ST. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

<u>MASTERS OF ART IN PROJECT MANAGEMENT</u>

AGILE PRACTICE AND PROJECT SUCCESS IN SOFTWARE DEVELOPMENT PROJECTS: THE CASE OF CYBER SOFT COMPANY

BY

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ADDIS ABEBA, ETHIOPIA

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APPROVED BY BOARD OF EXAMINERS

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DECLARATION

I, the undersigned, declare that this thesis titled "Agile Practice and Project Success in software development projects: The Case of Cyber Soft company" is my original work, prepared under the guidance of my advisor Dereje Teklemariam (Associate Professor). The thesis has not been submitted to any other higher learning institution to earn any type of degree. The sources and materials used for the thesis writing also have been duly acknowledged.

_____ _____

Name   Signature

St. Mary's University, Addis Ababa   May 2021

ENDORSEMENT

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

_____   _____

Advisor   Signature

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List of Acronyms and Abbreviations

APM - Agile Project Management

CN – Concept Note

CSF-Critical success factor

IT- Information Technology

PM- Project Manager

PMBOK- Project Management Body of Knowledge

PMLC-Project management life cycle

RBM – Result Based Management

RBS- Requirements Breakdown Structure

SPSS- Statistical Package for Social Sciences

TPM -Traditional Project Management

WBS -Work Breakdown Stricture

ABSTRACT

Software development projects are very complex and often unsuccessful. As a result, the issues around the development processes have been of great concern for both practitioners and academics. However, academic research has been mostly focused on the identification of critical factors during implementation, and much less attention has been given to project management approaches, and while used in practice, they are mostly unexplored in the literature (Kraljic et al., 2014, 2018). Recently, most software development companies are promoting the usage of agile practices because they are expected to present better results and increase the chances of success. Nonetheless, there still has not been sufficient empirical and rigorous academic research investigating this phenomenon (Erazo et al., 2017; Gren et al., 2018), especially in the Ethiopian context. This descriptive study addresses this important and emerging topic by examining the usage of agile practices in software development projects to understand its influence on project success from a software team perspective. Primary data was gathered through questioners and interviews with experienced practitioners, and secondary data consisted of project documents and records. Fifteen agile practices were identified, and their benefits and challenges were discussed. Taxonomy of agile implementation critical factors was built from the findings of the cross-case analysis, including the conceptualization of success from the software vendors' perspective, contextual factors, critical success factors, and project challenges. The results suggest that usage of agile practices can influence all dimensions of success in software development projects, including customer satisfaction, project performance, and perception of success. The findings show that agile practices have the potential to address many of the challenges and can generate many positive impacts, but their influence is context-dependent, and given unfavorable contextual factors, it could negatively affect project success. Therefore, the results suggest that the influence of agile practices in software development project success is dependent on a series of contextual factors that shape its effectiveness. These findings are mapped to a set of theoretical propositions, which have both academic and practical implications.

Key Words

Agile, Software Development, Project Management, Software Vendors, Changing Requirements

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Software projects are one of the categories for complex projects (Wysocki, 2014). they can be supported by any domain of business in the current age and the type of the domain is one factor that contributes to the complexity of software projects. The various moving parts in software projects are inherent characteristics that can lead to difficulties and in turn to complexity. To name a few: changes in user requirements, large project scopes, lack of expertise, and challenging technology are such characteristics of software projects that lead to complexity. The complexity and dynamism that contribute to the unpredictability of what to build and how to build it increase the challenges of delivering as promised in the plans of such software projects (OuafaSakka, 2016).

Chow, T.,& Cao, D.B (2008) research state that, Unlike many efforts which have been done before to apply a variety of software engineering methodologies, the software development process has not yet been consistently effective and faces some problems. These problems cause rejection in the final product (software), delays in delivery time and system, abandoning final products, and not pass products. Even software projects which are successfully finished and are already applied in systems may need expensive continuous maintenance support or other software services and fine release. Different researchers had identified different factors for these software development projects' failures and cancellations. For instance, IT managers may not identify and control software risk (Chen, et al., 2011), (Sarigiannids, & Chatzoglou, 2011); (Standish Group, 2010), as (Reed, A.H., & Knight, L.V.2010) report demonstrated undefined and uncontrolled risks are major causes for software development project cancellation and failure; and research done by Kerzner H. (2006) also argues for some IT projects lake of skills to manage and monitor cost, schedule and scope variables by the project manager led to project failure.

To manage the cancellation and failure rate of IT projects the Agile Software Project Management is now becoming a de facto standard (Project Management Institute, 2017). Agile project management is not a new concept, especially in the software development industry. Traditional project management approaches that call for intensive upfront planning work during the early

stages, which amounts to close to 40% of time and budget (Altexsoft, 2016) adds much lesser value to the client and waste huge resources. Agile project management is a response to avoid these non-value-adding efforts. Various research works have been conducted to measure the success rates in software projects and the types of project management used. For instance, (Dan Schilling Nguyen) studied 10 IT agile software development team managers with the success factors of people, process, organizational, technical, and technologies and development tools. The finding shows that the effective use of agile methods in the small and medium-sized teams helped in delivering the project within the budget and timelines planned.

Veiga's (2017) research concluded that the use of agile methodologies increases the chance of success by avoiding project resource misuse. Comparing the traditional project management approaches to agile project management methodologies, the study has also strengthened the popular belief that the use of agile methodologies increases the success rates of software projects Nevertheless, the anticipated benefits of the agile project management approach don't come out of fate; instead from carefully made preparation and the appropriateness of the adopted approach used given the organizational realities and the ability to manage changing priorities. The software development project is an extremely fast-paced industry, calls for flexibility and responsiveness in every aspect of project development. Agile methodologies allow for delivering cutting-edge products and cultivating innovative experiences while keeping the product in sync with the market trends and user requirements. Above all, the project management style should be compatible with growing project management demands; to ensure the approach of favorable climate in agile project management; should be appealing for both project managers and project team.

1.2. Statement of the Problem

Agile software project management holds the promise of delivering a quality software product as per the requirements of the user by avoiding non-value adding works. While this promise stands, to what extent organizations and their software projects are embracing and realizing these methods remain a contributing factor that needs continuous measurement. In the realm of agile software project management practices, software development teams typically need to do an iterative measurement and pivoting based on feedback collected to increasingly avoid wasted resources and deliver the value sought. Such measurements that use multifaceted indicators on the maturity of the adopted process gives direction on where the organization stand on its realization of this highly adaptive and flexible methodologies. In addition, the measure of the process maturity can also be

used to study its link with the organization's and team's success on delivering value. Depending on the software project management approach used, this research studies the contribution of the agile practices had to the success of delivering the software tool.

This study aims to explore the usage of agile practice in software development projects and investigate its influence on project success while taking the development and management team by taking cyber soft company as a particular case. The usage of agile practices has been positively correlated with project success in different types of projects, many issues andchallenges have also been reported. Therefore, to better understand the effect of agile practice in software project success, this study also investigates the potential challenges and issues that can be introduced by those practices by using the following supportive objective.

1.3. Research Questions

The research investigated the usage of agile practice in software development projects and their success as laid out in the statement of the problem by using the descriptive research method. The core research questions are:

- ➤ To identify teams' attitude towards project success
- ➤ To identify the impact of agile value for project success
- ➤ To identify which agile practices contributed to the success of software projects

1.4. Research Objective

1.4.1. General Objective

The general objective of the research is to investigate the contribution of agile project management practices to the success of software projects.

1.4.2. Specific objective

The specific objectives of this particular study are

- ➤ To identify success criteria project managers and teams used for software projects
- ➤ To identify the important agile practice used to achieve project success
- ➤ To identify gaps and their possible causes in adapting agile as a project management method
- ➤ To investigate the attitude of the team with the agile method

1.5. Significance of the Study

Doing this research for the partial fulfillment of the requirement for the MA program in project management has a big contribution to be used as an academic exercise and gain relevant experiences for practical scientific research practices. Since the research was a case-based study at an individual level it has a big contribution to personal development and experience.

The software development industry gradually desired to improve its overall competitiveness and innovativeness of the project undertaking becomes very demanding, complex and above all greatly requires project management for the effectiveness of the working condition. This study contributes to both theory and practice by bringing insights into the usage of agile practices and their influence in software projects' success, and by providing hints into the aspects that need to be considered to improve the likelihoods of success. It also provides information regarding the usefulness of different agile practices in the software development contexts and outlines the implication for practitioners.

In general, obtaining research based on objectives of agile project management practice may offer significant input for the improvement of the project management efforts. The research may also offer significant inputs for future academic study and practitioner research efforts.

1.6. Scope of the Study

Measuring the success of agile, obtaining holistic and objective agile project assessment requires well designed comprehensive study with a clearly identified context-specific examination. For this particular research, the adaption of the agile software development approach for software development project success is examined by capturing agile practices and other relevant items. The specific project teams were considered in the study to determine the assessment findings of the project.

In general, the research studies the relevance of the use of agile project management practices to successful software project delivery in the case of the cyber soft company located in Addis Ababa. Besides, the selected project's operating environment, organizational culture, and other internal or external factors might affect the agile practices that may limit the generalizability to similar projects. However, through careful factoring out of these peculiarities, the researcher attempts to draw a useful recommendation

1.7. Limitation of the Study

The software development process is a wide area and there are various kinds of tools, technologies, and techniques related to the improvement of this process, but in this thesis, the researcher focused on specific agile practices and their contribution to project success by focusing on some specific factors of limited subjects which calls success factors of agile methodology. Although there are widely studied success factors for agile project management, the researcher only focused on a specific factor in people, process, and technical subjects in terms of limited dimensions as time, cost, quality, and scope regarding their agile practice.

Due to limited time and resources, the researcher was forced to use a case-based study which is limited with sampling cases making it difficult for the researcher to reach a generalized conclusion because it's not free from the common criticism of other case studies in its dependency on a single case description. Therefore, it provides very little basis for scientific generalization since the study uses a total number of small cases, conducted with cyber soft company cases mainly presenting the project teams perspective and response regarding the agile approach used in their company and its impact on the success of their projects. The data analysis method which is descriptive statistics also limits the study since it only allows making summations about the case to be measured.

1.8. Ethical Consideration

During the stages and duration of research projects, different key ethical issues can arise. Those issues can be related to the confidentiality of data and information obtained from a particular company and their anonymity, the privacy of participants including their awareness and consent regarding data used on behalf of their response or their right to be informed and their right to choose to be or not to be part of the research. Therefore, to avoid inconvenient issues regarding the ethics and data misused and falsely interpreted of a company understudy the research process will be guided by ethical principles which include: voluntarism, objectives, confidentiality, informed consent, and respect.

1.9. Organization of the Research Report

The structure of the research is composed of five chapters. In the first chapter, a brief description of background on the issue consideration was discussed and it constitutes the statement of the

problem, objective, research questions, limitation and scope of the study as well as the ethical consideration with another introductory part of the study are discussed followed by a literature review in chapter two which holds a review of different related works of literature and presentation of the existing studies and their findings on the research topic presented by classifying them into three parts theoretical, empirical review, and conceptual framework. In the third chapter, the research methodology outlined the methods used for the research with detailed rationale on the selection of the research instrument, sample size, and research approaches.

