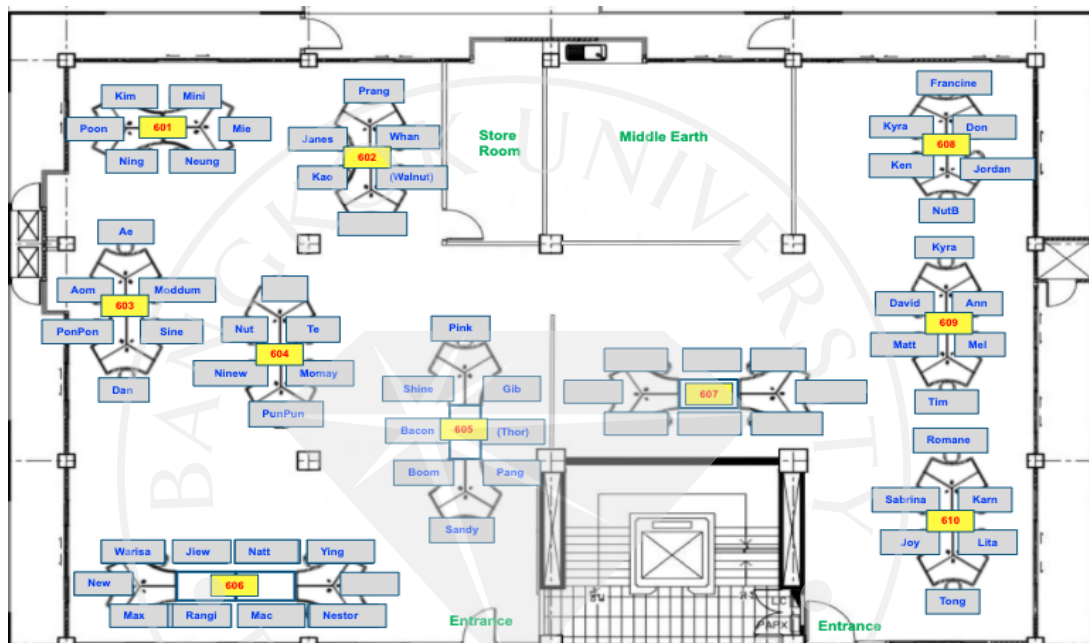


Figure 3.2: Functional Arrangements

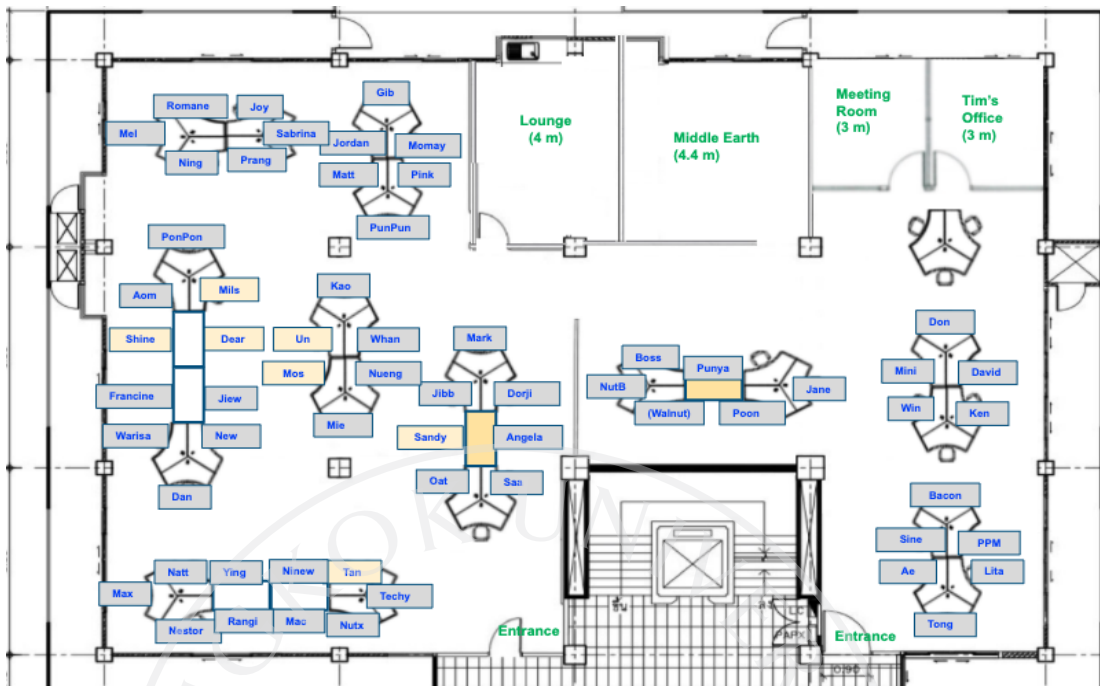


Figure 3.3: Cross-functional Arrangement

Functional arrangements are created for organizational members from several vertical levels of the organizational hierarchy who perform specific organizational functions. A typical functional team will have several subordinates and a manager who has authority to manage internal operations and external relationships of a particular department or division of the organization.

The cross-functional arrangements are for the experts from various functional areas and work cooperatively towards some organizational goal. Because these members are considered experts of their individual functional area, they are usually empowered to make decisions on their own without needing to consult management. Cross-functional teams are believed to improve coordination of interdependent activities between specialized subunits.

## **CHAPTER 4**

### **RESULTS**

#### **4.1 Introduction to the Teams Investigated in this Study**

The operations teams consist of three production teams (Titans, Tribe and Aztecs) and two support teams (Vikings and Warriors). The difference between support and production is the type of projects each team handles. On one hand, production teams create websites until they are live. On the other hand, support teams are in charge of maintaining the new websites after they have gone live. This gives an idea of the length of the projects each team handles. The projects are divided into two different types based on the organizational arrangement in which they were delivered (functional vs. cross-functional team composition).

#### **4.2 Performance Impacts of Different Organizational Arrangements on the Support Teams**

The Warriors stemmed the biggest project load of all teams; more than 30,000 thousand projects completed by this team were analyzed. It is evident that the new arrangement of seats resulted in a more efficient team, decreasing the full resolution time of each project by more than five hours. Client satisfaction also increased, although only marginally as it was already on a very high level in the functional arrangement. In accordance with the resolution time, the value perceived by the stakeholders on the projects increased while the team was constantly communicating.

Table 4.1: Team Warriors Results

| Team: Warriors                  | Functional | Cross-functional | Variation (hrs) | Variation (%) |
|---------------------------------|------------|------------------|-----------------|---------------|
