

Addis Ababa University
School of Commerce
Department of Project Management



**Agile Software Project Management Practices and
Success Rates of Monitoring and Evaluation Software
Projects in the NGO Sector – the case of PRIME: a
scrum software project**

A Thesis Submitted for the Partial Fulfillment of Master of Art Degree in Project
management (MA)

By

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DECLARATION

I, the under signed, declare that this thesis is my original work, prepared under the guidance of my advisor, Ato Seifu Mammo. All sources of material used while working on this thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any type of degree.

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LIST OF ACRONYMS

APM - Agile Project Management

CN – Concept Note

ID – International Development

LFA – Logical Framework

M&E - Monitoring & Evaluation

NGO – Non Government Organization

PO – Product Owner

PRIME – Pastoralist areas Resilience Improvement through Market Expansion

RBM – Result Based Management

SM – Scrum Master

ToC – Theory of Change

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ABSTRACT

Motivation towards the use of agile project management approach is an important step for adopting agile project management, however a spectrum of agile facades from the team's agile mindset to the business stakeholder's readiness are all relevant parameters that are needed to be measured for validating the implementation of a successful agile project management. This study selected PRIME project's Monitoring and Evaluation assisting software project that adopted Scrum – an agile software project management method, as its project management approach. With primary objective of identifying the effectiveness of the adopted management approach, the research analyzed the level of the agile use and the success of the project that can be attributed to the stated method.

The study used a primary data source using a structured questionnaire that are adopted from a standard Scrum metrics to measure the level and maturity of scrum implementation in the project. In addition, the success of the project has been analyzed to identify the relevance of the adopted method to the success of the project. Using a purposive sampling technique, the researcher selected respondents who assumed various roles in the software project.

The findings indicated a moderate or medium maturity level in the process adoption and there is also an observed link between the level and maturity of the Scrum method used and the project's success. Being a case study and constrained by the time resource, the research has limitation in strengthening the analysis by using qualitative methods as additional research approach. Future researcher may use this to further widen the research horizon. In addition, other similar organization's agile use and project success may be added as a comparative study to further strengthen.

Key words: Agile project management, Scrum agile methods, agile project success, project success measures

1. CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Software projects are one of the category of complex projects (Robert K. Wysocki, 2014). The various moving parts in software projects which 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 for complexity. The complexity and dynamism that contributes to the unpredictably of what to build and how to build it increases the challenges of delivering as promised in the plans of such software projects (Ouafa Sakka, 2016). The Standish Group in their most popular chaos report, identified the success rates of software projects as generally very low (The Standish Group Report, 2014). Using a pervasive standard parameters of success rates of projects: budget targets, timeline targets and scope, their report and other studies identified that the success rates as low as 32% (The Standish Group Report, 2014).

On the positive side, the industry's most reputable institute, the Project Management Institute (PMI), has more optimistic outcomes. The success rate of IT projects is on the rise (Project Management Institute, 2017), compared to years of stagnancy earlier. The continuous rise of awareness and increased knowledge in the project management industry, a more robust processes and models help in increasingly delivering software projects with a better success. One such improvements in how to manage software projects is now becoming a de facto standard, is the Agile Software Project Management (Project Management Institute, 2017). The traditional project management approach with models that runs in cycles from the initiation stage to planning, executing, monitoring and evaluation and closing might not exactly fit to the software development projects context. However as (Dan Schilling Nguyen) outlined Agile methodologies had a 72% success rate, compared to a 64% success employing traditional methodologies. Just shifting to agile methods doesn't guarantee the successful delivery of projects as planned.

Agile project management is not a new concept especially to the software development industry. Traditional project management approaches that calls for an intensive upfront planning work during early stages, that amounts to close to 40% of time and budget (Altexsoft, 2016) adds much

lesser values to the client and wastes huge resources. The agile project management is a response to avoid this 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 an effective use of the agile methods in the small and medium sized teams helped in delivering the project with in the budget and timelines planned.

In another study (Veiga, 2017) concluded the use of agile methodologies increase 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 believe that the use of agile methodologies increases the success rates of software projects (Veiga, 2017).

For a small and medium enterprise(SME) context, (O'Sheedy, 2011) identified yet a similar finding in that the relevance of agile methods are correlated to the success of project delivery.

As outlined below, (Standish Group, 2015) have conducted a more detailed empirical study on the success of projects with the type of project management adopted.

Table 1 - Resolution of agile versus waterfall (Standish Group, 2015)

Size	Method	Successful	Challenged	Failed
All sizes	Agile	39	52	9
	Waterfall	11	60	29
Large	Agile	18	59	23
	Waterfall	3	55	42
Medium	Agile	27	62	11
	Waterfall	7	68	25
Small	Agile	58	38	4
	Waterfall	44	45	11

A survey result conducted in (SCOTT AMBLER and ASSOCIATES, 2013) also supports these general success of agile project management, as cited below.

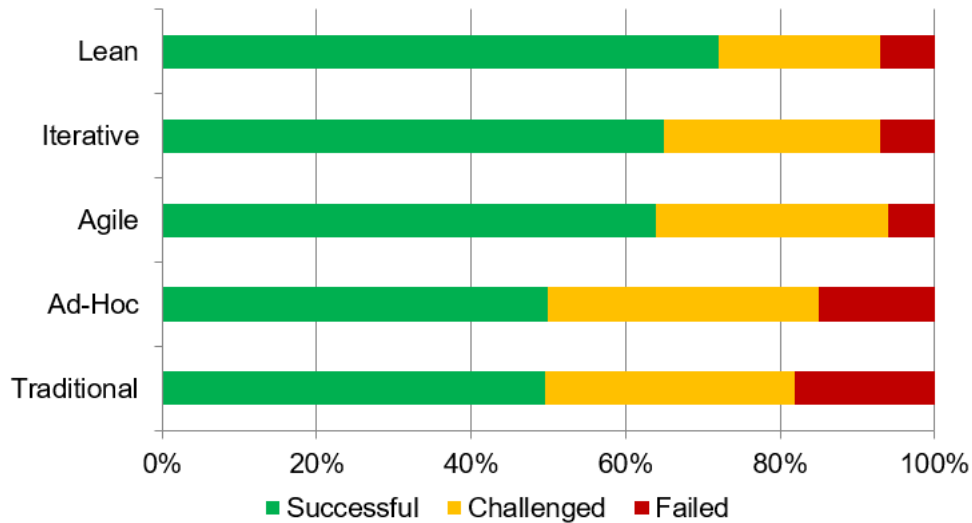


Figure 1 - Comparing Success of Software Development Paradigms: 2013 (SCOTT AMBLER and ASSOCIATES, 2013)

Software projects can support any domain of business in the current age. The type of the domain is one factor that contributes to the complexity of software projects. Monitoring and evaluation can help organization mine information from project activities. This information can be a key input for program improvement, reorientation and future planning. Monitoring and evaluation of humanitarian NGO lead intervention projects can by itself be influenced by various factors like the basic principles, approaches and monitoring discipline of the implementing organization.

There are different models and frameworks of monitoring and evaluations that are used by NGOs like Logical Framework Approach (LFA), Result Based Management (RBM), and Theory of Change (ToC).

The Logical Framework Approach (LFA) is widely used tool in the development community that aids in the identification of the expected causal links – the 'program logic' - in the following results chain: inputs, processes, outputs, outcomes, and impact (IFC Advisory Services in association with GTZ and DFID, 2008). While there may not be a clear distinction in using a RBM with LFA, the primary focus of RBM is however to measure results in the different project activities (Jody Zall Kusek, 2004). As outlined in (theoryofchange, 2018), theory of Change is a description and illustration of how and why a desired change is expected to happen in a particular context. Through this approach the precise link between activities and the achievement of the long-term goals are more fully understood.

Different NGOs that work in different or similar sectors may require and adopt one of these frameworks and models. There could also be a potential in variations by the context and cultural settings of a given organization. In any case, the software solution developed should adopt to the context each organization and its operation realities allows.

This research studies the level of agility – a metrics that shows how agile a software project management practices are and attempts to measure the contribution of this agile project management practices to the success of a software project. The selected project for study is a software project that supports the monitoring and evaluation practices of a project called - Pastoralist Areas Resilience Improvement through Market Expansion (PRIME)

1.2. About the program/project under study

Pastoralist Areas Resilience Improvement through Market Expansion (PRIME) is a five-year program led by Mercy Corps Ethiopia in partnership with international and local organizations (PRIME, 2018). Funded by the United States Agency for International Development (USAID), PRIME focuses on selected districts of Ethiopia's Afar, Oromia and Somali regions. PRIME is a collection of small projects that are geared towards the development of pastoralists life supported by USAID's feed the future (FtF) initiative.

Project parameters: -

Estimated Beneficiaries: 250,000 households

Period: October 2012-September 2017

Funding: US \$62 million, USAID

Implementing Partners: - Mercy Corps (lead), Aged and Children Pastoralists Association (ACPA), Action for Integrated Sustainable Development (AISDA), CARE, Ethiopian Center for Disability and Development (ECDD), Haramaya University, Horn of Africa Voluntary Youth Committee (Havoyoco), Kimetrica, SOS Sahel.

Project management approaches

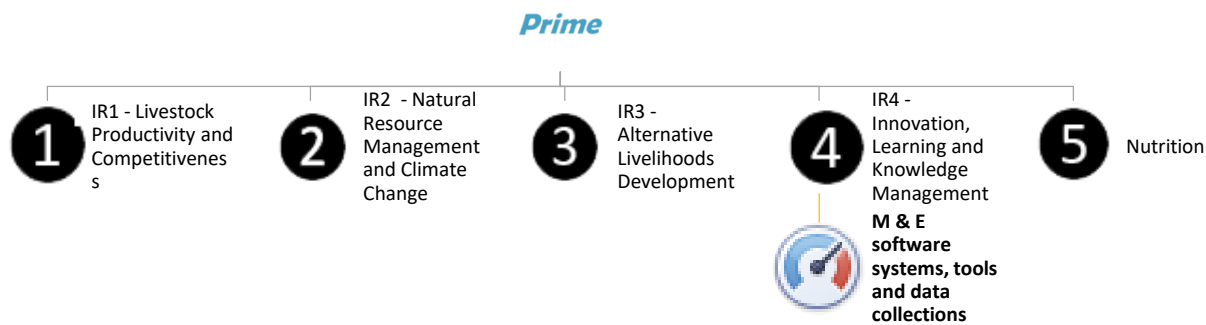
The project management approach adopted by the implementing partner organizations that make up the consortium followed a novel approach in innovating a workflows and project monitoring. The approach is based on a concept note (CN) document and a reporting document that captures

all the needed elements of a particular activity in the project. A sample CN document is included in annex 1. The concept note is the primary means for initiating an activity in the projects. It is used to capture the summary of the activity’s program context, the no of beneficiaries addressed, budget cost breakdown – a cost sharing based cost tracking and other relevant details.

After the activity has been approved by different approvers, the activity can be implemented in the ground. Following executing of the activity, its monitoring and evaluation are also tracked for checking the intervention’s quality in the concept note report.

Program structure

PRIME program is structured around 5 operational subprograms or projects: -



1

Figure 2 - PRIME project structure (PRIME, 2018)

The software project context

Operating under the 4th sub-program or project, the software development project is focused on supporting the routine workflow of the project and collecting data related to the project for the purpose of monitoring and evaluation of the intervention’s goal and objectives.

¹ IR – Intermediate Result ~ equivalent to sub-program

The software project by itself has its own structure and planned and implemented by one of the partner international organization.

- **Project timeline**:- Oct. 2013 – Dec. 2014 → main development time and Dec. 2014 – Oct. 2017 → support and maintenance period
- **Budget** - \$ 2.3 million
- **Project process model and project management** – scrum – an agile software development approach
- **Deliverables** – a web based project monitoring and evaluation system that is tailored to the program's context

One of the project partner – an international software development firm, who is the partner in the consortium of the program took the responsibility of designing and implementing the software tool that tracks the overall project progress. The team of this organization are located in Addis, Nairobi, US and South Africa. Collaboration of the teams in this offices were a prerequisite for the success of the project.

1.3.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.

Scrum is one of the most popular agile software project method. The software project that supported the monitoring and evaluation (M&E) of PRIME program/project have utilized a scrum - agile software project management method and approach.

By taking the software project management approach used, this research studies the contribution of the agile project management approaches used to the success of delivering the software tool. In the process the researcher aspires to measure the success metrics and its attribution to the agile project management used.

1.4. Research Questions

As in the context laid out in the previous section, the core research focus questions are:

- a) What level and maturity of agile software project management practices has been utilized or adopted?
- b) Was the project a success measured in an agile metrics?
- c) Can the success of the project be related or caused by the agile software project management methods used?
- d) Is the Agile PMs suitable to the monitoring & evaluation software development projects?

1.5. Research Objectives

1.5.1. General objective

The general objective of the research is to measure the contribution of an agile project management practice to the success of software project in the PRIME project context. In the process the level of agility of the project and the relevance of the method used shall also be studied.

1.5.2. Specific objectives

The research has the following specific objectives: -

- a) To analyze the importance of adopting an agile project management in the software development projects for the monitoring & evaluation of the PRIME project

- b) To measure the level and extent of agile process models adoption: level of agility in the software project that supports the monitoring and evaluation of the PRIME project
- c) To quantify the relevance of the agile process implemented in the success of delivering the projects as per the specification

1.6. Significance of the Study

A mere shift of paradigm to a hyped process model is not a guarantee to its relevance. There shall be an empirical reasoning behind moving away from traditional project management approaches to agile project managements in relation to its contribution to effectively and efficiently delivering software projects. This research endeavor attempts to measure the significance of such adoption of agile practices to successfully delivering software development projects.