The last two chapters focus on the analysis, presentation, and interpretation of the results from the data collected using appropriate tables, graphs, and charts. In chapter five summary, conclusion, and appropriate recommendation are presented.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1. Theoretical Review

2.1.1. Project Management

A temporary endeavor applied to provide a unique service or product depending on the scope, time, and budget is called a project and the way of managing the process from the start to the end regardless of its success or failure is called project management. Project Management Institute defines project management as the "Application of knowledge, skills, tools, and techniques to project activities to meet the project requirements." (PMI, 2017.p.542). The other definition by Wysocki stated that "A project management is an organized common-sense approach that utilizes the appropriate client involvement to meet sponsor needs and deliver expected incremental business value." (Wysocki, 2014.p.29)

To achieve the project objective, the PMI (2017) grouped the project management processes into five process groups: Initiating, Planning, Executing, Monitoring and Controlling, and closing. Based on these process groups, Wysocki also identifies the five different Project Management Life Cycle (PMLC) process, models. The process models are linear, incremental, iterative, adaptive, and extreme. Deciding on which PMLC model to choose, depends on the degree of solution and goal uncertainty.

Depending on their definition and characteristic Linear and incremental PMLC falls under TPM. Both have a low level of solution uncertainty and a clear goal of the project. Iterative and adaptive PMLC on the other hand falls under APM. They have a high level of solution uncertainty, but the project goal is still clear (Andre, 2016).

In TPM everything is planned out into details upfront, this is called a plane-driven approach In contrast, APM projects are change-driven. This means that instead of avoiding changes in the project, changes are encouraged. This causes a more dynamic relationship between the team that creates the product, and the external stakeholders (anyone with a vested interest in the product) who requested it. Stakeholders are more involved in the process, but the result will be much closer

to what they wanted. Since the end solution (scope) is unclear at the beginning, it is defined throughout the project, based on feedback from the customer and other stakeholders. (Andre, 2016)

2.1.2. Agile Project Management

Agile project management is a proven and natural response towards an uncertain project where complexity is a norm and hard to avoid. Agile Alliance defines agile "as the ability to create and respond to change. It's a way of dealing with, and ultimately succeeding in an uncertain and turbulent environment"

The four major characteristics that are fundamental to all agile methodologies are adaptive planning, iterative & evolutionary development, rapid and flexible response to change, and promote communication (Begel, &Nagappan, (2007)) (Peter Maher, (2009)). Its main emphasis is on obeying the principles of "Light but sufficient" and being people-oriented and communication-centered. As it is named a lightweight process, it is more suitable for the development of small projects (AnfanZuo et al., (2010)). Agile software development takes the view that production teams should start with simple and predictable approximations to the final requirement and then continue to increment the detail of these requirements throughout the life of the development. This incremental requirements refinement further refines the design, coding, and testing at all stages of production activity. In this way, the requirements work product is as accurate and useful as the final software itself.

The benefit of moving to agile project management is documented in many success stories (Altexsoft, 2016). However, the shift to agile project management needs more than the use of tools, techniques, and processes. As (Griffiths, 2015) remarked, "doing agile" and "being agile" are different, since the agile mindset is a paradigm shift in project management approaches and hence is more than just using tools and techniques. To manage a project in an agile way requires embracing the agile mindset.

Agile is a mindset defined by values, guided by principles, and manifested through many different practices. Agile practitioners select practices based on their needs.
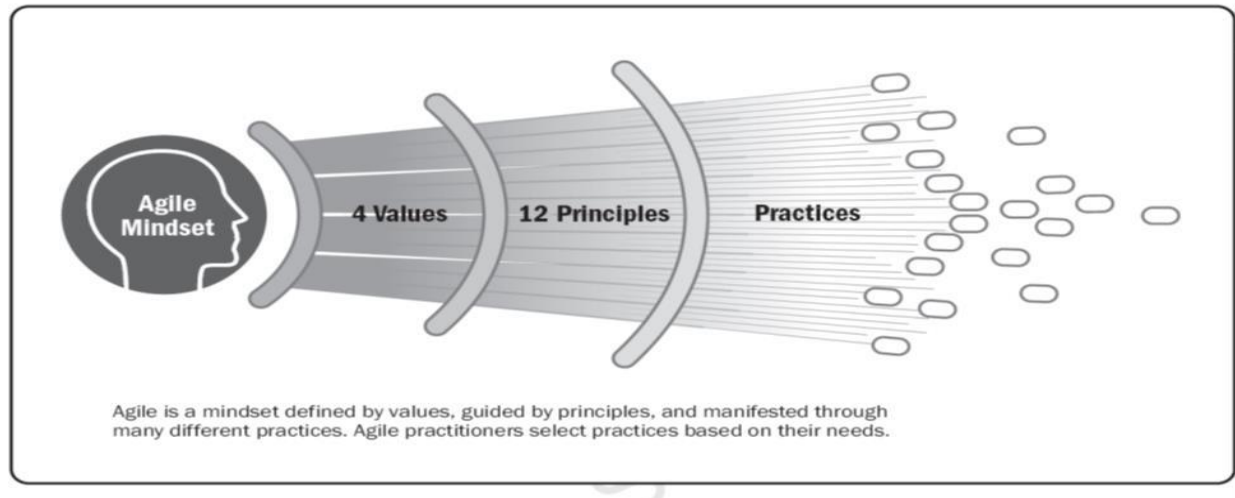
Figure 1 - Agile mindset (Project Management Institute, 2017)

Cultural changes in organizations, individual and team's agile mindset, and the customer's awareness about agile project management are also equally important. As outlined by the agile practice guide (Project Management Institute) the factors that shape the effective adoptions of agile project management are agile mindset, leadership approaches, and agile team composition. (GirumBizuayehu, 2018)

The agile term was developed by a group of professional experts from the software development company in the year 2001 (Fustik, 2017). They created the agile manifesto which provided the recommended values and principles common to all agile methodologies (Fustik). Agile manifesto provided 4 values and 12 principles which need to be followed while adopting agile methodologies. As stated in their manifesto:

"We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

Individuals and interactions over processes and tools

Working software over comprehensive documentation

Customer collaboration over contract negotiation

Responding to change over following a plan

These frameworks are widely adopted by the organization depending on the practices and techniques they most find fit (Ana Paula, 2019, p. 12).

2.2. Empirical Review

Different works of the literature suggested that the agile methodology provides an advantage and benefit for multiple organizations especially for software development companies and it was proven in multiple research papers. Scrum, XP, and Kabana are some of the most commonly used and adapted methodologies. A brief comparison of the features of agile methodologies concerning software development environment has been done by Fustic and his result suggests 60% of Software Company's use agile due to the requirements from the customers were constantly changing.

Taaffe (2019) states that the methodology used in the organization has an impact on theemployees and business operations. (Ruslan, 2017), (Kai, 2010) and other research stated that good agile practices in the industry inform us there is a good chance of successful software projectdelivery. They also point out that it's important to watch and be skeptical about the type of successthat we focused on.

2.2.1. Success of Software Project

Henriksen (2016) stated the traditional approach (cost, time, and scope) including quality as an element for project success definition. Traditionally for a project to be successful, it needs to be finished within the planned time, using the planned and assigned cost with the expected features (scopes) being delivered (Veiga, 2017). Chappell (2013) defined quality as a value, but for software products, he classified quality into three types; functional, structural, and process. Based on Chappell's report functional quality refers to how well the product works for the intended user; structural quality refers to the product's source code quality, and process quality refers to how the system is created and how the process around it is.

Bronte (as cited in Weaver, 2012) simplified that "Whilst the three constraints are relevant to aspects of project management success, the implications of the way the triangle of factors interact are not intuitive" (Bronte, 2015, p.21). Joosten, Basten, and Mellis, (2011) research also suggest that the success of a project depends on multiple dimensions, however, it's not clear which of the dimensions best represents or weights the most towards the definition of success. The use of the iron triangle to measure a project's success is probably because other factors such as customer

satisfaction are not enough specific or measurable to constitute a rigorous comparable indication (Cuellar, 2010).

Research by (Veiga) stated that to measure the success of a project two different categories should be established. One for the project success that would measure the outcome of the project in terms of time, budget, and features constraints; and another one for product success to measure how the delivered product fulfills the customers' expectations in terms of organizational goals and objectives.

2.2.2. Agile Planning

The approach to planning in agile project management is minimal planning that limits itself to the horizon of known elements (Cohn, 2006). "Planning and estimating the development of a new software project is a daunting task, made more difficult by our misconceptions about projects. On an agile project, continuous improvements are done as more is known. The new knowledge generated by the project may be about the product or the project: in either case what is known is used in the incremental planning "as stated by (Girum, 2018, p.14).

An agile team facilitated by the project manager performs daily, iteration, release, and product planning. Furthermore, he also stated that the planning can extend to portfolio and strategy to quantify the organization's vision alignment with the implemented project (Girum, 2018, p.15). There is a risk associated with bad or inaccurate planning if its planning extends well beyond the planner's horizon and does not include time for the planner to observe the current reality or the newly formed horizon, and make adjustments. Progressive elaboration of the plan is needed.

2.2.3. Agile Practices

Agile projects are characterized as having a more flexible process compared to traditional projects. This process is made of a set of practices, which describes the routines the project team is using to achieve the project goals. For software projects, which are projects where the goal is to create a working software product, this agile approach assists in defining the project scope throughout its lifetime. Scope, as well as time, cost, and quality are important criteria when considering the success of a software project (Henriksen, A. & Pedersen, S.R. 2017)

Project Management traditionally consists of five process groups: Initiation, Planning, Executing, Monitoring &Controlling, and Closing (Project Management Institute). In traditional project management, these are done linearly and incrementally. In agile project management, these are done more iteratively and adaptively (Wysocki, 2014). Agile methods are both incremental and iterative. Incremental because the work (scope) is pre-divided into smaller batches of work, and iterative because the scope of each batch is defined just before the start of each loop (Henriksen, & Pedersen, 2017). This iterative approach makes the process very flexible.

(Henriksen, A. & Pedersen, S.R. 2017.p.65) Explained that "different agile methods have different practices. When choosing a method for a given project, these practices should be considered to make sure they fit with the project. A method can be viewed as a collection of best practices, values and/or principles, which has been proven to work for certain types of the project". In the latest State of Agile Survey (VersionOne, 2015), a list of the 25 most commonly used practices was identified. The percentage in the list below shows the proportion of respondents who used the specified practice. A detailed description of each practice is listed in appendix c.

Table 2.1: - Agile Practices and percent of their usage

Source: - Andre Henriksen (2016). Agile project management: A case study on agile practices

• Daily standup (80%	• Coding standards (43%)
• Short iterations (79%)	• Openwork area (38%
• Prioritized backlogs (79%)	• Refactoring (36%)
• Iteration planning (71%	• Test-Driven Development, TDD (34%
• Retrospective (69%)	• Kanban board (31%)
• Release planning (65%	• Story mapping (29%)
• Unit testing (65%)	• Collective code ownership (27%
• Team-based estimation (56%)	• Automated acceptance testing (24%
• Iteration reviews (53%)	• Continuous deployment (24%)
• Task board (53%)	• Pair programming (21%

- Continuous integration (50%)
- Dedicated product owner (48%
- Single team (46%)
- Agile games (13%)
- Behavior-driven development (9%)

Based on Henriksen, A. & Pedersen, S.R research iterative development, sprint review, incremental design, and sprint retrospective / improve collaboratively are important agile practices that lead to project success. Henriksen, & Pedersen R. (2017) research identified 15 agile practices from a total of 53 practices based on their relevance to the agile project which is going to be used for this research.