| Mean-full resolution time (hrs) | 73.4       | 67.9             | -5.5            | -7.49%        |
| Client Satisfaction (%)         | 97.50%     | 97.90%           | 0.40%           | 0.41%         |
| Total projects                  | 18159      | 17624            | -535            | -2.95%        |

As shown in the chart below, the Vikings is the team that handles the longest, most resolution time-intensive projects. The full resolution time substantially increased in the cross-functional arrangement by more than a hundred and fifty hours, thus proving as a faster turnaround when the team members were arrayed in functional teams. Although the mean full resolution time increased, the percentage of client satisfaction also slightly increased in the cross-functional arrangement. The reason for this high deviation in the opposite direction compared to the Warriors team is that the Vikings is the squad in charge of all new services and products offered in the company portfolio. Vikings represent the team that transforms the client's new needs into new products and creates new processes; hence they take time to analyze risks to have a clear scope of the new products/services. The Vikings team works on more complex and sophisticated support projects that require more extended time for resolution. Due to the complexity, difficulty, and scope of the Viking team's projects, the company's best talents tend to be assigned to this team. Under those

circumstances, even if the time to deliver a project increased, the value delivered to the stakeholder also increased and the overall satisfaction improved marginally.

Table 4.2: Team Vikings Results

| Team: Vikings                   | Functional | Cross-functional | Variation (hrs) | Variation (%) |
|---------------------------------|------------|------------------|-----------------|---------------|
| Mean-full resolution time (hrs) | 200.3      | 364.2            | 163.9           | 81.83%        |
| Client Satisfaction (%)         | 97.58%     | 97.94%           | 0.36%           | 0.37%         |
| Total projects                  | 852        | 560              | -292            | -34.27%       |

#### 4.3 Performance Impacts of Different Organizational Arrangements on the Production Teams

The Titans reduced the full resolution time by more than 70 hours when the team was working physically close. Titan's team members were almost 50% more efficient, demonstrating that constant communication improves the overall coordination. Consequently, the stakeholders perceived more value on the product delivered, as it can be seen on the chart below, a slight increase in client satisfaction (which was already on a very high level).