In due course, it is believed to contribute towards: -

i. Knowledge

The research work and its findings contributes to the knowledge in the areas of an agile software project management and monitoring & evaluation projects.

ii. Practice and Implementation

Being an industry oriented research, its relevance to project management practitioners is equally reputable. To this end, the research result shall be useful to the practitioners of agile software management, in generalizing the relevance of the method to wider domain.

iii. Managerial Decision Making

The finding of the study can be taken as a relevant input to the higher level management in assisting them to make a contribution toward a shift to the stated agile software project management approaches.

iv. Literature and Reference

The research could be used to establish a framework for subsequent studies that can work with more comprehensive data sets. Furthermore, it could stimulate further research.

1.7.Scope of the Study

Being a case study, the research studies the relevance of the use of an agile project management practices to successfully delivering software projects that support monitoring and evaluation projects of the selected project. Hence, the scope of the study is bounded by the type of domain (i.e. Monitoring & Evaluation projects) and the context is limited to the project implementation mechanics of the studied project context. In addition, 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 a careful factoring out of these peculiarities, the researcher attempts to draw a useful recommendation.

1.8.Limitation of the Study

Due to limited research time and resources, the researcher is forced to focus only the selected project in the case study. However, the findings and conclusion shall firmly help future researchers and practitioners.

1.9.Definition of Terms

Agile: -

Dictionary meaning: *easy, quick, flexible, nimble*

A more mature version of “*light weight*”

Agile methods

A group of related software development methodologies

Agile mindset

Development teams and all responsible stakeholder's readiness to be flexible with a value-driven mentality and ability to embrace changes easily with minimal noise

International Development (ID)

Are development projects typically funded by aid granted by development partners to different developing countries to assist them to meet various international goals like Millennium Development Goal(MDG)

Lean

Sharing much concept with agile, lean software development methods are inspired by the production industry that focuses entirely to activities that only adds values to the customer and avoid any time or resource spent otherwise

Logical Framework Approach (LFA)

It is a popular blueprint for managing most of the development projects with an attempt to trace the logic of the intervention with a clear link to the impact created as a result: output and outcomes.

Progressive Elaboration

A method of increasingly refining the planning of projects as more is known about the various environmental factors, operating realities and the requirements of the project. Progressive elaboration is key to an agile planning.

Rapid Application Development (RAD)

A software development approach that focus on faster delivery of software systems by rapidly building systems to the requirements known in hand using possibly a technique of assembling existing software libraries and components.

Result Based Management (RBM)

A development management approach that focus on the result of an intervention with a focus on quantifying results of activities

Scrum

One of the most popular agile project development methods with iterations of development that is typically a month or biweekly, called sprint. Each sprint is marked with a starting sprint planning and daily stand up meeting within the team and the end marks a release. Teams also do retrospective meetings at the end of a sprint to pivot and add the knowledge acquired in the previous processes so far.

Theory of Change (ToC)

Is an approach towards project development practices ToC is a way to measure why a desired change is expected to happen in a particular context and what a program or change initiative does (its activities or interventions) and how these lead to desired goals being achieved.

Extreme Programming (XP)

Extreme Programming is one of one of the popular agile methodologies. was introduced by Kent Beck. The XP improves a software project in four essential ways which are *communication, simplicity, feedback* and *courage*.

1.10. Organization of the report document

The research report shall be composed of five chapters. The first chapter presents basic and introductory research inputs, which includes background of the study, problem statement, research objective, research questions, methodologies, significances of the study and the scope and limitations of the study. The second chapter presents the related literatures reviewed during the preliminary research phase.

The third chapter is dedicated to the research method adopted with detailed rationale on the selection of the research instrument, sample size and research approach. With this background, the report presents analysis and interpretation of the data gathered in the following chapter: chapter four. In the final chapter, the report concludes with the summary and conclusion of the study and recommendations that are made.

2. CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1.Theoretical Review

In this section, a detailed review of the literature from the academia of project management and industry of software project management shall be presented. Standard practices in agile project management and the approaches used to measure the success of such projects shall be reviewed and presented. In addition, a brief overview of the domain in which the software project has been designed: which is monitoring and evaluation of a result based NGO project shall be presented.

2.1.1. 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. Some of the benefits of managing projects the agile way are documented in (PHILOSOPHIE, 2017) as : Speed to market, Flexibility, Robust Risk Management, Cost Control ,Quality, Right Product and Transparency. While these benefits and others are documented in the literature as (Robert K. Wysocki, 2014) remarked that more than 70 percent of all projects should have used some type of Agile Project Management (APM) model but didn't.

Traditional software project management approaches which are inspired by the likes of waterfall process models and limited iteration practices have been at the spotlight and ridiculed enough (Robert K. Wysocki, 2014). Among other things the disparity between what is required and being developed and lead time in noticing the presence of such gaps are critical failing points of such project management approaches. Moreover, the need to do a heavy planning upfront with larger project resources allocated with minimal value added, is one problem that repel customers and developers from these traditional approaches. In addition, the very reaction towards changes in the key project parameters like cost, time and scope are viewed differently in the agile world when compared to the traditional one.

If asked “why agile”, the answer is to deliver a value adding product or project and different projects may need different approaches and principles. Hence software development teams need a

cultural shift in embracing agile practices. The benefit of moving to an 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. As stated in the introductory chapter to effectively manage projects in an agile way one of the key ingredient is for the entire stakeholders embrace the agile mindset needed. By entire stakeholders it means all the participating stakeholders from the development team, project sponsor and most importantly the client or customer of the project. An agile effective team functions and operates as a single individual with high level of synergy and team spirit. Team cohesion is very important and the role of the project manager is to mainly act as a facilitator and servant leader by focusing on avoiding any hurdles or friction in the environment the team operates. In the ideal agile team, the role of the project manager is very minimal, however literatures support the facilitator role of the project manager in the various stages like planning, executing and monitoring. Agile team roles are filled by specific individuals. In a typical agile flavor, the first role is the **product owner**, who is responsible for the product vision and for prioritizing features the team will work on. The next is the **customer**, who is the person paying for the project or purchasing the software once it’s available. **Users, developers** and **managers** are other roles on an agile project.

From its first introduction by software development practitioners (Agilemanifesto, 2018) in 2001, the concept of agile project management got its traction in how modern software projects are managed. The agile manifesto is an established principle that are very popularized in the software development domain. This manifesto identifies the following four core values. 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:

- A. **Individuals and interactions** over processes and tools
- B. **Working software** over comprehensive documentation
- C. **Customer collaboration** over contract negotiation
- D. **Responding to change** over following a plan

Striving to add value in every action of project implementation, the above values show the paradigm shift in the agile project management from a typical traditional project management. While the right ones are important, the focus is to give more priority to the ones in the left. In addition to the above values, there are twelve agile principles that guide the success of adopting the agile project management.

In order to do things in an agile way, a normal process change to the agile principles is not sufficient to fully realize the potential of the agile project management approaches. Cultural changes in organizations, individual and team's agile mindset and the customer's awareness about the agile project management are also equally important. As outlined by the agile practice guide (Project Management Institute, 2017) the factors that shape the effective adoptions of agile project managements are *agile mindset*, *leadership approaches* and *agile team composition*.

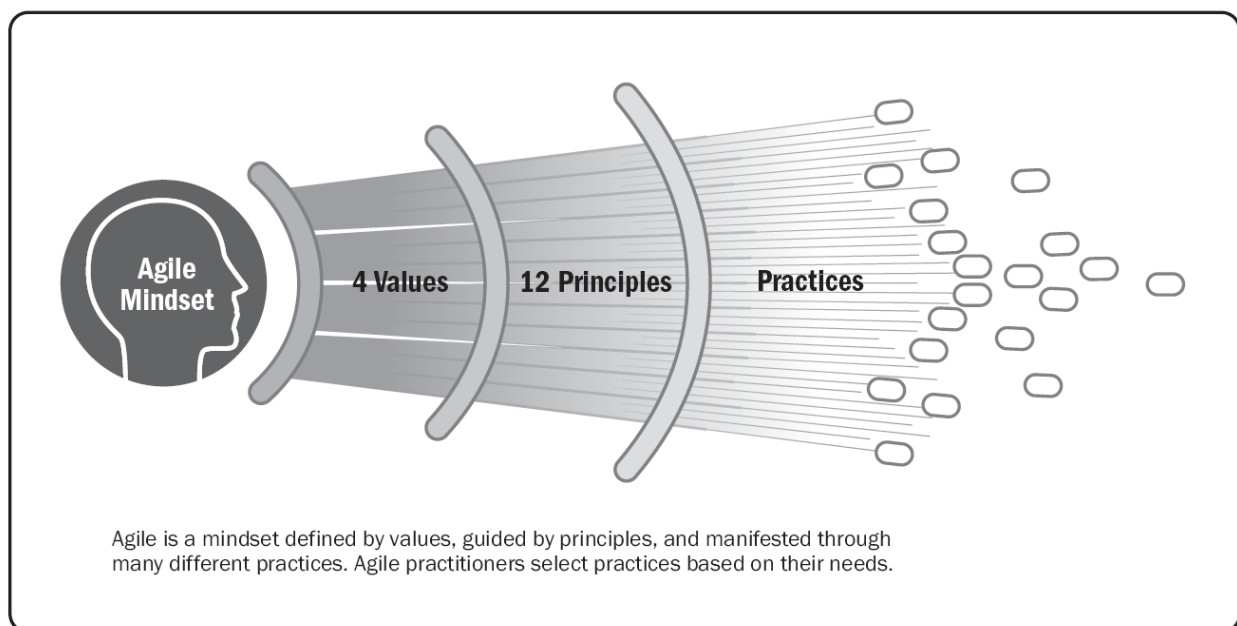


Figure 3 - Agile mindset (Project Management Institute, 2017)

Agile planning

The approach to the planning in the agile project management is a 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 cases what is known is used in the incremental planning.

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. A progressive elaboration of the plan is needed. Agile planning is done in multiple layers as captured in the planning onion figure below.

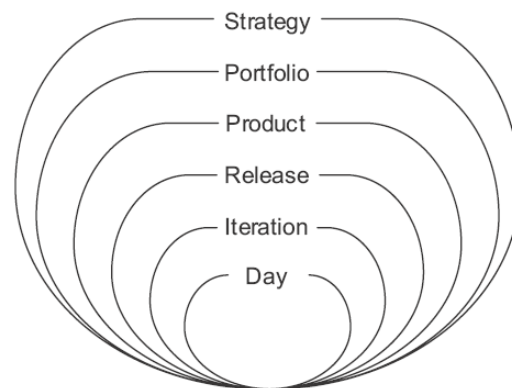


Figure 4 - The planning onion (Cohn, 2006, p. 28)

Typically, an agile team facilitated by the project manager performs a daily, iteration, release and product planning. Further the planning can extend to portfolio and strategy to quantify organization's vision alignment with the implemented project.

Flavors of agile software project management

The industry introduced various types of agile software project management approaches and models, which have a variation in realizing the guiding agile values stated and principles outlined. These approaches are different flavors of a similar agile philosophy and the development team can pick any one of them based on internal and external factors. Some of the agile software development methods are Scrum, Extreme Programming(XP), Crystal, Lean and Kanban to name a few popular ones. While there are variations in practically realizing agile values and principles, these methods all boil down to the same flexible software development. In this section, the researcher presents two of the most commonly used agile approaches: scrum and XP.

Scrum

Scrum is one of the most popular frameworks for implementing agile. Its defining characteristic is commitment to short iterations of work ” (Ruslan Shaydulin, 2017). In scrum, a product is developed through a series of fixed-length iterations, called sprints, that allow for software updates at a regular period. Team members are motivated by tangible, visible progress at the end of each sprint, as well as by the ability to "show off" during the sprint demo.

Sprint consists of four “ceremonies” (Ruslan Shaydulin, 2017):

- i. ***Sprint planning*** – team meeting where the next sprint is outlined.
- ii. ***Daily stand-up*** – daily 15-minute meeting for the team to sync up.
- iii. ***Sprint demo*** – weekly meeting where teammates showcase what they will ship during the week.
- iv. ***Sprint retrospective*** – weekly analysis of what went wrong and what went right during the previous week.

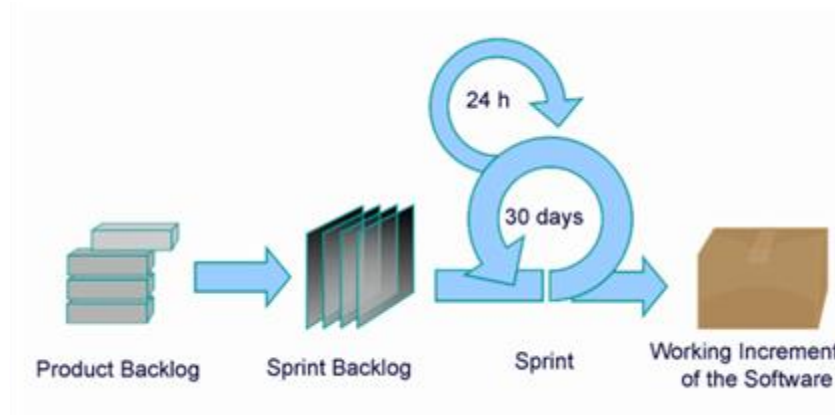


Figure 5- Scrum software development framework” (Ruslan Shaydulin, 2017)

Scrum has three specific roles: **product owner**, **scrum master**, and the **development team**.