2.2.4. The Agile Triangle

The "Agile Triangle" is an extension of the "Iron Triangle" of traditional project management. The idea was originally conceived by Jim Highsmith, where he states that "many agile teams are now caught in a dilemma. On one hand, they are told to be agile, flexible, and adaptable, but on the other, they are told to conform to the pre-planned traditional Iron Triangle framework of scope, schedule, and cost. In essence, they are being told 'be flexible in a very small box.' (K.D, 2021). Agile teams are striving to meet one set of goals and managers and executives are measuring against another set". The Agile Triangle, shown in Figure 4, addresses the real goals of projects producing value that delights customers, building in quality that speeds the development process and creates a viable platform for future enhancements, and delivering within constraints (which are scope, schedule, and cost). The Agile Triangle alters how we view success (Highsmith, 2002). As anticipated above, the Tradition Iron Triangle will no longer be appropriate. In the Tradition Iron Triangle, the constraints are scope, time, and cost. Considering these three constraints as the main success factors of the project will make us lose the main objective and purpose that the agile method is developed for objective and purpose that the agile is developed for.
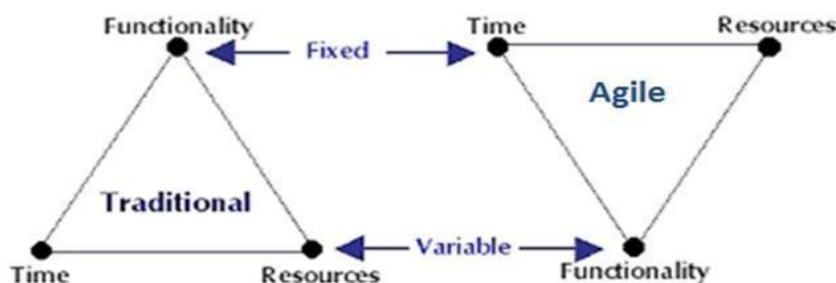
Figure 2: Conceptual differences between TPM and APM

Source: Jim Highsmith, 2010 agile triangle

Based on Jim Highsmith suggestion the agile triangle which is applied to the Iron Triangle would consist of the following endpoints:

1. Value – for the customer in terms of a released product or deliverable.
2. Quality – continuous delivery of high-quality and adaptive products.
3. Constraints - the traditional scope, schedule, and cost.

From this perspective, agile teams should focus on releasing the project rather than getting constrained by the iron triangle. The three endpoints of the iron triangle would collapse into one endpoint of the agile triangle called constraints. The other endpoints define the project's goal of obtaining the value and quality of the deliverables that are of utmost importance to the stakeholders and that would require more attention. Thus, according to Jim Highsmith, Agile teams should focus on the releasable product rather than getting constrained by the iron triangle. The three endpoints of the iron triangle collapse into one vertex of the agile triangle called constraints. The other endpoints such as value and quality define the ultimate goals since they are of utmost importance to the stakeholders and need more attention.

The value in the agile triangle represents releasable products. Several studies have shown that 50% or more of functionality delivered is rarely or never used. Even if some of that functionality is necessary, there is still a huge percentage of unused functionality in most software systems. This leads to the conclusion that scope is a very poor project control mechanism we should be using value. Furthermore, rather than asking, "Did the project implement all the requirements?" the question should be "Can the project release this product now?" many projects that were deemed releasable with 20-30% of the originally anticipated functionality and the customers may be delighted. They got their ultimate needs met very fast. The Agile Triangle elevates the critical role of quality, a dimension that is given lip service for far too long. If quality is taken seriously then it deserves a primary place in any project measurement. Quality comes in two flavors today and tomorrow. "Today" quality addresses the current iteration or release of a product. It measures the reliability of the product "Does it operate correctly?" If a product operates reliably, it delivers value to the customer in the form of implemented features. Unreliable products, ones that give

incorrect answers or periodically fail completely will fail to deliver current value (Highsmith J., 2002)

The second dimension is future quality "Can the product continue to deliver value in the future?" The ability to deliver in the future tests an application's ability to respond to business changes, both anticipated and unanticipated. While it can often be used for flexible designs, for anticipated changes, allowing for some changes, the strategy to deal with unanticipated changes is different. Responding to the unanticipated future requires adaptability, and the key to adaptability is keeping technical skills high and keeping open for customer feedback (Highsmith J., 2002).

The final piece of the Agile Triangle is constraints scope, schedule, and cost. It's not that these elements are unimportant, but they are not the goals of an agile project. Constraints are critical to the delivery process; they establish clear boundaries within which the team must operate. However, only one of the three can be paramount, and on agile projects, this is normally scheduled. With this approach, the project will be seen feasibly from a different perspective and will be planned as such. At this point in the project lifecycle, it will be important to have constant and direct contact with the customer to define clear priorities and the most critical features of the final deliverable. It will be important to analyze the building techniques to maximize the value of the final deliverable, as well as its internal quality. The Agile Triangle gives us a different way of looking at success, a way that resolves the paradox of adaptability versus conformance to plan (Highsmith J., 2002)

2.3. Conceptual Framework

To map out the actions required for the study a conceptual framework will be used. McGaghie (2001) defines the conceptual framework as a guideline that sets the stage for the presentation of the particular research question that drives the investigation being reported based on the problem statement. (Westhrop et al., 2011) also describe that the framework adopts a context-mechanism-outcome configuration that assumes that causal relationships are a complex processaffected by various contexts, interactions, and emerging actions.

Figure3: - conceptual framework of agile practices for project success
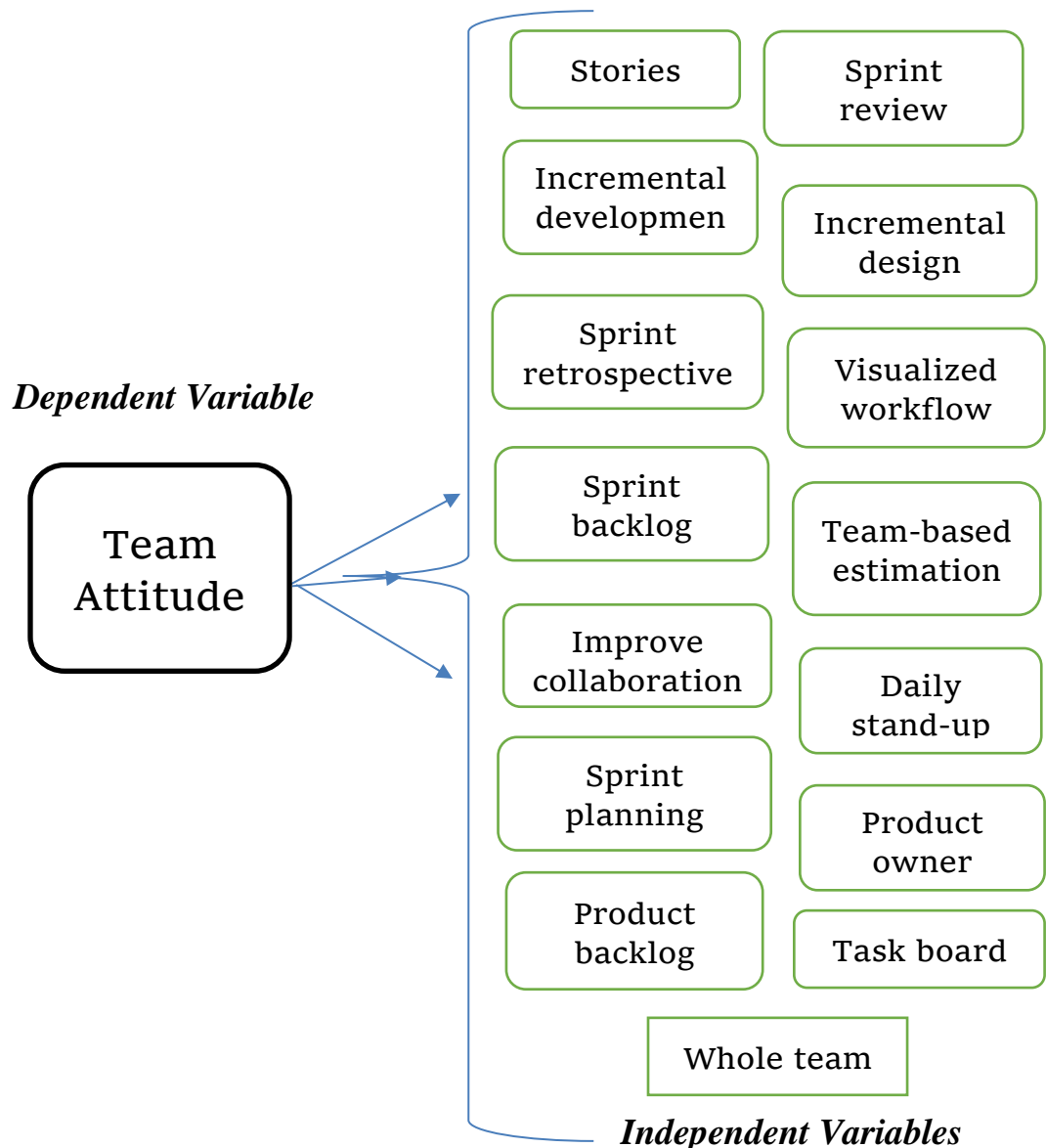
Based on the review of literature shown the relationship between agile practice and success of the project was conceptualized as follows based on the project contingency theory. This theory was chosen as a theoretical lens for the study because the effectiveness of a PM approach is contingent on its fit to the project organizational characteristics and context, and is supported by a substantial body of research (Howell, Windahl, & Seidel, 2010; Ahimbisibwe, Cavana, &Daellenbach, 2015). There is also a shred of significant evidence that agile practices are positively correlated with a project that might introduce potential success in the project.

2.3.1. Research variables

a) Dependent Variable

The dependent variable that is of interest and studied is

- The team attitude towards achieving project success

b) Independent Variables

In the context of the research, the variables identified as independent variables are:

- The use of 15 agile practices

As the conceptual framework presents above, the research attempts to analyze the team attitude towards achieving project success in terms of scope, quality and constraint by using 15 selected agile practices in the software development company. In addition to what extent the agile method adapted can be attributed to the success of project also have been studied.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Research Approach and Design

3.1.1. Research Approach

Saunders, Lewis and Thornhill, (2015) identified two approaches which can be adapted to test the research question formed by the researcher. Those approaches are Inductive and Deductive. In the inductive approach the research project is completely data-driven, and it was expected to provide theoretical explanation on the topic from the analysis done on the data collected (Saunders, Lewis and Thornhill, 2015, p. 144).

The deductive approach on the other hand helps to find the current theoretical position based on the research paper and then test the research question within the industry (Saunders, Lewis and Thornhill, 2015, p. 52). The deductive approach has been selected as multiple research has been published over the benefits of the agile methodologies in the software and other sectors. Few of the research papers also indicate the important agile practices which play the primary role in driving the project. Data was collated and summarized for the agile practices used in the software company.