Table 4.3: Team Titans Results

| Team: Titans                    | Functional | Cross-functional | Variation (hrs) | Variation (%) |
|---------------------------------|------------|------------------|-----------------|---------------|
| Mean-full resolution time (hrs) | 174.5      | 96.4             | -78.1           | -44.76%       |
| Client Satisfaction (%)         | 97.51%     | 97.92%           | 0.41%           | 0.42%         |
| Total Projects                  | 764        | 656              | -108            | -14.14%       |

The Tribe was more efficient. The mean full resolution time decreased by more than 30 hours when the team was working in a cross-functional arrangement. Furthermore, the reduction of the overall project management cycle reduced by almost 20% (equivalent to one day per week). It is noteworthy that the stakeholder satisfaction increased and this shows that the team was able to improve the overall quality and time.

Table 4.4: Team Tribe Results

| Team: Tribe                     | Functional | Cross-functional | Variation (hrs) | Variation (%) |
|---------------------------------|------------|------------------|-----------------|---------------|
| Mean-full resolution time (hrs) | 166.1      | 135.5            | -30.6           | -18.42%       |
| Client Satisfaction (%)         | 97.55%     | 97.92%           | 0.37%           | 0.38%         |
| Total projects                  | 768        | 578              | -190            | -24.74%       |

The Aztec is the team with the smallest workload, as shown above, only 222 projects were analyzed. Regardless of the number of projects, The Aztec was the team with the biggest improvement on the efficiency, solving their projects in half time or less, than the time they were taking in a functional arrangement. The speed on the project development generated value to the stakeholders causing an increase in the satisfaction of the stakeholders.

Table 4.5: Team Aztecs Result

| Team: Aztecs                    | Functional | Cross-<br>Functional | Variation<br>(hrs) | Variation<br>(%) |
|---------------------------------|------------|----------------------|--------------------|------------------|
| Mean-full resolution time (hrs) | 92.1       | 60                   | -32.1              | -34.85%          |
| Client Satisfaction (%)         | 97.51%     | 97.90%               | 0.39%              | 0.40%            |
| Total projects                  | 72         | 150                  | 78                 | 108.33%          |

## **CHAPTER 5**

### **CONCLUSION**

Agile and Scrum are meant to improve the efficiency, communication and performance in cross-functional teams. A Scrum team sitting in a cross-functional arrangement not only means that each team member can potentially perform several responsibilities, but it also emphasizes the importance of communication within the team, the motivation, and the way the changing requirements are communicated and acknowledged.

Teams are specified as groups of people working together to accomplish a shared objective. The adaptation of cross-functional teams facilitates any problem, and most importantly, the problems are faced by teams, with several team members helping to solve problems and improve client's satisfaction. Cross-functional teams include all expertise and technical intelligence in Scrum, without relying on anyone outside the team. This framework optimizes versatility, innovation, and efficiency, which can be the perfect way to produce high-quality products on schedule while improving the production processes and eliminating barriers. Without talented teams, composed of inspired and ambitious people, companies are unlikely to reap the broader market.

The communication approach does impact and improves teams' efficiency. Communication is a key factor to enhance the efficiency and the connectivity of the team. Reports and procedures such as model criteria may lead to the risk of miscommunication, resulting in both qualitative and rework consequences. Meanwhile, the Scrum framework aims to help overcome such challenges.

A good communication approach ensures that the customer experience is consistently acknowledged. Scrum teams are structured around providing a common goal, action, or value stream for the consumer. Mapping this enables staff to keep focusing on client interaction. The transparency, inspection and adaptation of the teams are the foundation stone for generating and providing greater value to the end consumer by coordinating teams around the customer interface.

Cross-functional teams can iterate more quickly. Rapid development contributes to early testing of the products, generating immediate consumer reviews and providing value in the marketplace before the rivals. With changes to their structure, companies can dramatically improve their ingenuity and problem-solving techniques by basing their interactions in the Scrum pillars as courage, focus, and respect. Using the agile manifesto helps to materialize and foster the confidence of every team member. Equally important, cross-functional team members bring a range of industry expertise, skills, professional qualifications, strengths, and experience with them.