The product owner works with the business requirements and gives requirements to the team.

The scrum master coaches the team and make sure the team observes scrum practices. The development team works closely together in an open and collaborative manner, talking regularly at scrum meetings. A potential point of failure, of course, comes from the quality of the product manager who is the sole point of contact between the development team and the customers.

The project under study, software project for M&E of the PRIME program, adopted Scrum as a software project management approach.

2.1.2. How to measure success of project delivery?

Having the right metrics to measure the success of a project is important. Especially in complex projects like software projects, where agile project management has been implemented, the multifaceted project artifacts and inherent need for adaption imply the need for a more robust method for measuring project progress and success.

The findings of many researches like (Ruslan Shaydulin, 2017), (Kai Petersen, A Comparison of Issues and Advantages in Agile and Incremental Development between State of the Art and an Industrial Case, 2010) and (Kai Petersen, The Effect of Moving from a Plan-Driven to an Incremental and Agile Software Development Approach: An Industrial Case Study, 2010) and practices in the industry inform us there is a good chance of successfully delivering software projects that are managed in an agile approaches. However, it is important to watch and be skeptical about the type of success we are talking about. In the general sense projects are successful when the triple constraints: time, cost and scope are as close as the plan. However effective success measurement of projects can be tricky and other metrics may also need to be considered, especially in the agile software project development arena the following questions may enlighten us to accurately measure the health of a project.

- i. Are You Delivering Value?
- ii. Are Your Customers Happy?
- iii. How Healthy Is Your Code Base?

Therefore, from the various research findings, it can be possible to coin the success of projects to the type of the software project management.

(Ruslan Shaydulin, 2017) conclude the success of small or medium projects resonates with the use of an agile approach. However, they have been also cautious about a mere shift to agile methods is not a guarantee for project success for all types projects. In addition, they remarked the traditional software project management approach is still widely implemented. In contrast to this

claim, (Robert K. Wysocki, 2014) remarked that more than 70 percent of all projects should have used some type of Agile Project Management (APM).

As cited in the previous chapter, (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 an effective use of the agile methods in the small and medium sized teams helped in delivering the project with in the budget and timelines planned.

For measuring success of a scrum agile type of projects, the (ScrumAlliance, 2012) also highlighted the multifaceted nature of the metrics that should be used including the employee engagement, level of innovation and overall performance to name a few.

To remark the multidimensional metrics of measuring agile projects, (SCOTT AMBLER and ASSOCIATES, 2013) identified the following parameters: Product Quality, Stakeholder Value, ROI and Time/Schedule.

2.1.3. Monitoring & Evaluation of NGO projects

International Development (ID) projects that makes up much of the aid industry in the developing world are one of a category of project types. These projects are the main tool by which international aid is directed to developing countries. Due to various factors, the project management approach and implementation utilized in such projects are peculiar (Golini, 2012) when compared to other development projects.

As outlined in previous sections, this research work focuses on a software project that has been designed and implemented for assisting the domain of monitoring & evaluation projects of in the NGO sector.

The Monitoring & Evaluation which have a parallel naming in PMI terminology (PMI, 2017) as monitoring and controlling – a key process group in the project management encompassing process like monitor and control project work, validate scope and the like. Mostly development projects lead and implemented by international and local NGOs have a need to measure and quantify the relevance and effectiveness of their intervention. No matter how much sophisticated or not it could be (Golini, 2012), such projects have their own approach in handling the management of their projects.

In a typical ID project, there is usually a need by the donors, the host country government and the implementers, to do a continuous monitoring and evaluation of to measure and quantify the effect of the intervention. This M&E effort is by itself a big task and consume a lot of resources. Moreover, the M&E component of the ID projects might be done either by a separate team in the same organization or by a different external company altogether. In the latter case especially the M&E process by itself can be treated as a separate project and managed by a different project manager using a monitoring instrument the context allows. One of the instrument is the use of software solution to assist and make it much easier the data collection and analysis processes of an M&E. The primary objective of an M&E in such settings and contexts is to collect, analyze and give timely and accurate information to the main development project. The nature and approach used to collect, analyze and give feedback to the main development project is further influenced by the type of framework or model agreed to perform the M&E with the main project. Common frameworks for M&E are Logical Framework Approach (LFA), Result Based Management (RBM), and Theory of Change (ToC).

Result Based Management (RBM) is an approach to project management based on clearly defined results, and the methodologies and tools to measure and achieve them (Addis Ababa University, School of Commerce, 2016).

In this research work the supporting software projects for the M&E needs of PRIME project shall be studied closely to examine the impact of the agile project management practices used on the success of the project delivery.

The PRIME project adopted a log frame enabled result based project management approach to measure, quantify and make key development decisions about its intervention.

Various indicators were designed at outcome and output levels to track the impact of the intervention. To support this M&E framework, as outlined in the previous chapter a concept note approach has been implemented to capture planned and actual values of every project activity. These activities are linked and measured using output indicator. The software project therefore has been designed in line with this M&E approach.

2.2. Research conceptual framework

Scrum – an agile software project management has been used by the software team to elicit requirements, design & architect the various layers and construct the PRIME project's M&E supporting software product. This research is a case based study focusing on the agile project management practices used in the context of PRIME project.

To measure and attribute the success of the project to the software project management practices used in the selected case of PRIME project, the following independent and dependent variables have been identified for study

2.2.1. Research Variables

a) Independent Variable:

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

- *The use of agile practices*
- *The nature of project domain*

b) Dependent Variable

The dependent variable that is of interest and studied is:

- *The success measure of the project*

As the conceptual framework below presents, using a multifaceted metrics the research attempts to measure the level of use of scrum using industry standard metrics. In addition, to what extent the scrum method adopted can be attributed to the success of the project have been also studied.

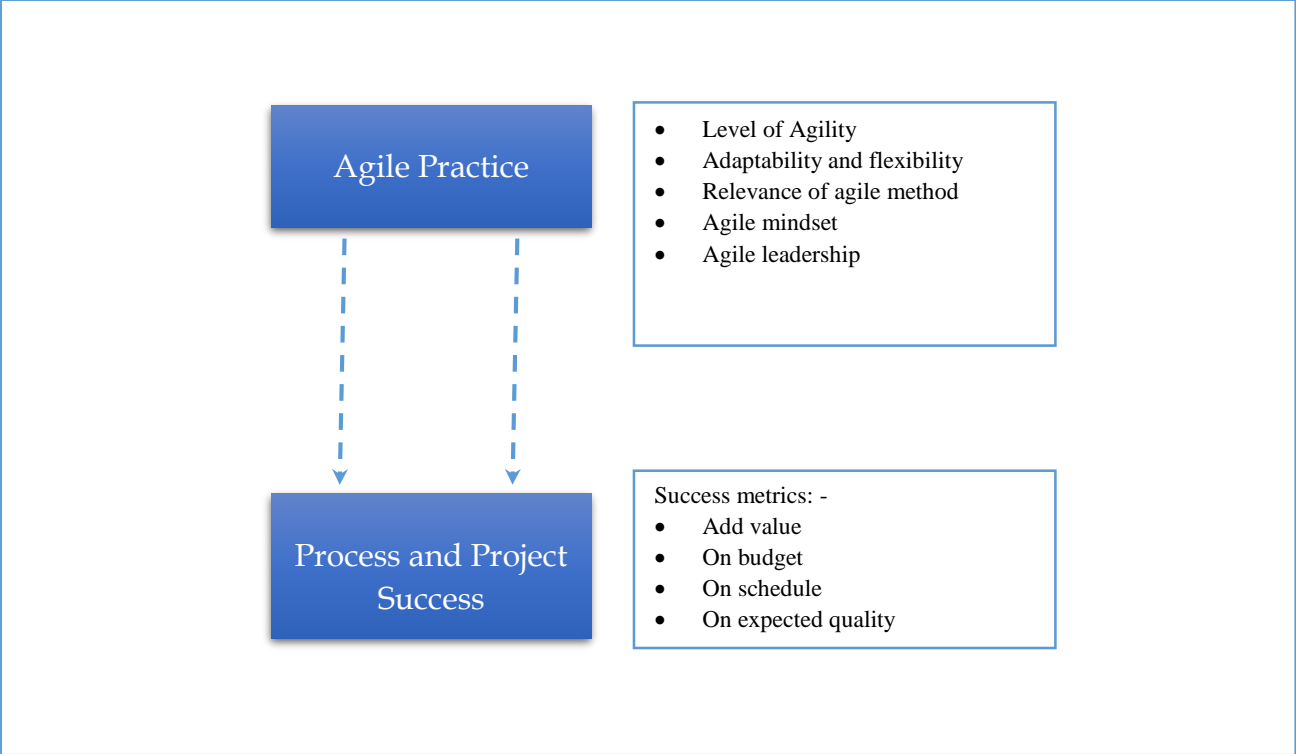


Figure 6 - Research model

3. CHAPTER THREE

RESEARCH METHODOLOGY

In this section, the methodology used for this research is presented. The section captures the research design, the type of data and its source, the target population and the sample, data collection and analysis methods that were employed by the researcher in the study. The chapter starts with a brief overview and description of the study area and organization.

3.1. Description of the Study Area

Broadly speaking, process maturity is an indicative of project success. In software development projects, processes that strive to add value to the artifacts being constructed, are generally known by an umbrella term – agile methods. In this research, the success of a software project that assisted an NGO in its monitoring & evaluation practices domain of a project is studied with a search to validate the success of the software project has been contingent on the agile project management approach used for the PRIME project. As stated in earlier chapters, the agile flavor adopted in the project was Scrum.

While the NGO might have various software projects that could assist their operation: like financial management systems, grant tracking systems and the like, this research study focuses on the monitoring and evaluation domain through a case based approach to measure how the M&E component of the NGOs has been assisted by a software project.

Success of a project delivery might be impacted by various factors, in this research the use of an agile project management approach in managing the software project is studied.

First, the level of agile use or maturity of the process in general is assessed and its impact on the success of the project is examined.

3.2. Research Approach and Design

The research adopts a quantitative method to measure the relation between the maturity of the agile method (scrum) used and the success of the project by using questionnaire adopted from a standard Scrum agile use metrics.

By focusing on the selected software development project that assisted the monitoring and evaluation of a humanitarian intervention projects, this research adopts a case based

phenomenological method to examine the relevance of the agile project management practices used.

For each of the questions raised in this research, the researcher designed the instrument to measure and quantify the use of an agile methods, the corresponding success attributed to the use of such methods and generalize the relevance of the agile project management approaches in the M&E domain.

i. To measure the level of use of an agile method

Pertaining to the first research question, using a predefined questionnaire that magnify the various agile metrics to measure the level and quality of agile project management realized in the selected projects. In this group of the questionnaire are targeted towards the project managers and agile development teams. The result shall put the project approach in the agile scale or level.

In addition, the researcher shall also perform detailed document and process reviews to identify the level of agility practiced in the project.

Key indicators to measure the level of agile use

The key indicators that can show the extent and level adopting of agile approaches are framed from the industry standard guideline (Project Management Institute, 2017). In this research, the following key criteria that are possible indicators for measuring the agile methods used to be measured.

Table 2 - Agile method indicators

Key Measurement	
Agile mindset	Within the development team
	Consortium members
Leadership	Type of leadership within the team
	Recognition of the agile leadership within the team
	Success of the leadership approach used
Team composition	Dedicated People
	Cross-functional team members
	Colocation or ability to manage any location challenges
	Mixed team of generalists and specialists

	Stable work environment
Agile team roles	Agile roles has been filled by team members?
	Team members assumed the agile roles effectively
	To what extent these roles filling helped in successfully adopting the agile practices ?
Use of agile practices	Iteration-based agile planning realized?
	Backlog preparation done?
	Backlog refinement done?
	Retrospectives were used?
	Daily standups conducted?
	Demo and reviews done in iteration?

Agile metrics

The following agile metrics shall also be used to measure the extent and efficient use of agile approaches in the selected project for this study. Since the development team of the project have used the agile flavor known as **Scrum**, this research also uses agile metrics which are relevant to the Scrum software project management approaches.

Table 3 - Key agile metrics

Key Metrics (Atlassian, 2018)	
Velocity	Velocity is the average amount of work a scrum team completes during a sprint, measured in either story points or hours
Sprint burndown	A sprint burndown report tracks the completion of work throughout the sprint.
Control Chart	Control charts focus on the cycle time of individual issues– the total time from "in progress" to "done". Teams with shorter cycle times are likely to have higher throughput, and teams with consistent cycle times across many issues are more predictable in delivering work.

I. To measure the relevance of the use of the agile methods to the success of project delivery

For measuring success and attributing that to the used agile methods, a research instrument with a set of questionnaires that are directed to the different stakeholders like customers, end users and software developers to measure the success of the project delivery.

II. To measure the success of the project

Finally, in the third category, the researcher uses key metrics to measure the success of the project under study. In addition, the casual link between the effective use of the agile methods with the success of the projects shall also be measured.

Key project success measuring instrument

Success may mean different things to different stakeholders of projects. To measure the success of the project, the researcher employs the following key metrics.

Table 4 – Measuring criteria for the success of the project

Success Metrics	
<i>1. Deliverable Success</i>	By measuring the number of business requirements that are originally outlined and satisfied in the final solution delivered, the extent of the project success can be measured.
<i>2. Process Success</i>	In this category, the researcher attempts to measure the way the project is managed from the following project artifacts point of view including timeline, budget, communication, collaboration, change controls and adherence to established project management processes.