3.1.1. Research Design

A case-based phenomenological method was used by focusing on the selected software development project for a comprehensive description and analysis of the issues. To make the findings and interpretation valid and consistent for the issues under consideration, the case study allows the study to be in-depth close analyzed, and investigated. Yin (2006) defines the case study research method to investigate a contemporary phenomenon within its real-life context. The research design was implemented based on descriptive research. In this type of research, both qualitative and quantitative mix of data was obtained from primary and secondary sources through different instruments where data were collected from every single elementary unit in the population to allow comprehensive analysis.

3.2. Data Type and Source

3.2.1. Data Type

A combination of qualitative and quantitative data was used to improve and present more reliable data in the analyzed research.

A quantitative research approach was used to assess the effectiveness of agile practice, and the project management approach. The relation between the maturity of the agile method used for software development and the success of the project is also measured by using the quantitative method. For each of the questions raised in the qualitative approach, an instrument was designed to measure and quantify the use of agile methods, the corresponding success attributed to the use of any methods, and to generalize the significance of the agile project management approaches to the project success.

As (Bell & Bryman, 2007) have stated qualitative strategy can be explained as a strategy of collecting data and analysis by concentrating on words. To understand the live experience of the project managers and the team an interview was conducted with key participants.

3.2.2. Data Source

Stake (1995) stated that cases are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures. For this particular study, both primary and secondary data sources have been used due to the nature of the research design which includes both qualitative and quantitative research approaches.

A primary source of data was collected by using well-designed and standard questionnaires modified to fit for the research purpose depending on the research questions and researches done in the reviewed literature. To make the research more valid and reliable additional interview questions were also designed and tested in the selected participants.

A secondary source of data was used to develop a questioner for the particular research by using different documentations including business reviews of different software companies, books, and related researches to the study. Different online-based project management systems, project charter, updated log frame of any projects is also used as supporting material.

3.3. Target Population and Sample

3.3.1. Target Population

The study assesses the practice of agile for the success of software development projects in the particular case of Cyber Soft. The target populations for this study are the employees of Cyber Soft. A particular team of software developers and managers with agile experience (Agile Professionals) are used as a population in the study. The employees' range for the company varies regarding the type of project they are working on. Based on April 20, 2021 report the company has a total of 62 permanent staff members with agile expertise. By using purposive sampling method, the entire population from those permanent staff members of the agile professionals are used for the study.

3.3.2. Sample Size Determination

The target population for this research is employees of "Cyber soft" a software development company located in Addis Ababa. Due to the smaller size of the total population, the researcher found it manageable to conduct the study on each and every member of the company by using Purposive sampling method which is one of Non-probability techniques that doesn't follow any mathematical guideline.

In purposive sampling, sampling is done with a purpose in mind. Purposive sampling can be very useful for situations where one needs to reach a targeted sample quickly and where sampling for proportionality is not primary concern (Anaekwe, 2002). With a purposive sample, it's likely to get the opinions of ones' target population, but one is also likely to overweight subgroups in ones' population that are more readily accessible.

Total population/ sample size of the team members with their role distribution is presented in the table below.

Table 3.1. Cyber Soft Employee data

Work Position	Number of Population
Project Managers	5
Solution Manager	10
Technical leader	7
Developers	40

3.4.   Data Collection Methods and Tools

The data type of the research includes both primary and secondary sources of data but to make the research more valid the research had focused more on the primary source of data. The data collection method for the primary data was through a well-developed questionnaire with supplementary open-ended questionnaires and semi-structured interviews distributed to the targeted group composed of key agile experts. As stake (1995) stated variety of forms of data collection procedures are used to collect detailed information since the cases are bounded by time and activities.

3.4.1. Questionnaires Design

The questionnaire layout contains four parts with simple questions that are easily understandable by the respondents.

- ➢ Category I: - Demographic Information
- ➢ Category II: - Employees attitude towards agile practice
- ➢ Category III: - Evaluating agile manifesto for project success
- ➢ Category IV: - Impact of agile practice for the success of project (scope, quality and constraints)

Category I: - Demographic Information

A demographic question to addresses the characteristics of respondents wasrepresented in the first part of the research question. It was collected to establish a profile of the same group in relation to positional status, educational qualification, and work experience with the company and with agile.

Category II: - Employees attitude towards agile practice

A 1-5 Likert scale questionnaire ranging from strongly agree to strongly disagree phases is used to assess the attitude of employees towards agile practice. It was used to determine the opinion of the employees based on their experience with specific regard to the agile project management approach used in their company. The questionnaire consists 9 questions that describe some aspects of the agile practice behavior and values for the project success.

A 1-3 Likert scale questionnaire was also used to assess the effectiveness of the agile approach

in the company. It was used to determine and identify the gaps and possible causes agile method had contributed for software development projects. The questionnaire contains 10 questions describing different patterns of values and behaviors agile have when applied in any projects particularly focusing on software development projects.

Category III: - Impact of agile practice for the success of project (scope, quality and constrain)

Part three of the research question tries to evaluate the contribution of agile manifesto to the project management triangles from three perspectives (cost, quality, and time & cost). factors presented in the agile manifesto include responding to change over following a plan; customer collaboration over contract negotiations; individual and interaction over processes and tools; and working software over comprehensive documentation.

Based on the researcher believed each factor had different impact on the project success triangles so the respondents are required to tick for each column on one of the sub columns based on their experience and belief.

4.1. **Category IV: - Category IV: - The Impact of agile practices on the team attitude towards the success of project (scope, quality and constraints)**

Part four comprises of a questionnaire based on fifteen components (agile practices) which are factors, affecting the accomplishment of the project with success in terms of scope, quality, and constraints. These factors include Iterative development, sprint review, incremental design, sprint retrospective, improve collaboration, stories, product backlog, sprint planning, task board, visualized workflow, daily stand-up, product owner, sprint backlog, team-based estimation, and whole team. The questionnaire was initially developed by Henriksen & Pederson R.'s (2017).

The respondents are required first to rank the phrases following each sentence beginning by placing numbers "4" for practices the respondents don't have knowledge or experience, "3" for practices the respondents believe haven't use or experienced in any projects, if the respondents believe or have experienced with Lilliputian they can place "2" and finally "1" to the one that's

heavily used in most software development projects.

To get additional information and perspectives from the development team and the project

managers an interview is performed. The interview questions were developed in a way that can issue the actual live experience of the employees. The data-driven from the development team and managers is analyzed using statically package software

3.5. Data Collection Procedure

After receiving permission from the targeted company, the researcher collects data from the respondents by using a survey form. A Google Form was used as a survey tool to organize the research question and collect the data. The google form is forwarded to the general manager by email and the general manager distributed the survey form/ questionnaires across a different department of the company. The questionnaire is prepared in the English language.

3.6. Data Analysis and Presentation

According to LeCompte and Schensul (1999) data is the raw material and data analysis is the process a researcher uses to reduce data to story and its interpretation. Consequently, both qualitative and quantitative data analysis techniques are used to analyze the raw data.

To analyze, interpret, and summarize the finding of quantitative data the researcher employs a descriptive statistic method. For developing a comparative analysis, the percentage computations are used as a basis to get the total picture of the data that is collected from the sample respondents. The data collected from the respondents using the questioner is interpreted, analyzed, and summarized using the statistical package for social science (SPSS) software tool.

In general, the data is tabulated and analyzed using the descriptive statistical method. By using tables and charts the data collected from different sources is coded, tailed, counted, and organized.

3.6.1. Model Specification

Since the main objective of the paper is to investigate the nature and the impact of agile practice on the and attitude

The standard multi linear relationship can be specified as

$$TA_i = \alpha + \beta_1 OC_i + \beta_2 PA_i + \beta_3 LS_i + \beta_4 T_i + \beta_5 R_i + \beta_6 CM_i$$

Where

ais constant term

bis coefficient of independent variables

i= 1, 2..., 91

TA = Team attitude, is the dependent variables which is measured by a Likert scale argument which is   measured by 1 strongly disagree, 2 disagree, 3 neutral, 4 agree, and 5 strongly agree

The fifteen agile practices are used as an independent variable which are measured by giving scale. The scale used in this research is represented as follow

1. Not used

2. Somewhat used, and

3. Heavily used agile practice

3.7.   Pilot Testing

To check the reliability of items of the questionnaire a pilot test was conducted and the necessary correction are made. The general objective of the pilot test is to minimize the mistakes made in the questionnaire.

3.7.1. Reliability and Validity

The accuracy and precision of a measurement procedure are tested with reliability (Kothari, 2004). The coefficient alpha, developed by Cronbach (1951), is the most used index for estimating the reliability of measurement instruments such as scales, multiple item tests, questionnaires, or inventories (Raykov 1997). The most frequently preferred measurement for internal consistency is Cronbach alpha for three, four, or five-point Linkert scale items. For low to high internal consistency with a range of 0 to 1 alpha is easily interpreted. To achieve internal reliability, different authors accept different values of this test. 0.70 is the most commonly accepted value as it should be higher than or equal to reach internal reliability. The researcher got an approximate value of greater than 0.87 by taking different five points to assure the reliability of each value. Triangulation was used to adders the validity and reliability of the open-ended and close-ended questionnaires along with the crosschecking questions and semi-structured interviews. In addition, thematic analysis was also used for qualitative interviews obtained from targeted respondents to allow triangulation.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS

Data collected from the primary sources are presented in this section. The questionnaires are analyzed to look for patterns of the responses from respondents using descriptive statistics such as tabulation, charts, and frequency distribution followed by detailed analysis in line with the agile manifesto and its practice. To confirm the validity of data analysis between variables the data was measured using IBM Statistical Package for Social Sciences Version 26 and Microsoft Spreadsheet version 2016.

4.1. Return Rate

From the major findings that were observed from the 52 questionnaires that were distributed to the respondents, 50 were filled and returned among them 5 questionnaires were not properly filled. Therefore, 45 questionnaires were effectively used for analysis, which shows a response rate of 86.5%. According to Fowler (2002), a 75% response rate is considered adequate.

Table 4.1. Return Rate of Questionnaires Distributed

	Total No of Population	Sample taken	Returned Questionn aires	Questionnair esnot returned	Not properly filed questionnaire	Questionnaire es used for analysis
Total Employees	62	62	55	7	10	45

Source: Survey Result, 2021

4.2. Category I: Demographic Profile of Respondent

Educational Status

Respondent's educational level as represented in figure 4 shows that 71.1 percent of the majority were first-degree holders the rest 28.9 percent of the total respondents were postgraduates. The higher educational status of respondents allows the organization to provide advanced contemporary project management methods such as agile since the level of understanding and educational background of the team will play an important role in adopting new approaches.