In any enterprise, cross-functional teams can involve coders, developers, UI/UX programmers, advertising, sales, and management. Scrum teams operate together to accomplish a common aim or purpose such as designing innovative goods, upgrading current items, enhancing consistency by reducing defects or increasing process performance or effectiveness. On the positive side, cross-functional teams can find answers to delivering functionality through practical thinking, critical thinking, or emotional content-driven thinking. By observing how different people navigate towards problems, the team will be able to discover innovative forms of managing

and working on challenges as well as developing new strategies and techniques to create solutions, both at a team level and at an individual team member level.

The inconsistency in the full resolution time between the functional and cross-functional teams is represented in the variance of the stakeholder's satisfaction, and the stakeholder's satisfaction represents the value that the stakeholder perceives in the final product delivered. Four of the five teams studied improved their efficiency, by doing something and producing a desired result in less time. Consequently, the value perceived by the stakeholder increased in all five teams, increasing with them the final satisfaction. More satisfaction means more value, better quality, following the Agile principle number 1: "Our highest priority is to satisfy the customer through the efficient delivery of valuable software".

With the exception of one support team, the newly-organized squads managed to reduce the full resolution time. Scrum teams also help companies recognize internal inefficiencies, thus improving their capacity to develop viable processes and alternatives. With the help of well-structured Scrum teams, the response time can be significantly minimized at each repeated point of the challenge. The team can work collectively to resolve the problem as efficiently as possible, delivering a significantly better service for consumers. This is applicable to all minor issues, such as a consumer complaint, as well as much broader initiatives, such as designing a new product to fulfill specific user needs.

There is also a strong link between consistent customer experience and client satisfaction on the one hand and revenue on the other hand. Various stakeholder engagements show the impact of reducing variability by implementing a high-quality, consistent customer issue resolution process into how organizations manage incidents

and problems. While correlation is not causation, consistency goes not only hand-in-hand with customer satisfaction, but also with performance.

Cross-functional Scrum teams also improve the quality of the product and improve customer satisfaction as compared to functional teams. Diversity in experience in cross-functional teams creates further incentives for teamwork, promotes team creativity both individually and collectively, and contributes to delivering a better product to the customer. Consumers are always really useful for feedback as they are the final users. In addition, it is impossible to evaluate the pros and cons of a project adequately without the feedback from customers and from the people employed in the different organizations of other stakeholders. Therefore, by engaging with the customer, cross-functional teams improve the quality of the product, thus enhancing customer satisfaction.

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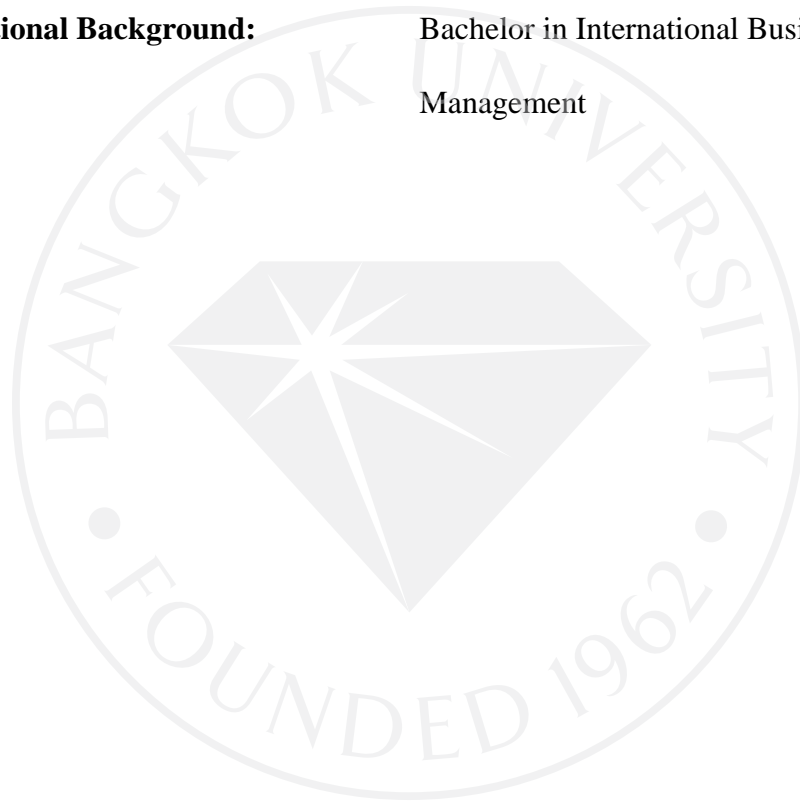


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