3.3.Data type and source

The data types which are collected and analyzed for this research are both quantitative and qualitative in nature.

As outlined in the research conceptual framework section, the key variables studied are:

Independent variables: - *Level of agile practice in the project* and dependent variable: *success of the project* measured from two perspectives: **process** and **project** successes. The data are collected and studied from both primary and secondary sources.

For a primary source, the researcher adopted standard questionnaires and modified it to fit for the research purpose. In addition, interviewed questions have been designed and tested in selected participants for validity and reliability.

For the secondary source, different documents related to the studied project, including the project charter, updated log frame of the project, the project website and the issue tracking system used (an online web based project management system) were used.

The following quantitative and qualitative data types are identified and studied:

Data	Data Type	Source
Process success		
Was the team and stakeholder exhibited an agile mindset during the course of the project?	Quantitative	Primary
Was the leadership adopted in the project in line with the agile method philosophy? and how much effective it has been?	Quantitative	Primary
How much the scrum agile method has been adopted and used? - what were the level of agility?	Quantitative	Primary
Project success		
Had the quality of the project output as per the expectation of the users?	Qualitative	Primary
Was the project success attributable to the agile level or maturity measured?	Quantitative	Primary

3.4. Population and Sample

The research is a case based study of a particular project. Driven by its objectives, the research looks for a suitable sample for study.

The sampling technique used is a purposive sampling technique that selects first the suitable and appropriate project and second for selecting the participant. The informants are constituting of the project managers of software project, the team members available at the time and the stakeholders who were primarily customer or user of the system.

3.4.1. Rationale for selection

The rationale for selection of the sample has been mainly accessibility and suitability of the participants and the studied project.

3.4.2. Sampling technique

The sample technique used is a purposive sampling technique that identifies the suitable project with conditions related to the phenomenon under study. In addition, the participants for questionnaire are purposively selected with a criterion that identify them to be either team member, project manager or stakeholder in the selected project.

3.4.3. Sample size determination

As the research is a case based study, the method for sampling used is a purposive sampling and the sample size is determined based on the relevant participants in the software project studied. The research included a questionnaire that are distributed to 12 respondents who were part of the project under study and took part different roles in the project. These sample respondents are distributed between the following roles: 6 software developers, 2 stakeholder representatives, 1 product owner, 1 scrum master and 2 software quality assurance experts.

3.5. Data collection methods

The research is conducted mainly on primary data. The software project management approach adopted in the project is a scrum, one of popular agile software management method. By adopting an industry standard agility measuring metrics (Kniberg, 2018), the questions are designed (see annex 2) . Based on the importance of the questions to the level of agile use studied, there are 8 categories of questions are formed and grouped the questionnaire accordingly.

Category 1: on the Product Owner (PO) of the project

Category 2: on sprint backlog

Category 3: on time-boxed iterations practiced

Category 4: on sprint planning

Category 5: on practice of scrum

Category 6: on scrum master(SM)

Category 7: on project success

Category 8: Miscellaneous Agile practices

3.6. Data Analysis

The collected raw primary data by using the research instrument outlined are arranged and analyzed for validating the objectives of the research. The questionnaire is designed to study the multifaceted nature of the agile metrics, hence there are 8 categories that make up the Likert Scale Data. Therefore, for each of the categories the appropriate research analysis applied including:

Analysis Category	Type of analysis preferred and used
Central Tendency	Median, mode and mean
Variability	Frequencies and Standard deviation
Other Statistics	Spearman correlation

Data collection and analytical tool Statistical Package for the Social Sciences (SPSS) is used to process, analyze and interpret findings. The unit of analysis for this case based research is the organization and the project studied in the context.

3.6.1. Validity and reliability

The research instrument used is adopted from an industry standard scrum measuring metrics. However, there are also additional questions added to further focus the study to the context. Therefore, to internally validate the research questions a Cronbach's alpha analysis is done and presented. The Cronbach alpha value have been computed on all the values from the 12 respondents to validate internally. A high value is computed

Table 5 - Cronbach's Alpha on selected responses

Reliability Statistics	
Cronbach's Alpha	N of Items
.917	60

The score shown above is greater than 0.7, which makes it an acceptable value.

3.7. Ethical Standards and Procedures

The common ethical consideration in research work are also applicable to this research work, which are:

- i. **Right to choose:** everyone has the right to determine whether or not to participate in the research project based on the guiding of the sampling frame context
- ii. **Right to be informed:** Research participants have the right to be informed of all aspects of a research task. Knowing what is involved, how long it will take, and what will be done with the data, etc.
- iii. **Right to Privacy:** all consumers have right to Privacy.

3. CHAPTER FOUR

RESULT and DISCUSSION

In this chapter the collected data for the research is analyzed and presented. A descriptive statistic to analyze the central tendency are done and presented for each category. The median, mode and mean per each groups are computed and presented. In addition, variability statistics are done through frequencies and standard deviation for each groups and presented.

Further input from observation on the control tool used, i.e. issue tracking system used in the project, a further analysis is done on how the project studied its success.

As outlined in the previous chapter, this research studies the multifaceted agile metrics. In line with this, the questionnaire systematically categorized into 8 groups. Each group describes one feature of an agile project management practice and the analysis entails computation of the median values per each category to merge the values of the responses in that category to one variable.

This analysis section begins with a frequency table of the respondent’s profile

Table 6 - Respondent Profile

	Frequency					
Primary role in the project	Project Manager	Product Owner	Scrum Master	Developer	Stakeholder Representative	Quality Assurance
	1	1	1	6	2	1
Project engagement scheme	Full time				Part time	
	7				5	
Education level	Bachelor (BSc/BA)		Masters (MSc/MA)		PhD(MD)	
	4		6		2	
Work experience with stated role	Less than 2 years	Between 2 & 4 Years	Between 4 & 6 years	Between 6 & 10 years	Above 10 years	
	1	3	4	2	2	
For how long stayed in the project	1 year or less	For 2 years	For 3 years	For 4 years	For 5 years	
	3	2	5	2		

3.1. Category 1: on the Product Owner (PO) of the project

Product owner is the primary focal person who took the responsibility of creating, updating and maintaining the product backlogs, sprints items and facilitate the planning or estimating of sprint items.

3.7.1. Central tendency (median, mode and mean) for category 1

Table 7 - Descriptive statistics on the Product Owner (PO) of the project

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
1.2 : The PO was empowered to prioritize issues	12	2	3	2.58	.515
1.3 : The PO had enough knowledge to prioritize	12	2	4	2.67	.778
1.4 : The PO had direct contact with team	12	2	3	2.58	.515
1.5 : The PO had direct contact with stakeholders	12	2	4	2.83	.718
1.7 : The PO understood purpose of all backlog items (PBL)	12	2	3	2.67	.492
1.8 : The PO has product vision that were in sync with PBL	12	2	4	2.50	.674
1.9 : PBL and product vision were highly visible	12	2	3	2.50	.522
Valid N (listwise)	12				

From the above descriptive stat values, we can note that most of the respondents agreed on the existence a PO in the project. In addition, the designated individual who acted as a PO has an overall above average value in these metrics.

The cumulative value for the first category of product owner(PO) status in the project gives a consolidated value, which is computed by taking the Median of those questions in this category.

Under this section a yes no interview questions have been asked to the respondents on the presence of the PO and backlog. The frequency of the results is plotted below:

Table 8 - PO Preences

	Questions	Yes	No
Q_1.1	The project had a clearly defined product owner (PO)	9	3
Q_1.6	The PO had a product backlog	10	2

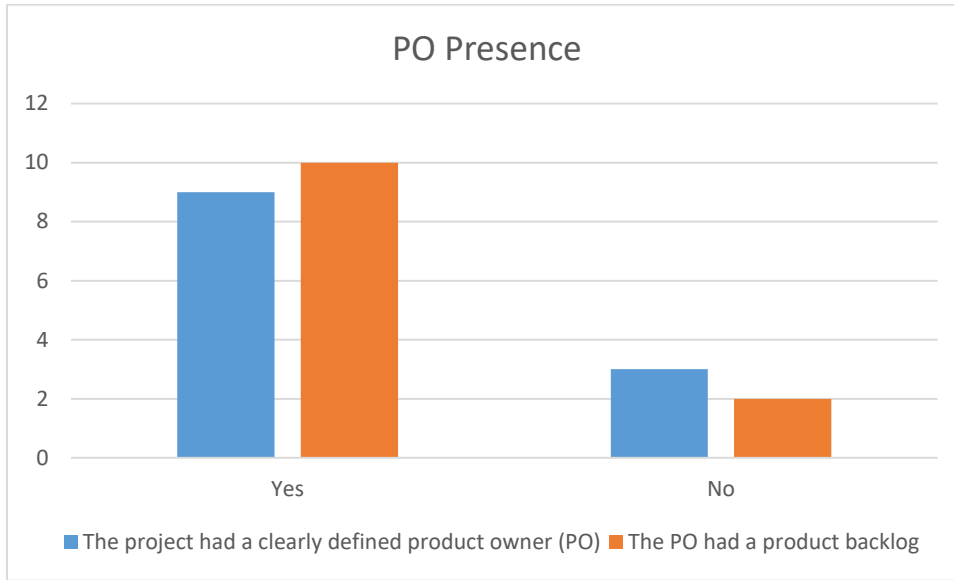


Figure 7 PO Presence

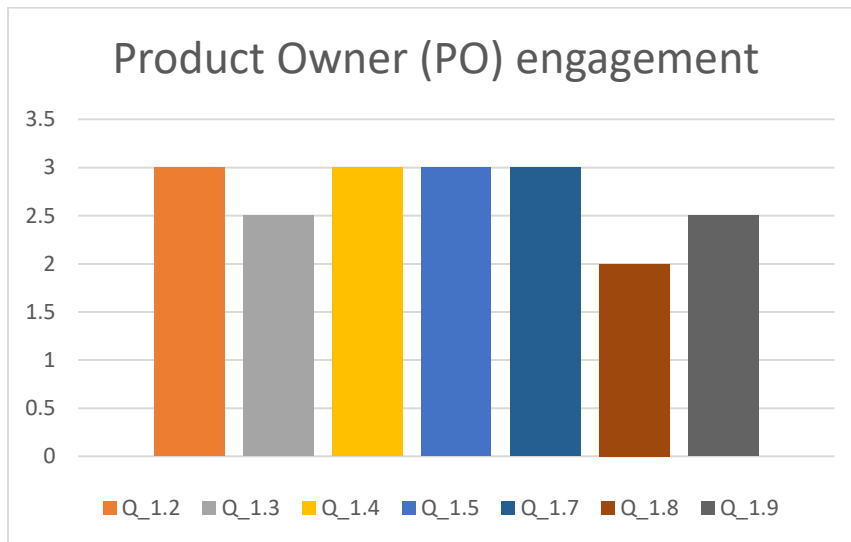


Figure 8 - PO engagement result chart

To consolidate further, the computed mean of all the responses in the first category are further run to compute the corresponding median of the medians of each questions and a representative of the extent of the product owner (PO) engagement and availability to the project is computed to be **2.6**.

From this consolidated value for the first category, we can conclude that the level of product owner commitment and engagement is of more than the median value.

3.2. Category 2: on sprint backlog

Having a well built and continuously updating backlog is the backbone of a scrum agile method. In this category the extent and level of backlog usage in the project is analyzed.

3.7.2. Central tendency (median, mode and mean) for category 2

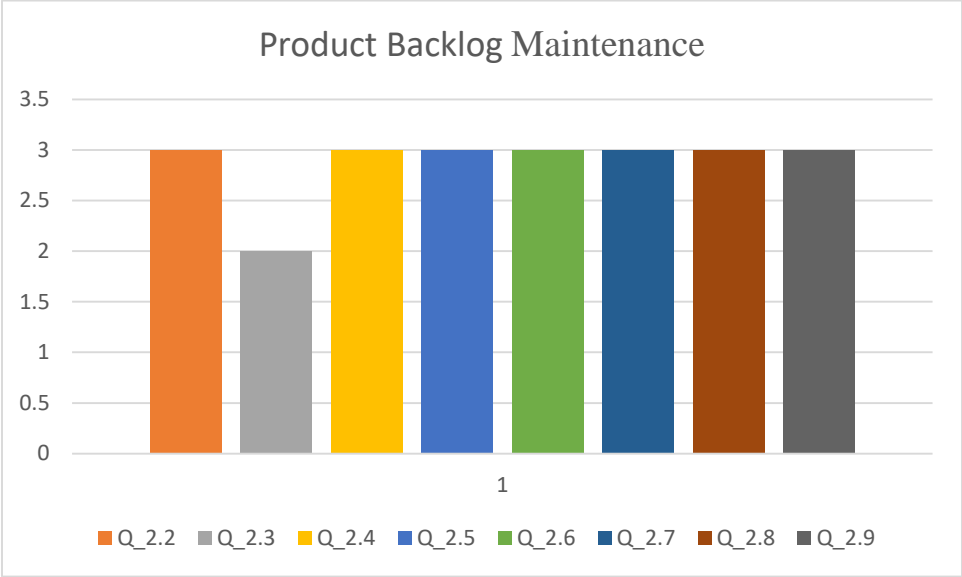


Figure 9 - Product Backlog Maintenance Result

On the presence of a product backlog that was used by the team as a primary source of tasks to be done in each iterations.