Educational status

post Graduate
28.9%

13 (28.9%)

32 (71.1%)

Bachlor Degree
71.1%
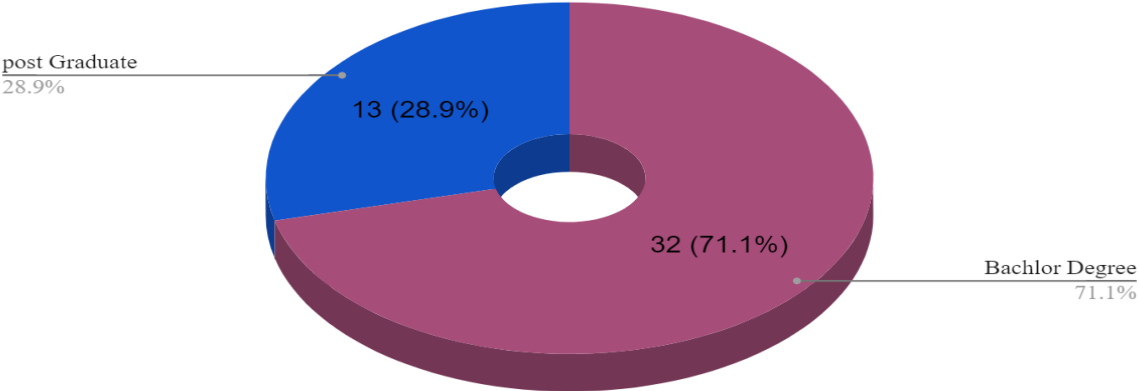
Source: Survey Result, 2021
Figure 4: - Educational Status

Work Experience of Respondents

As shown in figure 5 44.4 percent of the employees which represent 20 respondents work in the company for more than 3 years, 17.8 percent of the respondents which represent 8 respondents have worked in the company within a range of 6- 10 years and 4.5 percent of the employee representing 2 respondents worked in the company for more than 10 years the rest 33.3percent which represent 15 respondents fall within 0- 2 years of work experience. This shows that most of the respondents have been with the company and had a good working experience with the management method and it's believed that these respondents can provide the correct data from their agile experience. Hence, their agile experience will give them a flexibility advantage by enabling the project teams to accustom themselves to the agile methodologies.
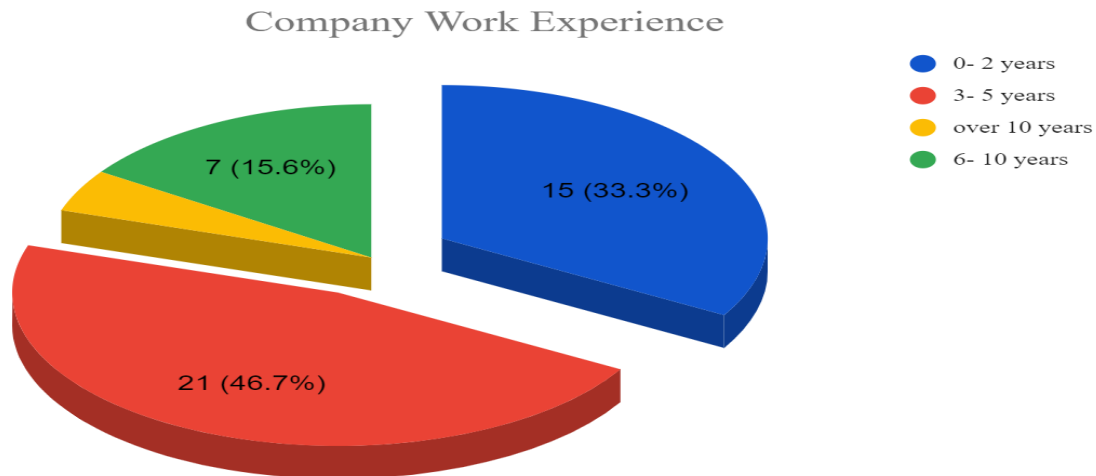
Figure 5 Work Experiences of Respondents

Source: Survey Result, 2021

Job Position and Agile Experience

The researcher categorized the job position of respondents into 7, Project Manager, Developer, Quality Assurance, Product Owner, Delivery Manager, Technical Leader, and Solution Manager. In table 4.2 the researcher described collective years of experience the employees have with agile in respective of their job position.

As shown in table 4.2 71.1 percent of employees which represent 32 respondents were developers; from the total 5 respondents which accommodate for 11.1 percent of respondents were project managers and the rest of respondents belong to the position of technical leader (4) 8.9 percent, and project manager representing (4) 8.9 present of the respondents in both cases.

Table 4.2. Job Position and Agile Experience of Respondents

Job category and position	Job Position and Agile Experience					Total	
	0 years	1-2 years	3-4 years	5-6 years	>7 years		
Project Manager	0	0	2	0	2	4	8.9%
Developer	0	18	12	2	0	32	71.1%
Quality Assurance	0	0	0	0	0	0	0

Product Owner	0	0	0	0	0	0	0
Technical Leader	0	0	1	2	1	4	8.9%
Solution Manager	0	0	3	2	0	5	11.1%
	0	18	18	6	3	45	100%
Total	0	40.0%	40.0%	13.3%	6.7%	100%	

Source: Survey Result, 2021

All of the respondents have knowledge about agile software development techniques, more than 13 percent of respondents have 5- 6 year of agile experience, 6.7 percent of respondents which account for 3 employees had worked with agile for more than seven years, (18) 40 percent of respondents have a work experience with agile in range of 3- 4 years, and (18) 40 percent of the respondents have an experience for 1- 2 years. This indicates all employees have previous awareness and experience about agile methods which may affect the adoption speed of the approach and also their ability to use it in their work.

4.3. Category II: Team Attitude towards Agile

Employees' attitude towards the agile method has a big contribution to achieving organizational goals. The frequency of agile project management methods adopted in the project that best describes respondents' experience on the agile methods of the Cyber Soft discusses and analyzed as follows. These questions have a 5- point Likert scale ranging from strongly agree to strongly disagree that covers the subsequent questions from part two.

Table 4.3. Respondent's attitude towards agile

	Ratings						
	SA	A	N	D	SD	Mean	Std. Dev
Agile methods serve an important purpose in our project	84.4%	15.6%	0	0	0		
	38	7	0	0	0	4.84	0.367
Agile accommodates a change	44.4%	46.7%	8.9%	0	0		

	SA	A		D	SD	Mean	SD
in requirements at any stage of development to ensure that the final product is refined	20	21	4	0	0	4.33	0.640
Prior organizational culture determines the effectiveness of Agile.	37.8%	37.8%	24.4%	0	0		
	17	17	11	0	0	4.15	0.796
Software development projects must deliver the right product timely	57.8%	40%	2.2%	0	0		
	26	18	1	0	0	4.53	0.548
To reduce project risk agile method, have a high advantagecompared to the traditional waterfall method.	40%	53.3%	6.7%	0	0		
	18	24	3	0	0	4.31	0.596
The challenges in applying agile methods in the context of our project were within the control of my ability	6.7%	20%	46.7%	22.2%	4.4%		
	3	9	21	10	2	3.02	0.941
The agile method can help a company achieve its project objective.	26.7%	46.7%	17.8%	4.4%	4.4%		
	12	21	8	2	2	3.89	0.92
Agile approach increases team motivation	22.2%	31.1%	46.7%	0	0		
	10	14	21	0	0	3.78	0.795
The agile method improves engineering discipline and self-organizing teamwork in our project.	42.2%	40%	17.8%	0	0		
	19	18	8	0	0	4.22	0.735
Cumulative	40.2%	36.8%	19.02%	2.95%	0.98%	4.11	0.704

Source: Survey Result, 2021

Where % - Percentage, SA- Strongly Agree, SD- Strongly Disagree, D- Disagree, and A- Agree

The data gathered from the respondents indicate approximately 59% of the respondents had

practiced agile for more than three years with a total mean of 1.87 and .894 standard deviation. In cases where agile projects were implemented, most respondents pointed to the important purpose that agile methods serve in managing IT projects 84.4% strongly agreed while 15.6% were agreed. One of the top five reasons for introducing the agile method in IT projects was related to company culture on accommodating changing project requirements at any stage of development to ensure that the final product is refined. Accordingly, 44.4% of respondents strongly agree on implementing agile improved their ability to manage to change priorities while 46.7% of respondents agree which indicates the ability to manage changing requirements of the project and the rest 8.9% respondents have a neutral opinion.

37.8% strongly agree, 37.8% agree, 24.4% neutral about the determinant effect of prior organizational culture on the effectiveness of the agile approach. This could be related to the traditional project management organizational culture and experiences of the team. As it can be referred from table 4.7, more than ¾ of the respondents responded that they believe prior organizational culture before the adoption of agile can positively or negatively affect the effectiveness of the adoption.

According to the data gathered from the respondents, 57.8% strongly agree, 40% agree in delivering the right product in a timely and 2.2% of the respondent have a neutral opinion. 53.3% and 40% of respondents agree on the agile ability to reduce project risk than traditional one while 6.7% were neutral about it. As per the respondents, even though a formal risk management system is applied in the company, the nature of the agile project is difficult to manage unanticipated risks. Moreover, 4.4% of the respondents strongly disagreed and 22.2% disagree on their ability to deal with the challenges in applying agile methods in the context of their project environment. Yet 46.7% of the respondents were neutral while 20% agreed on getting better project performance by managing the challenges that agile method appeal that indicates the project team maturity level in dealing with the challenges of an agile project. Regarding achieving project objective with the agile method 26.7% of responses were strongly agree 46.7% agreed which implies if agile is implemented well, an agile company can meet their goals and business intent that is aligned with the company's project objectives and overall goals higher than what low agile company achieves on the other hand 17.8% of the respondents were neutral, 4.4% strongly disagree, and the rest 4.4% disagree.

The data collected from table 4.3 indicates 22.2% of the respondents strongly agree, 31.1% agreed

on the contribution of the agile method for increased team motivation throughout the project this indicates half of the respondents are motivated in applying an agile method in their project management endeavor and 46.7% of responses were neutral which implies some gap in the management method. For the agile method contribution to improving engineering discipline and self-teamwork, 42.2% of the respondents strongly agreed, 40% agree, and 17.8% neutral on the agile approach introduced as an attempt to make software engineering more flexible and efficient.

The grand mean analysis shows that the attitude of the team towards agile has got a mean score of 4.11 with a standard deviation of 0.704. Based on the mean score we can analyze the attitude of the team towards the agile methods is positive and it serves an important purpose in the organization.

Category II: Gaps and Possible Causes in Adapting Agile

	Yes	No	Don't know	Mean	Standard deviation
	1	2	3		
Should agile methods be consideredas a best working approach for IT projects	41	0	4	2.867	.505
	93.3%	0	6.7%		
Do the project teams overlook the benefits of Agile in their day to day activities	18	20	7	2.24	.712
	40%	44.4%	15.6%		
Should the company introduce other methods than agile	19	20	6	2.289	.695
	42.2%	44.4%	13.3%		
Is working with agile principles challenging	27	18	0	2.6	.495
	60%	40%	0		
Do agile methods keep individuals motivated throughout the project	35	2	7	2.6	.747
	79.5%	4.5%	15.9%		
Do agile methods improve project management processes	37	3	5	2.71	.661
	82.2%	6.7%	11.1%		
Do agile methods enhance ability to manage changing priorities	41	3	1	2.88	.383
	91.1%	6.7%	2.2%		
Is there a strong customer	15	28	2	2.289	.549

		33.3%	62.2%	4.4%		
collaboration and commitment in your project case						
	Cumulative	65.2%	26.1%	8.65	2.56	.593

Table 4.4. Responses of gaps and possible causes in adapting agile

Source: Survey Result, 2021

As table 4.4. Shows about 93.3 percent of the respondents consider agile as the best working approach for software development projects but only 44.4 percent of respondents value the worth benefit of agile in their activities 40 percent of the respondents didn't. Similarly, 42.2 percent of the respondents believe the company should introduce other methods than agile whereas 44.4 percent of the respondents respond "No". This implies that even if the employees acknowledge the agile method as the best due to some gaps they are not immersed in the system yet.

According to numbers shown as per Table 4.4 above, one of the most agile challenges that must be tackled is an adaptive project delivering which represents the idea that projects should always be in a state of continuous adaptation with an agile mindset, which results in better project performance. Concerning this, table 4.4 shows that working with agile principles is considered challenging by 60 percent of respondents. While 40 percent of the respondents respond were "No"

which implies the agile mindset is not fully incorporated in project teams and respondents are experiencing barriers to using agile project management methods.

Managing a project requires managing process to manage agile-oriented project needs accordingly, 82.2 percent of respondents agree with the improvement that the agile method has made on project management processes 6.7 percent of the respondent's responses were "No" and 11.1 percent of the respondent's responses were "Don't Know". 91.1 percent of respondents respond "Yes" for the enhancement of ability that the agile method can add in managing changing priorities 6.7 percent of respondents responded "No" and 11.1. Percent of respondents respond "Don't know". Around 79 percent of respondents replied "Yes" towards the agile method keeping them motivated throughout the project but 4.5 percent of the respondents disagree and the rest 15.9 respondents don't have any comment regarding agile motivation.

Among the agile manifesto, customer involvement is given much attention yet 62.2 percent of respondents indicate that there is no close customer collaboration throughout the development period of the project. This implies a lack of customer involvement that makes it extremely difficult

for the project team to meet the requirements of the customer exhaustively since customers usually are not closely part of the team which includes attending team meetings.

The grand mean analysis shows that a mean score of 2.56 with a standard deviation of 0.593. this indicates that even if the teams accept the agile method as the best approach for managing software development projects there is still a gap when it comes to its applicability and its value for the projects in real life.

4.4 Category III: - Evaluating agile manifesto for project success

Table 4.5. Analysis of working software over comprehensive documentation for agile triangles (Quality, Value, and Time & Cost) Success

working software over comprehensive documentation for agile triangles (Quality, Value, and Time & Cost) Success				
	Frequency	Percent	Valid Percent	Cumulative Percent
Quality				
Good	43	95.6	95.6	95.6
Poor	2	4.4	4.4	100.0
Total	45	100.0	100.0	
Value				
High	43	95.6	95.6	95.6
Low	2	4.4	4.4	100.0
Total	45	100.0	100.0	
Constraints				
Increased	39	86.7	86.7	86.7
Decreased	6	13.3	13.3	100.0
Total	45	100.0	100.0	

Source: Survey Result, 2021

As shown in table 5 good quality and high values are the most indicated responses among the agile manifesto value for working software over comprehensive documentation in terms of agile triangles (Quality, Value, and Constraints). 95.6 percent of the respondents sympathize to deliver value a small amount of documentation with the update are very important instead of chunks of

papers. Good is also shown as the most preferred principle by 95.6 percent of respondents.

Documentations before agile involved the creation of technical specifications and detail requirements, and documentation plans, and also each document required approval thereby consuming a lot of time. Valuing working software over comprehensive documentation has an effect on time and cost. The agile mindset ensures that documentation was only done for absolutely necessary requirements and nothing more. 13.3 Percent of the respondents respond delivering a project within the given time and cost is possible but based on 86.7 percent of the respondents respond giving priority for working software increase the time and cost for deliveringthe project. Therefore, prioritizing the working software over the documentation have a positive effect on quality and value but in terms of constraints (Time & Cost), more of the negative impactis observed.

Table 4.6 Analysis of individual and interactions over processes and tools for agile triangles (Quality, Value, and Time & Cost) Success

Individual and interactions over processes and tools for agile triangles (Quality,Value, and Time & Cost) Success				
	Frequency	Percent	Valid Percent	Cumulative Percent
Quality				
Good	39	86.7	86.7	86.7
Poor	6	13.3	13.3	100.0
Total	45	100.0	100.0	
Value				
High	39	86.7	86.7	86.7
Low	6	13.3	13.3	100.0
Total	45	100.0	100.0	
Constraints				
Increased	11	24.4	24.4	24.4
Decreased	34	75.6	75.6	100.0
Total	45	100.0	100.0	

Source: Survey Result, 2021

As shown in table 4.6 good quality and high values are the most indicated responses among the

agile manifesto values for individual and interaction over process and tools in terms of agile triangles (Quality, Value, and Constraints). 86.7 percent of respondents prefer good quality and high value because with the right group of team and daily interaction will improve the knowledge, skills, capabilities, and communication of team which helps them to solve any problems that arise through time.

People are the ones who normally respond to business needs and therefore through their skills, they drive the development process. The process and tools were given less value in order to drive a more responsive project team. As table 6 shows 75.6 percent of respondents' responses indicate that the individuals and interactions over processes and tools have a positive effect on project cost and time that results in increased project cost and time. In general, having the right team has a positive impact than having the best tool in the wrong hand and it also gives a big advantage for the development team to work as a group.

Table 4.7 Analysis of responding to change over following a plan for agile triangles (Quality, Value, and Time & Cost) Success

Responding to change over following a plan for agile triangles (Quality, Value, and Time & Cost) Success				
	Frequency	Percent	Valid Percent	Cumulative Percent
Quality				
Good	43	95.6	95.6	95.6
Poor	2	4.4	4.4	100.0
Total	45	100.0	100.0	
Value				
High	43	95.6	95.6	95.6
Low	2	4.4	4.4	100.0
Total	45	100.0	100.0	
Constraints				
Increased	39	86.7	86.7	86.7
Decreased	6	13.3	13.3	100.0
Total	45	100.0	100.0	

Source: Survey Result, 2021

Around 95 percent of respondents agree responding to change over following a plan have a big success impact for good quality and high value of the product this indicate for software development changes always improve the project and provide more value to that project

Table 4.7 shows that the agile triangle with a different way of looking at project success, a way that resolves the paradox of adaptability versus conformance to plan. Responding to change over following a plan may affect the project time and cost. Around 86 percent of respondents confirm that responding to change over following a plan increases project time and cost which has a trade-off effect on the project constraints.

Table 4.8 Analysis of customer collaboration over contract negotiations for agile triangles(Quality, Value, and Time & Cost) Success

Customer collaboration over contract negotiations for agile triangles (Quality, Value, and Time & Cost) Success				
	Frequency	Percent	Valid Percent	Cumulative Percent
Quality				
Good	39	86.7	86.7	86.7
Poor	6	13.3	13.3	100.0
Total	45	100.0	100.0	
Value				
High	39	86.7	86.7	86.7
Low	6	13.3	13.3	100.0
Total	45	100.0	100.0	
Constraints				
Increased	39	86.7	86.7	86.7
Decreased	6	13.3	13.3	100.0
Total	45	100.0	100.0	

Source: Survey Result, 2021

As shown in table 4.8 good quality and high values are the most indicated responses among the agile manifesto values for Customer collaboration over contract negotiations in terms of agile triangles (Quality, Value, and Constraints). For both cases (Quality and Value) 86.7 percent of respondents respond giving priority in any action of the development process for the customer has

a big impact on customer satisfaction. This indicates customer collaboration improves performance and meets more customer needs than negotiating on exhaustive contract terms. In terms of time and cost, 86.7 percent of respondents respond customer collaboration increases the time and cost of the project.

4.5. Central Tendency Statistic for Category III

Interpretation of Central Tendency Statistics and Graphical representation for the overall impact of agile values for project success as illustrated in, Figure

Figure 6 central tendency statistics - quality
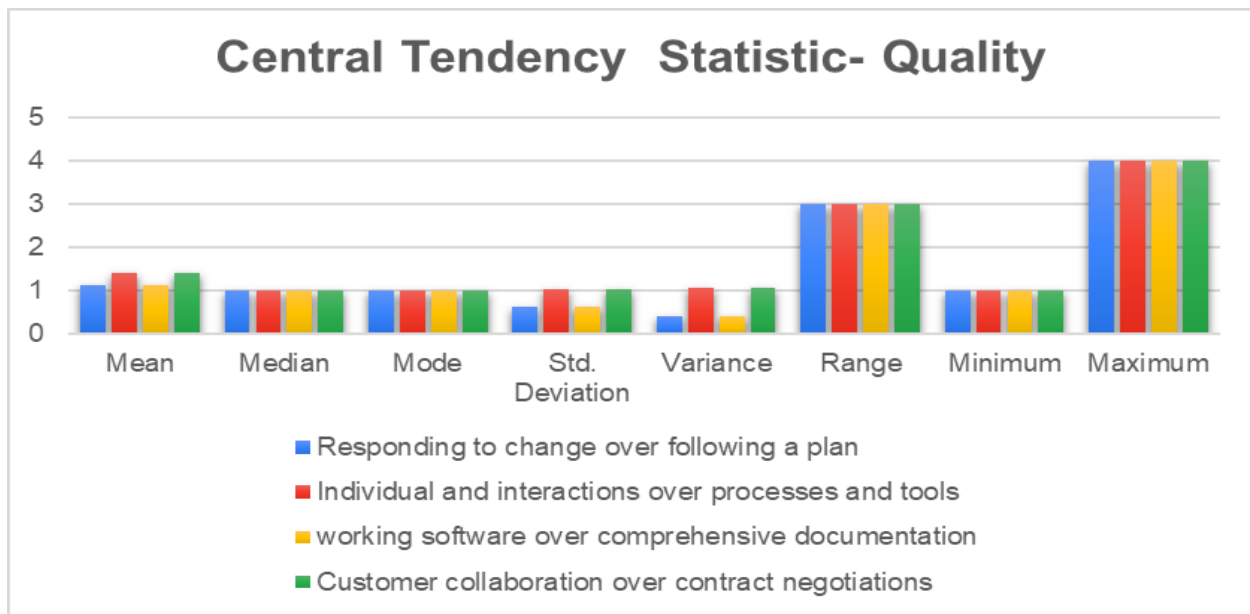
Figure 6 illustrates the percentage ratings pertaining to the preferred agile values or manifestos for project quality in CYBER soft company. It illustrates that, the employees preferred 'Individual and interaction over process and tools' and "customer collaboration over contract negotiation" to achieve a perfect quality project which is indicated with a mean score of 1.4 respectively.