Table 9 - PBL Presence

	Questions	Yes	No
Q_2.1	The project team had a sprint backlog(PBL)	11	1

Table 10 - PBL presence

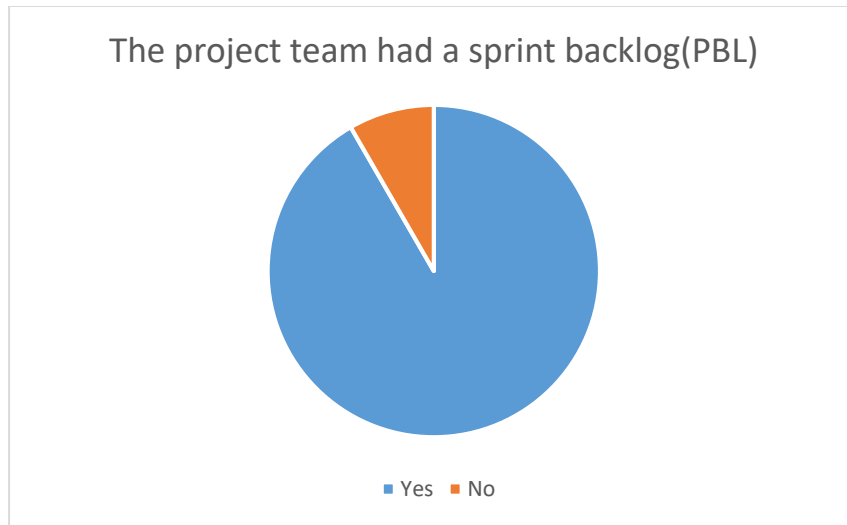


Table 11 - Descriptive stat result on the use of product backlog

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
2.2 : The PBL have been highly visible to the team and stakeholders	12	2	4	2.83	.577
2.3 : The PBL have been updated daily	12	2	4	2.50	.674
2.4 : The PBL have been owned exclusively by the team	12	2	4	3.17	.718
2.5 : The PBL items were broken into tasks within a sprint	12	2	4	2.92	.669
2.6 : In the PBL, top items were prioritized by business value	12	2	4	2.75	.622
2.7 : In the PBL, top items were estimated	12	2	4	2.75	.622
2.8 : Top items in PBL were small enough to fit in a sprint	12	2	4	2.83	.835
2.9 : In the PBL, estimates were written by the team	12	2	4	2.83	.718
Valid N (listwise)	12				

In a similar approach, a median value of each Likert items in the second category are further consolidated to give us an insight into the level of the backlog use.

The consolidated value that computes the mean of these category of responses and run a median again on the result gives a value of **2.65**.

The level of implementing and maintaining the backlog as a source for the requirements of the software application is above the mid-level, therefore a modest maintenance of backlogs is observed.

3.3. Category 3: on time-boxed iterations practice

Time-boxed iterations, which in scrum terminology called sprints are one of the pillar feature of the agile project management. To study the level of the agile use, this variable is critical to indicate how much iterations have been realized and value added to the customer through series of releases.

3.7.3. Central tendency (median, mode and mean) for category 3

Table 12 - Statistics on time-boxed iterations practice

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
3.1 : The project followed iteration length of 4 weeks or less	12	2	4	3.25	.754
3.2 : The iteration almost always end on time	12	2	4	2.75	.754
3.3 : During this time, the team were not disrupted or controlled by outsiders	12	2	4	2.75	.622
3.4 : At the end of the sprint, team usually delivered what they committed to	12	2	4	2.58	.793
3.5 : There was an agreed notion of Definition of Done (DoD)	12	2	4	2.67	.778
3.6 : Were the DoDs achievable within each iteration	12	2	4	2.75	.622
3.7 : Did the Team respect DoD	12	2	4	2.67	.651
3.8 : Iterations that are doomed to fail were terminated early	12	2	4	2.67	.651
Valid N (listwise)	12				

The mean values in this category, taking a similar approach is computed.

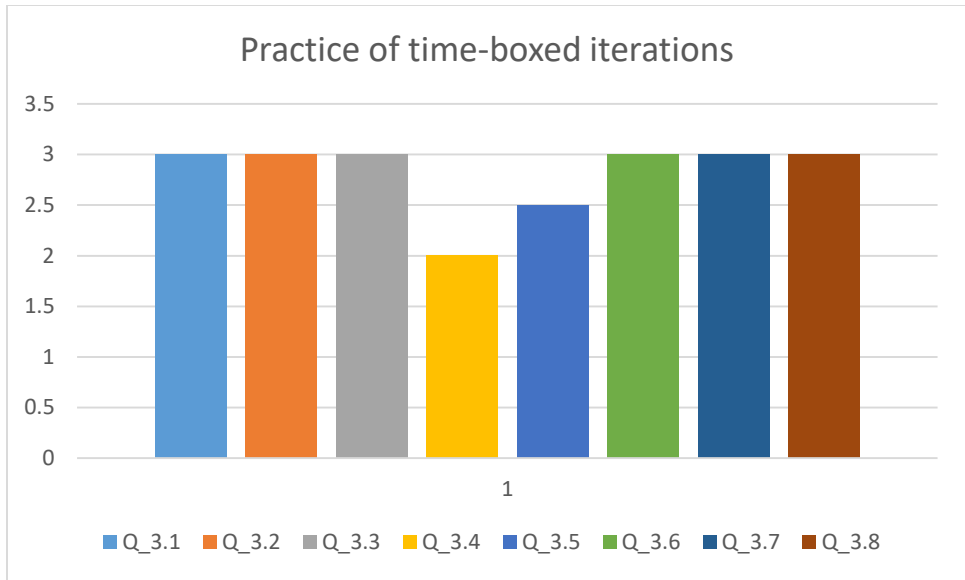


Figure 10 -Result on time-boxed iterations practice

The median and mean values for the Likert items in this category are computed to **3** and **2.9** respectively. An indicative of the team attempted to keep a moderate level of iteration in the project.

3.4. Category 4: on sprint planning

The mark of the start of an iteration is a sprint planning. The planning process should be a team effort and results in a list of task or issue that are planned to be done in the current sprint.

3.7.4. Central tendency (median, mode and mean) for category 4

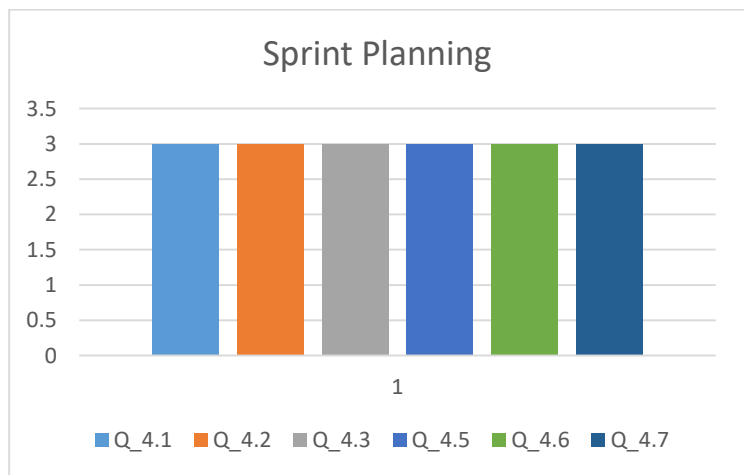


Figure 11 - Result on sprint planning

Table 13 - Sprint planning central statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
4.1 : Did the team have series of sprint planning meetings	12	2	4	2.92	.515
4.2 : The PO participated in such meetings	12	2	4	3.08	.515
4.3 : Whole team participated in such meetings	12	2	4	2.92	.793
4.5 : Whole team believed plan is achievable	12	2	3	2.67	.492
4.6 : PO satisfied with priorities	12	2	4	2.67	.651
4.7 : PO brings up-to-date PBL	12	2	4	3.08	.669
Valid N (listwise)	12				

To consolidate the Likert item responses in this category, a similar descriptive statistic: median & mean is computed.

As charted below, the median and mean are in agreement amongst the respondents. The consolidated mean value is **3.21** for both statistics, which is an indicative of the presence of sprint planning in the project.

3.5. Category 5: on general practice of scrum

Traits that describe generic practices of scrum as an agile method are categorized in this group and analyzed.

The view of respondents on the existence of daily scrum standup meeting are presented. These metrics may give more practical relevance for the developer group of users.

Table 14 daily stand up meeting happened

	Questions	Yes	No
Q_5.1	In the project Daily Scrum Stand up meeting happened	9	3

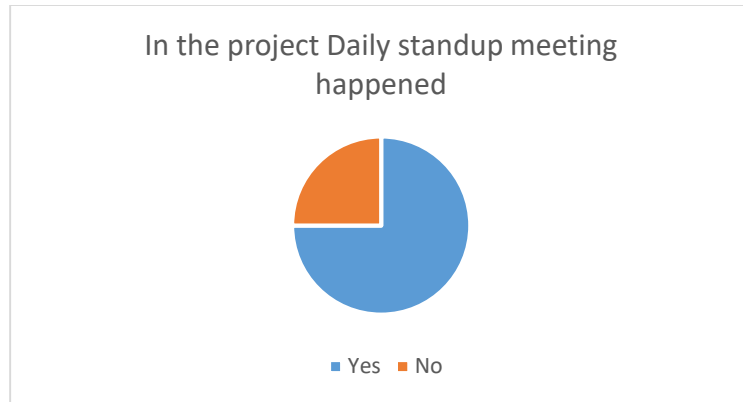


Figure 12 - view of team on sprint standup meeting happened

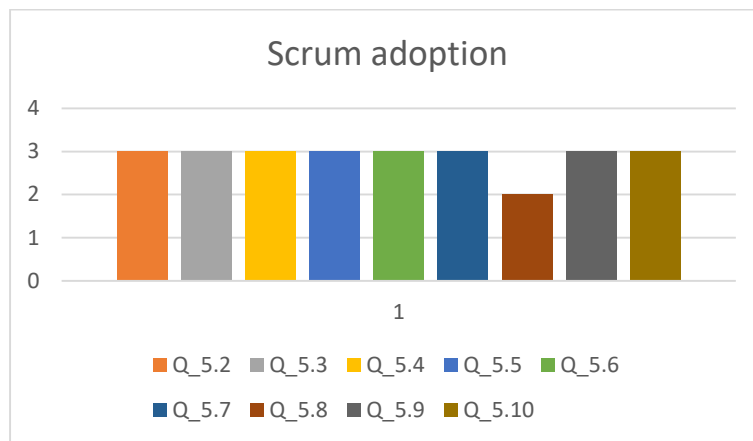


Figure 13 - Scrum adoption level chart

3.7.5. Central tendency (median, mode and mean) for category 5

Table 15 - Descriptive stat on general practice of scrum

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
5.2 : In each of the Scrum meeting, whole team participates	12	2	4	2.83	.577
5.3 : In these meetings, problems & impediments were surfaced	12	2	4	3.08	.515
5.4 : Software feature demo happened after every sprint	12	2	3	2.75	.452
5.5 : The demo showed a working, tested software	12	2	4	2.75	.622
5.6 : At the end of the sprint, feedback received from stakeholders & PO	12	3	4	3.17	.389
5.7 : Retrospective happens after every sprint	12	2	4	2.67	.651
5.8 : Results in concrete improvement proposals	12	2	3	2.33	.492
5.9 : Some proposals actually get implemented	12	2	4	2.67	.651
5.10 : Whole team + PO participates	12	2	4	2.83	.577
Valid N (listwise)	12				

The mean in this category is computed to be a consolidated value **2.74**. Some of the scrum practices listed under this category vary from organization to organization. However, some of these practices are still an important indicator of the method.

3.6. Category 6: on scrum master(SM)

Scrum Master (SM) is the role in a scrum process that is designated to the person who acts as gate keeper and servant leader by tracing and moderating the adoption of the scrum method as much as possible in the team. In this category, the presence and extent of impact of this role is studied.

The presence of a SM in the team and to what extent he/she interacts with the team have been analyzed from a yes/no question of the team.

Table 16 - on SM for the team

	Questions	Yes	No
6.1	Team had a Scrum Master (SM)	9	3
6.2	SM sat with the team	8	4

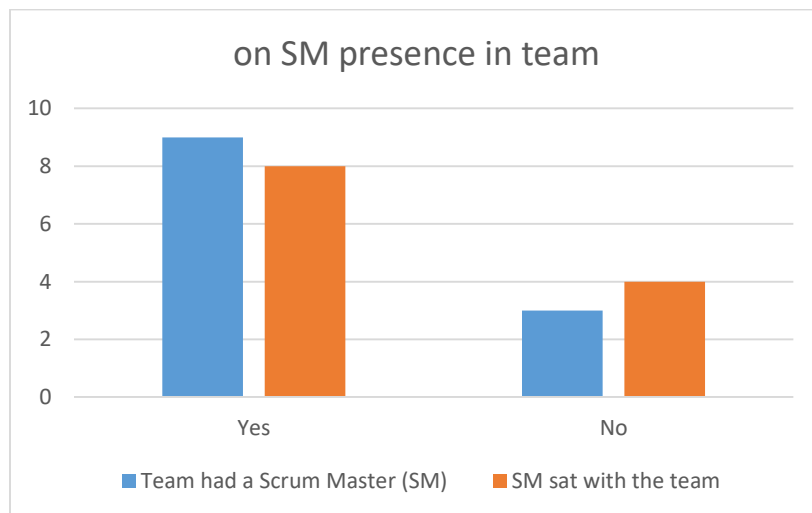


Figure 14 - on SM presence in the team

3.7.6. Central tendency (median, mode and mean) for category 6

Table 17 - Central tendency on scrum master

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
6.3 : Whole team knew top 1-3 impediments	12	2	4	2.50	.674
6.4 : SM has had strategy for how to fix top impediment	12	2	3	2.33	.492
6.5 : SM focusing on removing impediments	12	2	4	2.67	.651
6.6 : Escalated to management when team can't solve	12	2	4	2.67	.778
Valid N (listwise)	12				

The role of the SM is evaluated by the respondent in this category and an aggregated value of **2.5** is found to be the median in this category.