The coded values as per questionnaire for project quality are: -

1. = Good Quality
4. =Poor Quality

Figure 7 central tendency statistics - value
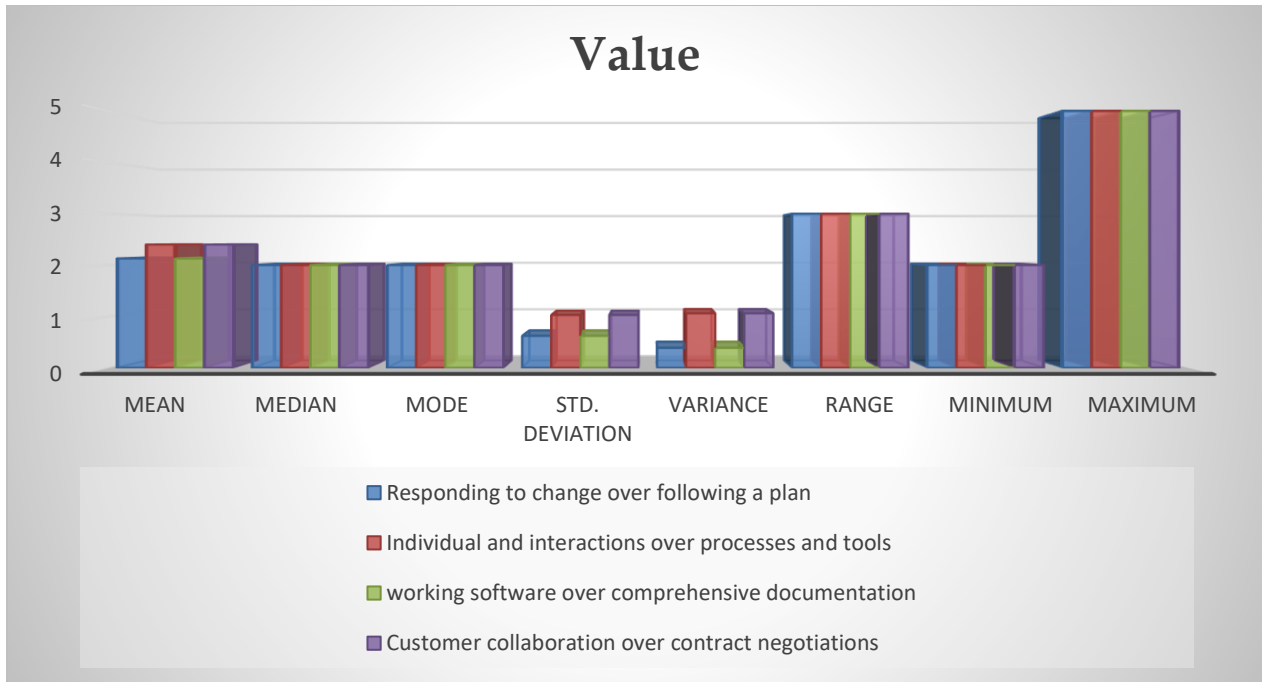
Customer collaboration over contract negotiation had a big effect for the accomplishment of the project because the main used of the product need to identify and get satisfied about the project it went to use. Individual and interaction also had a big impact to accomplish a project success with in the attended value. One of the greatest strengths of interaction among teams is that it's the team that respond to the need of the business and having a daily communication allow them to came up with new ideas and workflows and working in agile environment allow them to focus on goals and results which lead to a high value. As shown in figure 8 the mean value of individual and interaction over process and tool and customer collaboration are 2.40.

The coded values as per questionnaire for project value are: -

2 = High Value

5 = Low Value

Figure 8 central tendency statistics - constraints

Constraints

Legend:
- Responding to change over following a plan
- Individual and interactions over processes and tools
- working software over comprehensive documentation
- Customer collaboration over contract negotiations
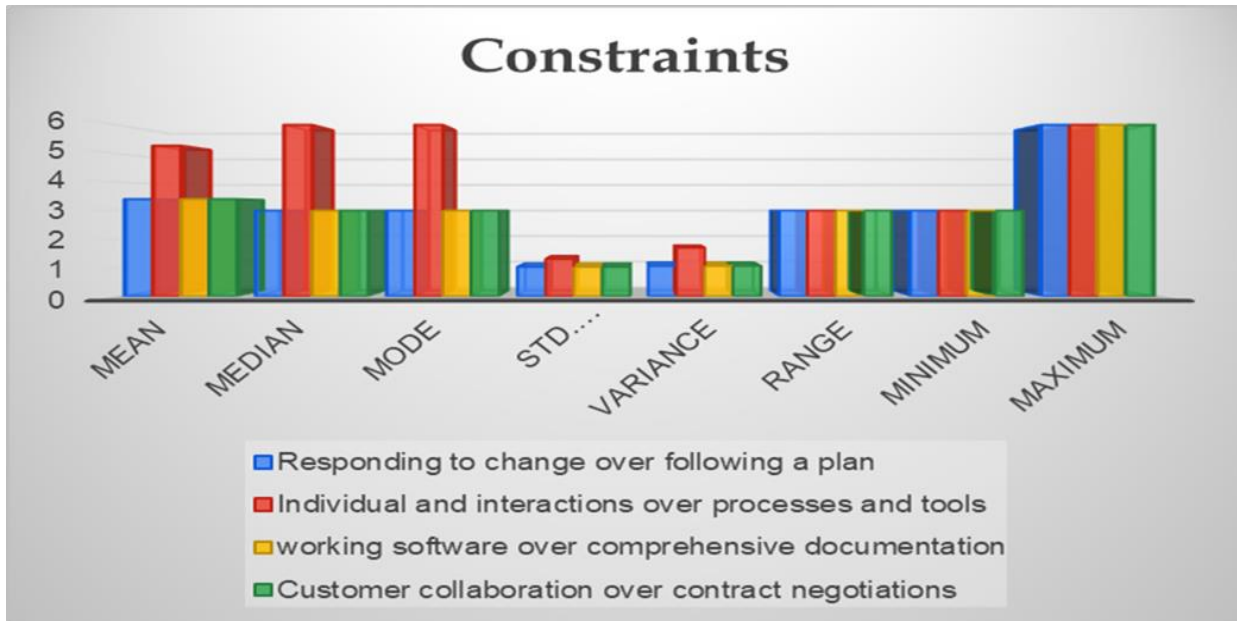
Unlike quality and value, individual and interaction is suspected to have a negative impact on the constraint because for this research cost and time are considered as constraints and since projects are limited with time and resource a flexible working environment and daily interaction of team is considered to delay and incur high cost for the project but as illustrated in the above figure the mean value of 5.27 describes a decrease in time and cost and this is because the employees work as self-organized team, everything is not controlled and organized by the managers. But the three agile manifesto values had a mean value of 3.40 happens to increase the project constraints.

The coded values as per questionnaire for project constraints are: -

    3 = Increase project constraints

    5 = Decrease project constraints

4.6. Category IV: - The Impact of agile practices on the team attitude towards the success of project (scope, quality and constraints)

4.6.1. Regression Analysis

Regression is a measure of association between two quantitative variables. This form of statistical test is only possible with interval or ratio data (www.SPSS for Psychologists). The following table below shows the regression analysis of the impact agile practice had for the success of Cyber soft company success.

Table 4.9: - Regression Analysis Result

Variables	Coefficient	Std. Error	t	Sig.
(constant)	1.653	.854	1.935	.062
Iterative development	.964	1.335	.722	.475
Sprint review	1.241	1.306	.950	.349
Incremental design	-1.499	1.186	-1.264	.215
Sprint retrospective	-.0483	.703	-.068	.946
Improve collaboration	1.626	.926	1.756	.089
Stories	.171	1.187	.145	.876
Product backlog	.193	1.232	.157	.056
Sprint planning	-.695	.350	-1.987	.936
Task board	.128	1.603	.080	.936
Visualized workflow	-1.499	1.186	-1.264	.215
Daily stand-up	.129	.1.603	.080	.936
Whole team	-.104	.876	-.119	.906

Product owner	-1.193	1.232	-.969	.340
Sprint backlog	-.156	1.655	-.094	.926
Team based estimation	.027	.533	.050	.960

Table 4.10: - Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the estimation	R Square Change	F Change	df1	df2	Sig. f Change	Durbin Watson
					Change Statistics					
1	.700	.489	.275	1.192	.489	2.286	13	31	.029	.217

a. **Predictors: (Constant)**, Iterative development, sprint review, Incremental design, Sprint retrospective, improve collaboration, Stories, Product backlog, Sprint planning, Task board, Visualized workflow, Daily stand-up, Whole team, Product owner, Sprint backlog, Team based estimation

b. **Dependent Variable: Team Attitude**

The result of multi linear regression of the above equation in general show that, the attitude of the team in Cyber soft company towards achieving the project success are affected by iterative developments, sprint reviews, improve collaborations, stories, product backlogs, daily stand-ups, task bored, and team-based estimations.

Iterative development has a significance and positive impact on the team attitude to accept it as a flexible approach in order to accomplish their project within success in all targets (scope, quality, and constraints). 0.964 is the magnitude coefficient iterative development had which is less than the improved collaboration coefficient. This implies a one percent increase in iterative development practice will increase the team attitude by.964 percent. In other word the increase in iterative development activity will increase the teams' attitude in believing better accomplishment in the

final project due to the practice and accept it as a mindset for future endorsement.

Sprint review, stories, product backlog, daily stand-up, team-based estimation, and task board also had insignificance and positive impact on the team to accept them as value adding practices for there project. The coefficient value of each practice is 1.242, .172, .193, .129, .027, and .128 respectively. Based on the given magnitude of coefficient team-based estimation has highly insignificance and positive effect but the effect is minimum when it comes to affecting the team attitude to accept it as a practice used to increase the project success.

Improve collaboration is the other variable that has insignificance and positive impact on team attitude in cyber soft company. With estimated coefficient value 0f 1.626 improve collaboration has the highest impact on the team attitude. Thus, we can interpret the result as, on average a one person increases in performing improved collaboration practice will increase the team's attitude towards achieving the project success by 1.626 percent. Next to improve collaboration, sprint review has the highest impact on team attitude with magnitude of coefficient value of 1.242.

On the other hand, from the given fifteen agile practices seven of them sprint retrospective, sprint planning, visualized workflow, whole team, product owner, and sprint backlog had an insignificant and negative value on the team attitude towards assisting for the accomplishment of project success. Sprint retrospective had a coefficient value of -.048 when interpreted this implies that, on average a one percent increase in performing sprint retrospective will decrease the team's attitude towards achieving its success by 0.048 percent. In other word the teams don't believe applying sprint retrospective in their daily work routine had assist them for project success. The coefficient values of sprint planning, visualized workflow, whole team, product owner, and sprint backlog are -.696, -1.499, -.104, -1.193, and -.156 respectively.

In general, the regression value implies that the team attitude towards achieving project success is not influenced by the fifteen heavily used or somewhat used agile practices as recommended rather improve collaboration, sprint review, iterative development, product backlog, stories, daily stand-up, task board, and team-based estimation have a great impact on the attitude of the team regarding their support for success achievement in their order respectively.

CHAPTER 5
SUMMARY, CONCLUSION, AND
RECOMMENDATION

5.1. Summary

This paper examines agile project management practice from the perspective of the project team to provide a view of the progress on the adoption as a project management approach. The purpose of this study was to identify and assess the adoption of the agile project management method and its management practices. This chapter summarizes the major results from the case study entitled, examining the outcomes of agile practice from the cyber soft company.

As the primary objective, the research tries to establish the understanding of the agile method whether agile project management method adopted successfully in the project is also being adopted fully, or in part, when managing software development projects. This focused further on the extent to which it contributes to the overall project success which was completed by 45 practitioners belonging to cyber soft organizations' representatives to explain how this information helps answer the research questions presented in chapter one, to discuss the importance of the findings, and to compare how these findings relate to previous research studies of agile project management practices.