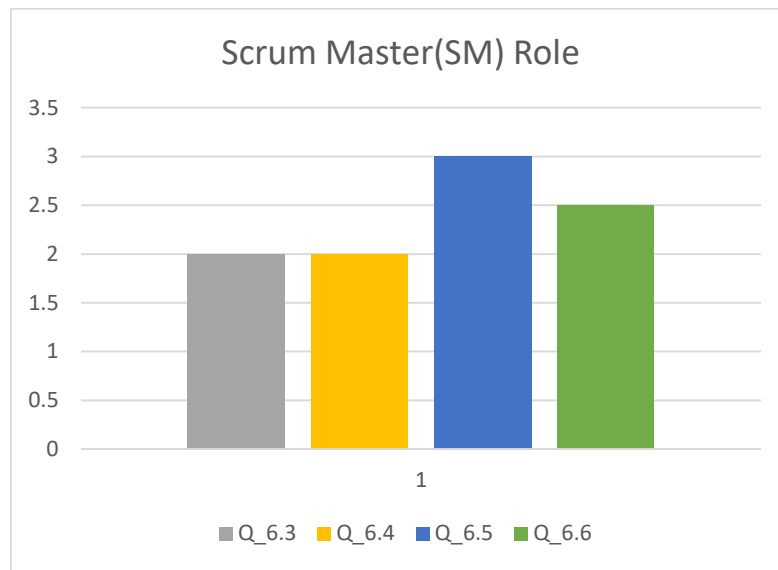


Figure 15 - SM Role in the project chart

3.7. Category 7: on project success

Respondents perspective on the success of the project which measured as per an agile project management metrics point of view, is analyzed in this category of the Likert items. The view of the respondents on the contribution of the agile method used and some process success yes or no questions are extracted and presented here first followed by the Likert items answered and aggregated to create a representation of the success of the project as a value.

Table 18 - yes/no response on success related questions

	Questions	Yes	No
7.2	Had the project been implemented in traditional project management other than agile, do you think it would not be successful?	11	1
7.3	Requirements were captured in a story point format?	10	2

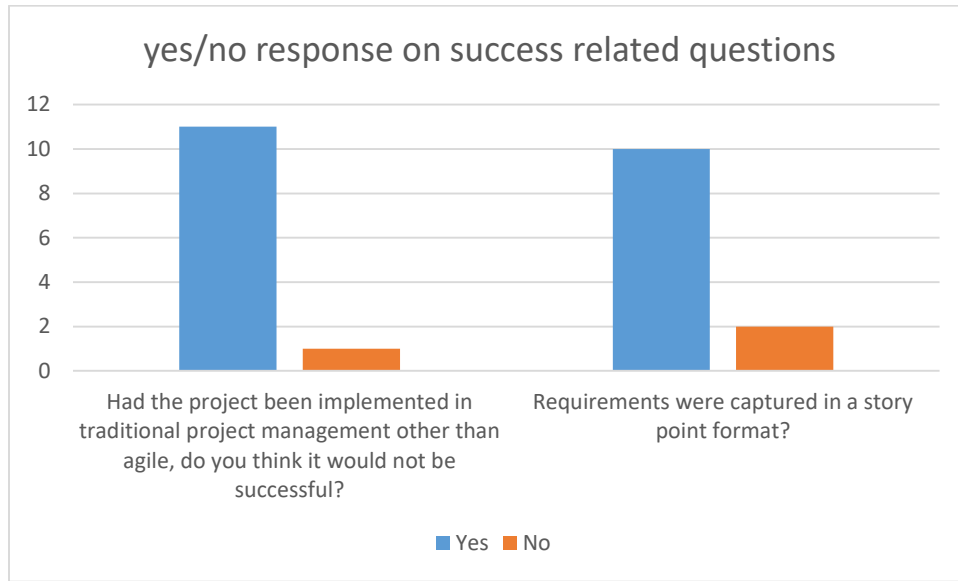


Figure 16 - yes/no response on success related questions

3.7.7. Central tendency (median, mode and mean) for category 7

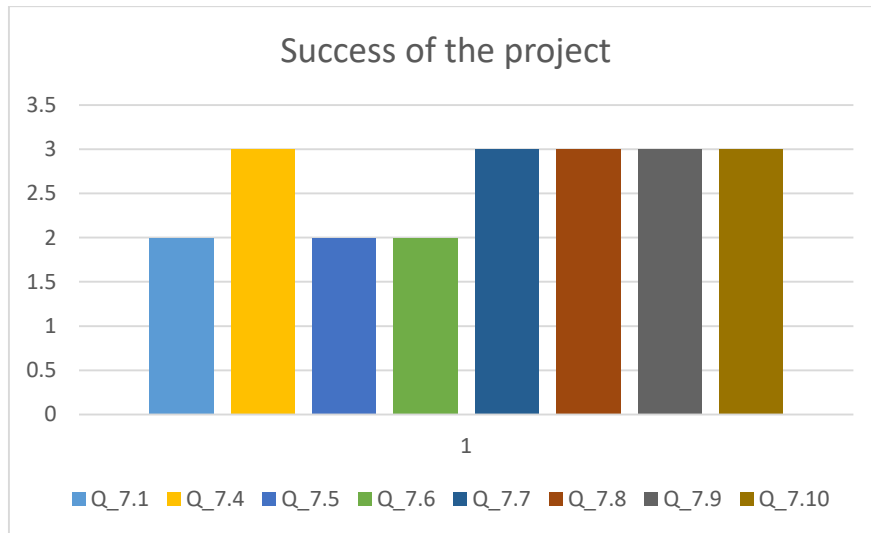


Figure 17 - Success of project

Table 19 - Descriptive stat on measuring the success of the project

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
7.1 : In your view the agile mindset of the team can be characterized as moderate and helped in finalizing the project successfully	12	2	3	2.42	.515
7.4 : The corresponding story point estimation were acceptable by the team?	12	2	3	2.58	.515
7.5 : The actual spent times on each task were generally within acceptable range	12	2	3	2.33	.492
7.6 : Budget were properly estimated and didn't generally exceeded the estimates above an acceptable range	12	2	4	2.42	.669
7.7 : The quality or implemented features were generally acceptable by the user?	12	2	4	3.00	.426
7.8 : Were the issues that made up a typical iteration within in the acceptable number that can be handled by the developer user	12	2	4	2.75	.622
7.9 : Were the defects large in the number after a typical release?	12	2	3	2.67	.492
7.1 : Do you think the leadership approach used contributed to the success of the project	12	2	3	2.75	.452
Valid N (listwise)	12				

Perhaps the hardest part of this analysis is to come up with a consolidated figure representing the dependent variable – success of the project, as there might be multiple and to some degree conflicting view by stakeholders on how to measure the success of an agile project. However, an attempt is made by the researcher to diversify the Likert items in this category and the consolidated figure is believed to be a representative of these values. Therefore, a consolidated value of **3** is found to be the value in this category.

3.8. Category 8: Miscellaneous Agile practices

In this category, various agile practices which if used in the project might show the maturity of the scrum process adopted, however might not necessarily be a must have processes. The Likert items

in this category measures another facet of the level of use of agile processes in the project and can be taken with the categories 1 – 6, excluding the previous (i.e. category 7)

A yes/no question on sprint burndown has been asked and the team’s view on this tool has been plotted below:

Table 20 - burndown chart

	Questions	Yes	No
Q_8.5	Team had a sprint burndown chart	9	3

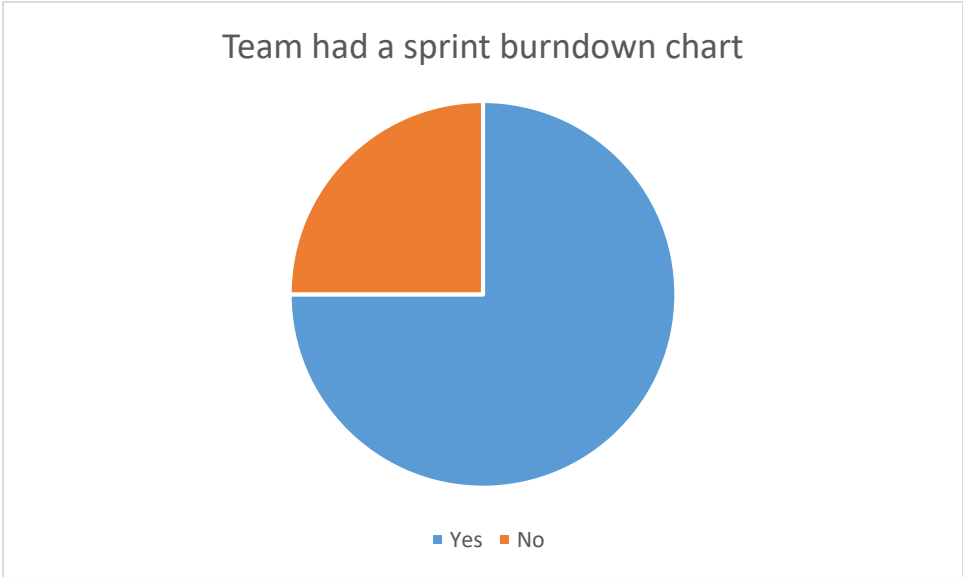


Figure 18 Team had a sprint burndown chart

3.7.8. Central tendency (median, mode and mean) for category 8

Table 21 - Descriptive stat on miscellaneous agile practices

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
8.1 : In the project velocity were measured	12	2	4	2.58	.669
8.2 : All items in sprint plan have an estimate	12	2	4	2.67	.651
8.3 : PO used velocity for release planning	12	2	4	2.58	.669
8.4 : Velocity only included items that are Done	12	2	4	3.00	.603
8.6 : Each team member knew what the others are doing	12	2	4	2.92	.515
8.7 : Team had all skills needed to bring backlog items to Done	12	2	3	2.50	.522
8.8 : Team members not locked into specific roles	12	2	3	2.42	.515
8.9 : Everyone on the team participates in estimating	12	2	4	2.83	.577
8.1 : PO available when team is estimating	12	2	4	2.58	.669
8.11 : Estimate relative size (story points) rather than time	12	2	4	3.08	.515
Valid N (listwise)	12				

In this category the Likert items are aggregated to a median value of **2.5**, representing a consolidated value of the various scrum management practices which didn't necessarily fit in the previous categories.

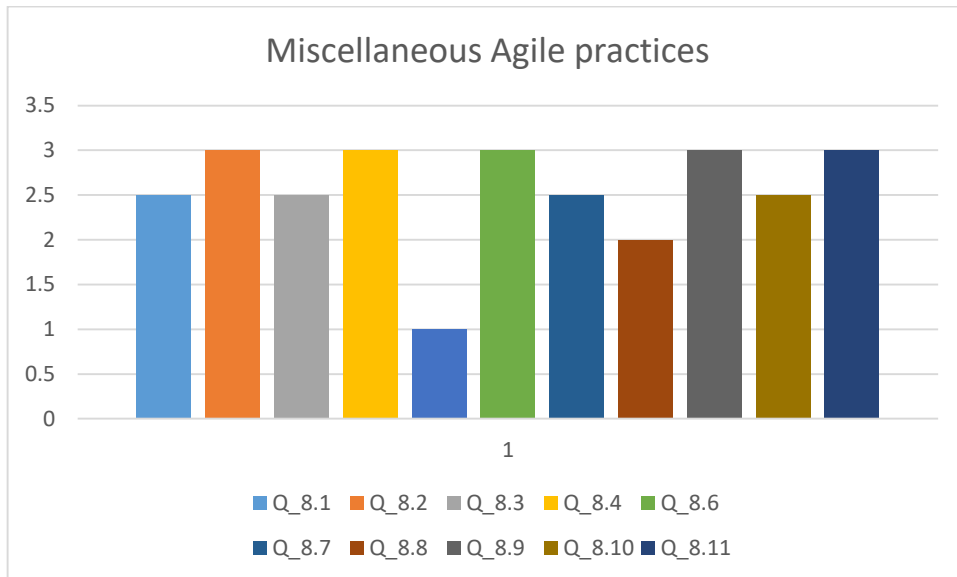


Figure 19 - Miscellaneous Agile practices

3.9.Overall scrum implementation status in the project

In this section an aggregated value for the independent variables, category 1 through 6 and category 8 are presented. The aggregated value for the agile level is computed by taking the mean of the categories 1 through 6 and category 8 value.

Table 22 Aggregated values of each category

Category1	Category2	Category3	Category4	Category5	Category6	Category8	Aggregated
2.17	2.5	2.5	2.83	2.33	3	2.67	2.57
3.33	3.38	3.13	3.5	2.89	3	3	3.18
2.33	2.88	2.63	2.67	2.56	2.25	2.44	2.54
3	3.13	3.63	3.33	3.56	3.5	2.89	3.29
3	3.38	3.38	3	2.22	2	2.67	2.81
2	2.13	2.13	2.33	2.89	2.5	2.56	2.36
2.67	3.25	2.63	3.17	2.89	2.25	2.56	2.77
2.33	2.13	2.25	2.67	3	2.5	2.67	2.51
2.17	2.5	2.5	2.5	2.56	2	2.44	2.38
2.33	2.5	2.38	2.5	2.78	2.5	2.78	2.54
3.17	3.25	2.88	3.17	2.89	2.5	3	2.98
2.5	2.88	3.13	3	2.89	2.5	2.78	2.81

An aggregated value of the above agile usage gives us an insight on the view of the respondents in an aggregated way the extent and maturity of the scrum method adopted. The final column captures this aggregated value.

Table 23 - Aggregated value of respondents

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12
2.57	3.2	3	3.29	2.81	2.36	2.77	2.51	2.38	2.54	2.98	2.81

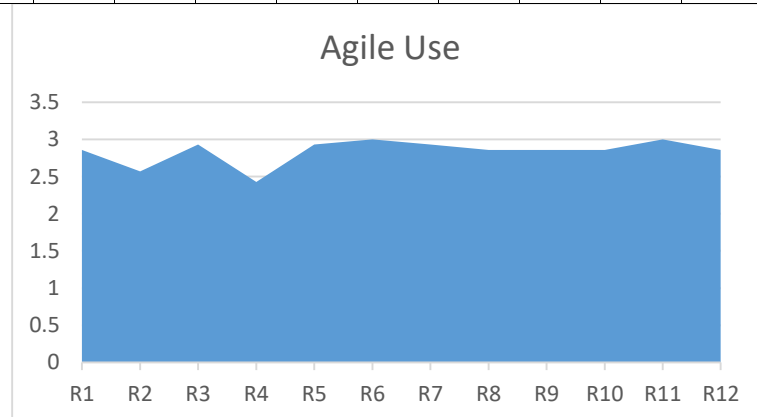


Figure 20 - Agile usage

As depicted in the previous plot and values, the level of agile use is agreed by the respondents to a moderate level.

3.10. Relation of the level of agile use with the success of the project

With the constrained view from the sample size and possibility of other contingent variables, the independent variable: the level of agile use and the dependent variable success of the project are studied for correlation.

A nonparametric Spearman correlation is appropriate to use for checking the hypothesis, that assumed there is relation of some sort between the level and maturity of agile use in managing a software project to its success. Therefore, the consolidated values representing the level of agile method used and the success of the project has been analyzed.

Table 24 - Pearson Correlation Values

		Correlations	
		scrum_use_maturity	project_success
scrum_use_maturity	Pearson Correlation	1	.857**
	Sig. (2-tailed)		.000
	N	12	12
project_success	Pearson Correlation	.857**	1
	Sig. (2-tailed)	.000	
	N	12	12

** . Correlation is significant at the 0.01 level (2-tailed).

The above correlation coefficient value, i.e. 0.857 with a significant level of nearly zero. The value shows a very strong relation between the variables, with a pattern that is indicative of a positive correlation. The claim in this research that rejected the null hypothesis and accept the alternate one that underline the existence of a relation between the success of the project and the agile method used, is to an acceptable degree confirmed in the positive relation. The following graph also shows

a linear relation between the independent variable – *agile method uses* and dependent variable – *success of the project*.

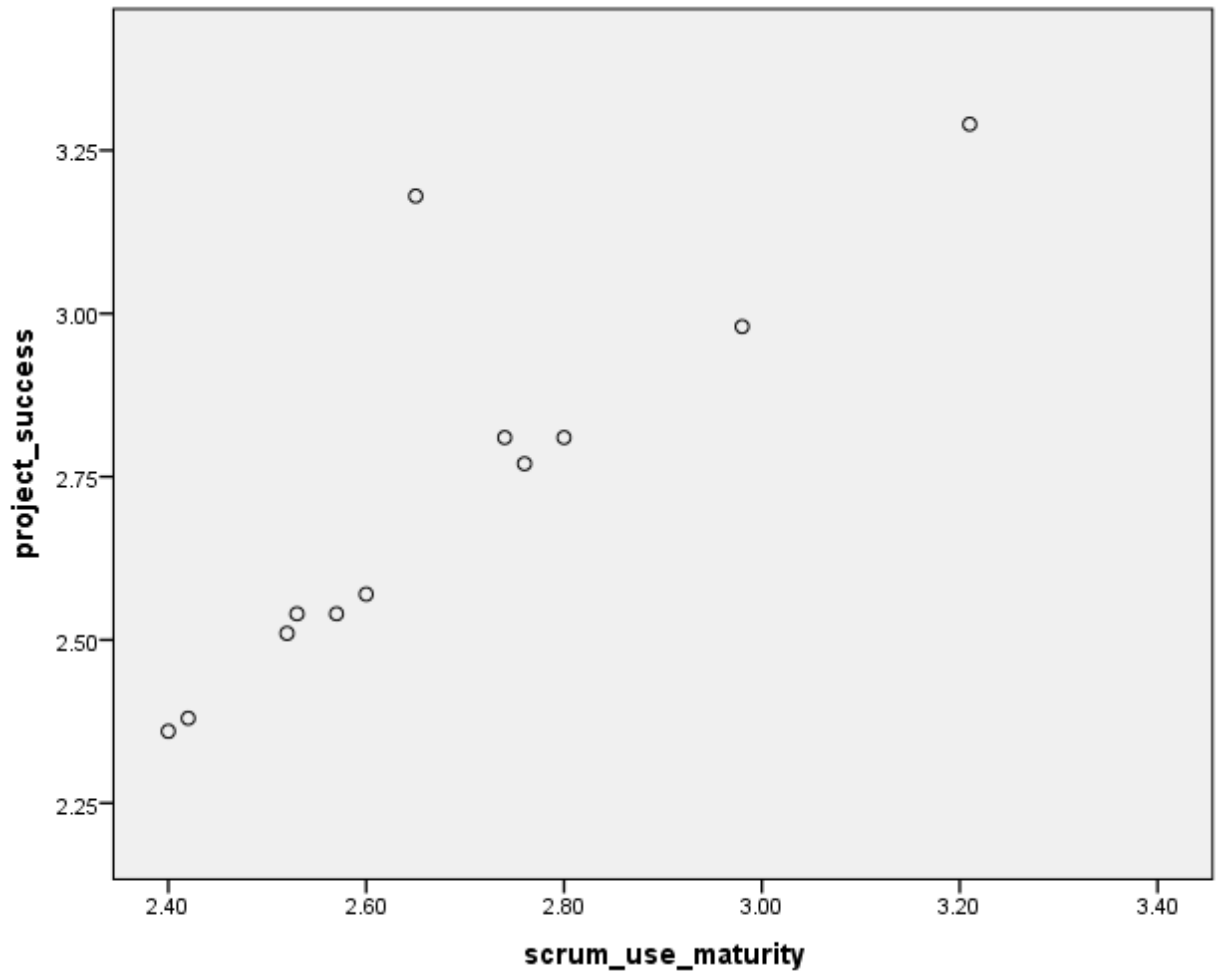


Figure 21 - success of project vs agile use

The relation between the level of use scrum and success of the project is evidenced with a positive correlation, which is the anticipated result. Given it is a Likert scale item the research used, it showed only a view of the respondents. To strengthen this result, an objective observation is presented below.

3.11. Objective Observations

In this section, an objective observation of the scrum tools and approaches used in managing the software project is presented. In addition, investigating the control tools and project documents

used in the project, the planned and actual values for time and budget for the software project are extracted and included.

Table 25 - Objective Observations

Tools and practices used	Description
Redmine issue tracking system	An issue tracking software system has been used by the team to track user requirements in story format and track the product backlog. Given the team are not collocated, this issue tracking system enables the team to function in the synergy needed to deliver the value.
Earned Value Measure (EVM)	Earned values were used by the project manager to track the variances primarily in the budget and time to report the progress of the project to the chief of party of the PRIME program.
Communication tools	Communication tools are key to increase the effectiveness of the team as the various roles in the project have been filled by distributed teams. The team used a web based company wide communication tool that enables virtual meetings for planning and collaborating with some of the stakeholders.
Version control system(VCS)	A version control system that is a mandatory tool for a team of software developers have been used. The tool is called git with a repository in the cloud, that makes it easier to track various changes in the code and documents.
Planning poker	For estimating efforts in story points, a collaborative method that

Table 26 - Objective Observation of Planned vs Actual Values of timeline and cost

	Phase 1 Release			Phase 2 Release		
	Planned	Actual	Variance	Planned	Actual	Variance
Timeline	12/7/2013 - 2/20/2014	12/7/2013 - 3/27/2014	(35)	4/1/2014 - 6/25/2014	4/1/2014 - 8/5/2014	(41)
Budget	\$351,000	\$391,000	(\$40,000)	\$551,000	\$580,000	(\$29,000)
Main Output	Beta Version with all the main M&E features based on RBM			Version 1.0 with all the integration done on the main modules		

The parenthesis in the above variances shows a negative value.

The above table presents the planned and actual values for two main releases of the software project. The first one being a beta release with all major result based monitoring and evaluation features included in it. The second one contains all the reported issues during the beta testing and usage. In the interim there were continuous releases done during the end of a sprint.

As outline above, both cost and time showed a variance of some value. For the first release, a -35 days and -41 days for the second. For the cost, a variance of -\$40,000 and -\$29,000 for major release 1 and 2 has been recorded. With these parameters, the success of the project might be in question. However, as this paper and many in the academia and industry remarked, these rudimentary parameters for measuring the success of a project might not be sufficient. Quality of product, value added and customer satisfaction are few agile metrics that needed to come in to the picture.

4. CHAPTER FIVE

SUMMARY, CONCLUSIONS and RECOMMENDATIONS

In this chapter the major findings of the study are summarized; conclusions are drawn based on the findings and recommendations are forwarded.

4.1. Summary

The main prospect of shifting to agile project management in managing software projects is to increase the likelihood of success of the project. When projects are managed in such value adding approaches, wasted precious resources can be saved and in turn the success of the project can be enhanced. Such flexible approaches also help pivoting at any time when the need arise and take a malleable process that can easily fit to the changing environments, as oppose to a rigid process models. Adaptation is the benefit in such agile project management.

In this research, a software project has been selected as a case, that adopted one of the prominent agile project management approaches. The aforementioned prospect of agile project management has been assessed. Going agile is one thing, but the extent and maturity of adopting such agile projects needs more than mere ambition by management. Therefore, the level of agile use has been studied as an independent variable. Measuring the level or maturity of the scrum process used in the project demands measuring the multifaceted metrics of agile use. A quantitative research method has been used to measure the level and maturity of the project. An industry standard questionnaire has been adopted to measure the level of agile use and its impact on the project success. A purposeful sampling approach used to select 12 respondents with a criteria of participation in the project taking different roles: from software developer, software quality assurance, product owner, scrum master and stakeholder representatives. The questionnaire contains a 70 Likert items categorized in eight groups. To study the independent and dependent variables, each groups has been aggregated by taking the median in each category.

4.2. Conclusion

4.2.1. Agile usage level

The independent variable of the research, the level of agile usage in the project has been measured from the responses in an aggregated way. The consolidated response is indicative of a moderate or medium level of agile use. In addition, the researcher also employed further observation and review of control tools used in the project, that narrates a similar level of agile use in the project.

4.2.2. Success of project

Measuring the success of a project is an argued subject in the academia and industry alike. Are we going to reject the notion that if a project delivered with the values promised, i.e. most or all original requirements satisfied by the end of the project, if the project exceed the baseline values of time and cost? Especially in the service sector projects, like software projects, the value added which may surpass the span of the project in context is a key metrics hard to ignore. In the project, a metrics that are suitable to measure agile project management success like the agile mindset of the team, effective use of the selected agile process model, the value added and no of defects found in the deliverable, has been objectively assessed. In line with this, the questions selected are meant to capture the view of the respondents more than just to measure the traditional metrics of budget and timelines.

The aggregated result showed a positive value which is more than an average value that shows the success of the project from both process adoption and successful delivery point of views.

4.2.3. Effect of the agile use on success of the project

The correlation of the effect of agile use on the success of the project has been examined in this study. While other confounding variables might be there to affect the result, there is however a positive relation observed between the independent and dependent variable.

The result is also in agreement with the anticipation and primary motivation for shifting to agile methods in the industry.