Most agile adoption has been driven from the software development arena, but there emerging investigation whether this methodology can be used by other industries The approaches established for developing a software-related project are Waterfall and Iterative (Agile) approach. Hereby, each approach can separately be seen as a reaction to the limitation of an approach previously introduced. Subsequently, various hybrid project management approaches were found in practice.

Accordingly, basic questions were describing the agile project management practice in cyber soft development project case. Specifically managing projects in a changing environment where time to market is very short. Therefore, based on findings the following are summaries: high-quality adaptive software was developed by small teams that use the principles of continuous improvement of design and testing based on fast feedback and change where the knowledge management was more of tactic based with less detailed information.

5.2. Conclusion

Based on the finding of the research agile project management strategies have greater potential to offer for cyber soft project success for better ways to cope with the internal and external environment characterized by increased marketization, including technological advance and customer choice. The study suggests that with efficient and structured agile project management can be used to enable the capabilities of the project team for adjustment to the external environment change.

To manage agile activities companies need to exhibit certain balance and dynamic effective management capabilities. They need to become more aware of the synergized information from the external stakeholders, communicate with the team on a daily basis, adapt rapidly to new market conditions using existing resource bases, and flexibly manage human and physical resources.

Based on the findings of the data analysis, agile principles can be based on whether the principle is more affected by prior organizational culture and other differences in order to better leverage what agile has to offer in IT projects. Understanding the difference between the traditional (waterfall) and iterative (Agile) approach in the outcome of a project is difficult. The multitude of factors that are always changing depending on the project makes it hard to pinpoint one factor or even the type of factor that has the most bearing on that outcome.

Based on the argument of this paper agile manifesto has a big impact for comping with agile practices through its 12 principles and 4 values in managing software development projects (Jim Highsmith, 2010), uncovering better ways of developing software by valuing: individual and interaction over process and tools, working software over comprehensive documentation; customer collaboration over contract negotiation; and responding to change over following a plan.

5.3. Recommendation

The study notes passive project management methods are the main cause of projects failing because needs are never fully understood. There are also other findings in the study that have indicated technical aspects can be what brings a project down. These factors become multiplied when a company is going through a transition. Transitioning between methodologies can lead to even more, issues because the workflow and phases that a project goes through are changing, which affects the people and the technology. Based on the case results alone, it seems evident that most findings of the study indicate some human factor is the key to a successful agile project.

This study may be of value to cyber soft employees in the development of an agile management approach. They may find this research useful in a situation in which project complexity and technological advance create an unstable or turbulent project environment. The following actions are recommended for software development companies that are interested in employing agile principles:

- Pay attention to organizational factors including variables such as rewards, culture, training, and resources. Collective rewards help motivate groups whose tasks were made interdependent, while individual rewards acknowledge members whose performed tasks reflect individual responsibilities (Shore, 2008). In general, the culture which favors open and objective thinking over tradition, values result in more than bureaucracy is suitable to agile;

- Pay attention to people. Interactions among team members and interactions with other teams, customers, and suppliers directly affect team performance (Cao, 2009);

- Pay attention to the process. The process contains information about how to follow agile-oriented
needs for project management or following agile-base project management, agile-base configuration, strong communication channel which its critical point in daily face-to-face conversation, following honoring regular working schedule, following strong customer commitment and presence;

- Pay attention to both internal and external conditions so that continuous actions may be taken that improve the company and exhibit a readiness to redeploy existing resources, thereby enabling rapid adaptation to changes in project requirements; and

- Develop technical expertise of the team. In the software industry, previous technical expertise and knowledge compared to the length of experience matters in project

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APPENDIX

Appendix I: Agile Methods and their Practices

Practices are grouped by the agile method/framework they originated from. Practices are not listed in any specific order. Some of the methods identified in the literature review are listed below with their identified list of practices

Scrum

1. Iterative development	6. Burndown chart	11. Team members
2. Product backlog	7. Scrum of Scrums	12. Scrum master
3. Sprint backlog	8. Daily stand-up	13. Product owner
4. Sprint retrospective	9. Sprint planning	
5. Definition of done	10. print review	

XP

1. Whole team	9. Team continuity	17. Shrinking teams
2. Sit together	10. Single codebase	18. Root-cause analysis
3. Weekly planning	11. Daily deployment	19. Shared code
4. Quarterly planning	12. Test-first programming	20. Code and test
5. Slack	13. Incremental design	21. Negotiated scope contract
6. Energized work	14. Stories	22. Pay per use
7. Real customer involvement	15. Ten-minute build	23. Information workspace
8. Incremental deployment	16. Continuous integration	24. Pair programing

Kanban

1. Visualization workflow	2. Manage flow	5. Make process policies explicit
3. Limited WIP	4. Improve collaboration	

Others

1. Taskboard	5. Team-based estimation	9. Agile games
2. Coding standards	6. Integration testing	10. Single team
3. Refactoring	7. Story mapping	11. Automated acceptance
4. Unit testing	8. Test-driven development	

Appendix II: Questionnaire

St. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MASTERS OF PROJECT MANAGEMENT PROGRAM

QUESTIONARIES TO BE FILLED BY CNET SOFTWARE TECHNOLOGIES EMPLOYEES

Dear respondent

This questioner is prepared by a graduate student of St' Marys' University, School of Graduate Studies to identify and assess the outcome of Agile practices as a project management approach for software development projects in Addis Ababa particularly in the case of CNET Software development company. The questioner was designed to collect information about your experience with agile practices and their advantage for your project success related to your role in the company as a project team. Your response to the items of this questioner will be used to analyze the existing agile practices and their result on the project performance and outcome.

With all due respect, I hope you will be able to take some time and carefully complete the questioner as frankly and reasonably as you can. You don't have to mention your name and your responses to these questions are assured confidential and used for academic purposes only.

Category I

Demographic Questionnaire

N.B. (Please check on one answer)

1) How long have you been working in the company?

☐ 0-2 year's ☐ 3-5 year's ☐ 6-10 year's ☐ over 10 year's

2) What's your educational status

    ☐ Diploma Graduate

    ☐ Post Graduate

☐ Bachelor Degree

☐ Ph.D. Graduate

3) How many years of agile experience do you have?

☐ 0 year   ☐ 1-2 years   ☐ 3- 4 years   ☐ 5-6 years   ☐ more than 7 years

4) What is your current role in the project team?

☐ Project Manager   ☐ Developer   ☐ Taster   ☐ product owner

☐ Delivery manager   ☐ Technical leader

Category II

With specific regard to the agile project management approach used in your company please complete the following questioner.

Tick on the appropriate box among options that best describes your experience on the agile methods with your project practice.

1. Agile methods serve an important purpose in our project

☐ Strongly Agree   ☐ Agree   ☐ Neutral   ☐ Strongly Disagree   ☐ Disagree

2. Agile accommodates a change in requirements at any stage of development to ensure that the final product is refined.

☐ Strongly Agree   ☐ Agree   ☐ Neutral   ☐ Strongly Disagree   ☐ Disagree

3. Prior organizational culture determines the effectiveness of Agile.

☐ Strongly Agree   ☐ Agree   ☐ Neutral   ☐ Strongly Disagree   ☐ Disagree

4. The agile method improves engineering discipline and self-organizing teamwork in our project.

□ Strongly Agree □ Agree □ Neutral □ Strongly Disagree □ Disagree

   5. Software development projects must deliver the right product timely

□ Strongly Agree □ Agree □ Neutral □ Strongly Disagree □ Disagree

   6. To reduce project risk agile method, have a high advantage compared to the
      traditionalwaterfall method.

□ Strongly Agree □ Agree □ Neutral □ Strongly Disagree □ Disagree

   7. The challenges in applying agile methods in the context of our project were within the
      control of my ability.

□ Strongly Agree □ Agree □ Neutral □ Strongly Disagree □ Disagree

   8. The agile method can help a company achieve its project objective.

□ Strongly Agree □ Agree □ Neutral □ Strongly Disagree □ Disagree

   9. The agile approach increases team motivation

□ Strongly Agree □ Agree □ Neutral □ Strongly Disagree □ Disagree

The following yes or no question was developed to assess the effectiveness of the agile approach in the company and to identify the project team attitude, and to identify the gaps and possible causes' agile method contribute to software development projects.

N.B. put a cross (X) sign in the appropriate box

NO		Yes	No	Don't know
1	Should agile methods be considered the best working approach for IT projects?			
2	Do the project teams overlook the benefits of Agile in their day-to-day activities?			
3	Do agile methods attract the interest of the project team to work with?			
4	Should the company introduce other methods than agile?			
5	Is working with agile principles challenging?			
6	Do agile methods keep individuals motivated throughout the project?			

7	Is the agile method effective for face-to-face communication of the project team?			
8	Do agile methods improve project management processes?			
9	Do agile methods enhance the ability to manage changing priorities?			
10	Is there a strong customer collaboration and commitment in your project case?			

Category III

The following questions were developed to evaluate the contribution of agile manifesto to the agile project management triangle from three key project perspectives that are quality, constraint, and value depending on your project experience and agile triangle

Value- for the customer in terms of a released product or deliverable.

Quality- for the project in terms of continuous delivery of high-quality and adaptive products.

Constraints- the traditional time and cost excluding scope for this purpose.

N.B. put a cross (X) sign in the appropriate box

	Value		Quality		Constraints Time & cost	
	High	Low	Good	Poor	Increase	Decrease
Responding to change over following a plan						
Customer collaboration over contract negotiations						
Individuals and interactions over processes and tools						
Working software over comprehensive documentation						

Category IV

The following question was developed to look for factors that increase the chance of project success. The goal is to see which agile practices are being used, as well as why and what effect they have on the project.

The following questions were adapted from Henriksen& Pederson R.'s (2017) research to evaluate the importance of agile practice for the iron triangles.

N.B. weight the agile practice based on the usage within the team

1. Heavily used
2. Somewhat used
3. Not used

Practices	Importance			Scope	Time	Quality
	1	**2**	**3**			
Iterative Development						
Sprint review						
Incremental design						
Sprint retrospective						
Improve collaboration						
Stories						
Product backlog						
Sprint planning						
Taskboard						
Visualized workflow						
Daily stand-up						
Product owner						
Sprint backlog						
Team-based estimation						
Whole team						

Based on the answers given in question one answer the following question

A. What was the effect of the heavily used practices in the project (positive/ negative?)

B. For each of the somewhat used practices, why were they only somewhat used?

c. What is the reason for the practices not being used?

Annexes III: Open Ended Questions

St. MARY'S UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MASTERS OF PROJECT MANAGEMENT PROGRAM

Part V

1. The following questions were developed for all of the teams in the project regarding success destination and their criteria for project success

a) How do you define success for a project?

b) What are the key factors that have contributed to the success of your project?

c) What were the biggest challenges of the project from your point of view?

2. The following questions were developed for the project managers regarding their experience to agile practice

a) What is the motivation of a project manager to use agile practice for software development projects?

b) What are the challenges of implementing agile practices?

c) What are the drawbacks or potential problems of using those agile practices?

d) How much do agile practices contribute to the success of software development projects?