4.3. Recommendation and Further Research

By taking a software project managed in agile way for supporting the monitoring and evaluation endeavor of an NGO led program: PRIME, this research work attempted to measure and articulate

the significance of the use of agile project management approaches to the success of the project. Due to limitation in resources like time, the researcher has been forced to study one case only. The case might have been expanded to include different organizations that adopted similar project management approaches. However, the result is believed to be generalizable for similar cases. Future direction for further research includes but not limited to expand the horizon of the research to different organizations and domains. In addition, qualitative study can be added to further support

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Annex 1 – Sample concept note paper

Sub-Activity CONCEPT NOTE (version 3 – September 2015)

All shaded areas are **MANDATORY**

Date of submission 31/7/2017
Sub-activity Name: Training on Barrier Analysis tool for PRIME staff from three clusters

Sub-activity type: Assessment Crisis modifier Event Grant IIF
 Publication Rehabilitation Training

Proposed location of implementation Addis Ababa Office
 Implementing office: Mercy Corps
 Key result 4.1 Program Effectiveness Improved Through Participatory Monitoring & Evaluation
 Sub-activity code (5-6 digits once the sub-activity is entered in ki-projects) 401-41
 Lead implementing partner ACPA AISDA CARE ECDD FSA Haramaya
 HAVOYOCO Kimetrica Mercy Corps SOS Sahel

Proposed start date 7/8/2017 Proposed end date 11/8/2017

CHECKLIST

<input checked="" type="checkbox"/>	Key consideration	Explanation: (be brief, only a few sentences)
<input type="checkbox"/>	Is the activity proposed relevant to PRIME's approach and does it contribute to the project's objective?	Yes, Barrier analysis tool help PRIME staffs to better understand how to successfully promote behaviors change and design behavioral strategies' by identifying the most important barriers and promoter of sustainable food security behaviors. The training will enable PRIME team to effectively plan and implement a barrier analysis studies and use the results to enrich PRIME's behavior change strategy.
<input type="checkbox"/>	Are there other PRIME activities (any IR) taking place in the area you propose to conduct the activity? Which?	Yes, the PRIME behavioral change activities have been implemented and also it is intended to identify the barriers of behaviors for the PRIME cost extension.
<input type="checkbox"/>	Who have you met with from other IRs/partners to support integration?	This activity involves IR1, IR3, IR4 and IR5 teams. After training, the team will conduct a barrier analysis studies on eight behaviors of PRIME project. ??
<input type="checkbox"/>	Do you have the budget to implement this activity? If not, what activity(ies) will you drop to do this one?	Yes we have budget.
<input type="checkbox"/>	Is the activity replicable by other actors/can be maintained with limited or no support from PRIME?	Yes. After the barrier analysis, the findings are going to be implemented, adopted and to sustain the positive behaviors for the community.
<input type="checkbox"/>	Is this a new or similar activity in the proposed area or other clusters? What was learned previously if so?	New
<input type="checkbox"/>	Is the activity in the right sequence? Explain previous activities that led you to this proposed activity	Yes, it is on the start of PRIME cost extension.
<input type="checkbox"/>	Is the activity proposed in the right time/season?	Yes
<input type="checkbox"/>	Who will monitor/follow up on the activity? Please provide name of person and confirm they agreed.	Fekadu Wolde
<input type="checkbox"/>	What are the gender and disability considerations?	NA

SUB-ACTIVITY DESCRIPTION

1. How does this activity link to the key result mentioned above?

Barrier Analysis tool is developed to provide an effective and accurate method for identifying behavioral factors associated with a particular behavior so that the team can develop a more effective behavioral change communication messages and activities for sustainable food access behaviors. This approach places a relatively low demand on logistical, financial and human resources to provide detailed information. PRIME will use barrier analysis study results to decide what behavioral changes needed in the program design, what messages are to be developed, whom to target in the behavior change messaging and decide how to monitor changes in the factors during PRIME cost extension period. A total of 20 PRIME staff will be trained in the Barrier analysis tool of which, 9 are from Addis Ababa office, 3 from SC, 4 from EC and 2 from AC. The training will be undertaken from August 7-11, 2017 at Addis Ababa Mercy corps meeting hall center.

2. Describe your approach/methodology

An interactive training approach including the use of power point presentations, facilitated discussions, group work, and a field visit to Dukem town to test the tool will be used in this training. Vimbai Chishanu, IR5 leader will be leading the training.

This training covers the following topics:

- Designing for Behavior Change (DBC) Framework
- A Doer/Non-Doer and Barrier Analysis Survey
- The behavior statement
- A Doer versus a Non-Doer
- The survey questionnaire
- Interviewing
- The field work
- Tabulating the results
- Using the data

3. Tell us about any environmental impacts the activity may have (EMMP section below should be addressed accordingly)

This training has no any negative environmental impact

MONITORING AND EVALUATION [This section must be filled with the assistance of IR4 team]

1. What indicators will this activity contribute to? [choose up to 5]

- Vulnerable households reached
- Number of people trained in food security
- Number of people trained in child health/nutrition
- Number of children U5 reached with nutrition programming*
- Number of person/hours of training in NRM/CCA
- Number of hectares under improved mgt/tech
- Number of institutions supported
- Number of policies, institutional arrangements, etc.

*Please note that your activity does not need to be IR5 to reach children if the activity has also a nutrition objective.

2. If you selected “Number of institutions supported”, please fill out the following table

	Type of recipient institution														Total	
	Private enterprise		Producer association		Women groups		Trade association		Water user assoc		CBO		Others*			
	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C
Target																

N=Newly supported during the reporting year

C=Continuous – previously supported during the current reporting year

*Others: consider government-operated institutions (or others than don't fit the previous categories) if they are ultimately supporting civil society. Please also consider customary institutions as “CBOs”

2A. If you selected “others” above, please explain what institutions you will be supporting.

3. If this is a training activity on NRM/CCA topics, please include the length, in hours, of the training. Please assume one full day = 8 hours.

Length of training is hours long.

4. If this activity type is “Rehabilitation”: enclosures/dry-season reserve grazing, bush thinning/prosopis clearing, soil and water conservation measures, how many hectares does the activity cover?

4a. How many of the hectares above were previously supported during the current reporting year?

5. Recipients and Impact beneficiaries (individuals)

Occupation	Target					
	Recipients			Impact beneficiaries ²		
	M	F	T	M	F	T
Pastoralist						
Farmers						
Agro-pastoralists						
Non-specified/other producer						
Government employees						
Private sector						
Civil Society						
Total						

4A. Any female recipients or impact beneficiaries pregnant or lactating? Yes No

4B. If yes, how many?

4C. Any recipients or impact beneficiaries who have disabilities? Yes No

4D. If yes, how many?

6. How many households will you reach with this activity? 0

To calculate impact beneficiaries and households reached:

- o If you know the number of households:
 - o **Do not** translate recipient individuals into beneficiary households
 - o Children: PRIME calculates 1 child under 5 years of age in every household on average
 - o Events: For IR5 promotional events, we assume 3 people per household attend on average
 - o In PRIME areas, on average, our beneficiaries household size is 7

² Impact beneficiaries include training participants and those who will receive training after a ToT. Recipients are those individuals who have agreements, contracts or other documents with PRIME – these may include individuals who agree to cascade training.

- For trainings, 1 person = 1 household (unless you know this ratio is different for your particular event)
- For TOTs: provide impact beneficiaries if you have a good idea of how many will be trained through cascading.

EMMP AND REPORTING

1. What EMMP activity number does the proposed activity fall under? [1-18]

1A. Is screening required? Yes (1-17) No (18)

1B. If YES, is screening approved? Yes No If YES – attach approved screening document in ki-projects.

1C. Is ERR required? Yes No

1D. If YES, is ERR approved? Yes No If YES – attach approved ERR document in ki-projects.

Note: if screening or ERR are required but not approved, this CN will not be approved. If they are approved but documents are not attached in ki-projects, the CN will not be approved.

2. Reporting

Who will submit SA-report?	Fekadu Wolde, LKM deputy advisor for M& E
How frequently will you report on this activity?	one-time reporting
When will the final report be submitted?	Date 20/8/2017

PARTNERSHIPS

Co-organizing partners:
Co-implementing partners:
Co-sponsors:

Co-sponsors are other organizations (government, NGOs, private companies, etc.) that are not part of the PRIME consortium but who will provide financial and/or other in-kind resources for this sub-activity to be implemented.

TASKS TO BE ACCOMPLISHED

	Task to be Completed	Main Responsible Party / Implementation Partner	4 th week of Aug 17	1 st week of August 17	2 nd week of August 17	3 rd week of August 17
1	Develop concept note	Fekadu Wolde	xxx			
2	Invitee trainees	Tilahun Asmare	xxx			
3	Developing training materials	Vimbai Chishanu				
4	Ensure appropriate materials (training, stationery, equipment)	LKM team		xxx		
5	Conduct training	Vimbai Chishanu			xxx	
6	Report writing	Fekadu Wolde				xxx

Coordination and Responsibilities

- Coordination: Vimbai Chishanu (PRIME IR5 leader) with support from Tilahun Asmare (IR4 leader)
- Reporting: Fekadu Wolde
- Follow-Up/using the tool: Vimbai Chishanu and Tilahun Asmare

BUDGET

Sub-code	Item Description	Number of Items 1	Cost per Item 2	Total Cost 3 (1*2 and also 4+5+6+n)	MC 4
	Lunch for participants	20 people *5 days	120	12000	120000
	refreshment	20 people*5 days	90	9000	9000
	Community guide for field tool test	3	500	1500	1500
	TOTAL COST in ETB			22500	22500

TOTAL COST in \$US	961	961
Rate \$/ETB	23.41	COST SHARE 100%

ANNEXES

List all documents (training materials, event agendas, participant/invitation lists, EMMP documents when required, etc) that will be uploaded into ki-projects.

Annex 2 – Questionnaire

Category 0: Profile of the respondent in relation to the project						
0.1.What were your primary role in the project		A) Project Manager	B) Product Owner	C) Scrum Master	D) Developer	E) Stakeholder Representative
0.2.Were you engaged in the project as a part time or full time		A) Full Time	B) Part-time			
0.3.What is your education level?		A) Certificate	B) Undergraduate	C) Bachelor (BSc)	D) Masters	E) PhD
0.4.How much in years is your work experience?		A) Less than 2 years	B) Between 2 & 4 Years	C) Between 4 & 6 years	D) Between 6 & 10 years	E) Above 10 years
0.5. For how long were you stayed in the project		A) For 5 year	B) For 4 year	C) For 3 years	D) For 3 years	E) 1 year or less
Category 1: on the Product Owner (PO) of the project		Strongly Disagree (1)	Disagree (2)	Agree(3)	Strongly agree (4)	
1.1	The project had a clearly defined product owner (PO)					
1.2	The PO was empowered to prioritize issues					
1.3	The PO had enough knowledge to prioritize					
1.4	The PO had direct contact with team					
1.5	The PO had direct contact with stakeholders					

1.6	The PO had a product backlog				
1.7	The PO understood purpose of all backlog items (PBL)				
1.8	The PO has product vision that were in sync with PBL				
1.9	PBL and product vision were highly visible				
Category 2: on sprint backlog		Strongly Disagree (1)	Disagree (2)	Agree(3)	Strongly agree (4)
2.1	The project team had a sprint backlog(PBL)				
2.2	The PBL have been highly visible to the team and stakeholders				
2.3	The PBL have been updated daily				
2.4	The PBL have been owned exclusively by the team				
2.5	The PBL items were broken into tasks within a sprint				
2.6	In the PBL, top items were prioritized by business value				
2.7	In the PBL, top items were estimated				
2.8	Top items in PBL were small enough to fit in a sprint				
2.9	In the PBL, estimates were written by the team				
Category 3: on time-boxed iterations practiced		Strongly Disagree (1)	Disagree (2)	Agree(3)	Strongly agree (4)
3.1	The project followed iteration length of 4 weeks or less				

3.2	The iteration almost always end on time				
3.3	During this time, the team were not disrupted or controlled by outsiders				
3.4	At the end of the sprint, team usually delivered what they committed to				
3.5	There was an agreed notion of Definition of Done (DoD)				
3.6	Were the DoDs achievable within each iteration				
3.7	Did the Team respect DoD				
3.8	Iterations that are doomed to fail were terminated early				
Category 4: on sprint planning		Strongly Disagree (1)	Disagree (2)	Agree(3)	Strongly agree (4)
4.1	Did the team have series of sprint planning meetings				
4.2	The PO participated in such meetings				
4.3	Whole team participated in such meetings				
4.4	Such meetings typically resulted in a sprint plan				
4.5	Whole team believed plan is achievable				
4.6	PO satisfied with priorities				
4.7	PO brings up-to-date PBL				
Category 5: on practice of scrum		Strongly Disagree (1)	Disagree (2)	Agree(3)	Strongly agree (4)
5.1	In the project Daily Scrum happened				

5.2	In each of the Scrum meeting, whole team participates				
5.3	In these meetings, problems & impediments were surfaced				
5.4	Software feature demo happened after every sprint				
5.5	The demo showed a working, tested software				
5.6	At the end of the sprint, feedback received from stakeholders & PO				
5.7	Retrospective happens after every sprint				
5.8	Results in concrete improvement proposals				
5.9	Some proposals actually get implemented				
5.10	Whole team + PO participates				
Category 6: on scrum master(SM)		Strongly Disagree (1)	Disagree (2)	Agree(3)	Strongly agree (4)
6.1	Team had a Scrum Master (SM)				
6.2	SM sat with the team				
6.3	Whole team knew top 1-3 impediments				
6.4	SM has had strategy for how to fix top impediment				
6.5	SM focusing on removing impediments				
6.6	Escalated to management when team can't solve				
Category 7: on project success		Strongly Disagree (1)	Disagree (2)	Agree(3)	Strongly agree (4)

7.1	In your view the agile mindset of the team can be characterized as moderate and helped in finalizing the project successfully				
7.2	Had the project been implemented in traditional project management other than agile, do you think it would not be successful?				
7.3	Requirements were captured in a story point format?				
7.4	The corresponding story point estimation were acceptable by the team?				
7.5	The actual spent times on each task were generally within acceptable range				
7.6	Budget were properly estimated and didn't generally exceeded the estimates above an acceptable range				
7.7	The quality or implemented features were generally acceptable by the user?				
7.8	Were the issues that made up a typical iteration within in the acceptable number that can be handled by the developer user				
7.9	Were the defects large in the number after a typical release?				
7.10	Do you think the leadership approach used contributed to the success of the project				
Category Miscellaneous:		Strongly Disagree (1)	Disagree (2)	Agree(3)	Strongly agree (4)
8.1	In the project velocity were measured				
8.2	All items in sprint plan have an estimate				
8.3	PO used velocity for release planning				
8.4	Velocity only included items that are Done				
8.5	Team had a sprint burndown chart				
8.6	Each team member knew what the others are doing				

8.7	Team had all skills needed to bring backlog items to Done				
8.8	Team members not locked into specific roles				
8.9	Everyone on the team participates in estimating				
8.10	PO available when team is estimating				
8.11	Estimate relative size (story points) rather than time				