ADDIS ABABA UNIVERSITY

COLLEGE OF BUSSINESS AND ECONOMICS

SCHOOL OF COMMERCE

DEPARTMENT OF PROJECT MANAGEMENT

ASSESSING THE PRACTICES OF SOFTWARE DEVELOPMENT PROJECTS: THE CASE OF INFORMATION NETWORK SECURITY AGENCY (INSA)

BY

MOHAMMED BIRHANU

JUNE 2019

ADDIS ABABA, ETHIOPIA

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Approval Page

An Assessment of the Practices of Software Development Projects: The Case of Information Network Security Agency (INSA)

By

Mohammed Birhanu

Approved by the Board of Examiners

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Statement of Declaration

I, **Mohammed Birhanu**, hereby declare that the thesis entitled on: **"Assessing the Practices of Software Development Projects: The Case of Information Network Security Agency (INSA)"** has been carried out by me under the guidance and supervision of Wubishet Bekalu (PhD).

I also declare that all materials and Sources used for this thesis have been duly acknowledged. The work had not been submitted to any educational institutions for the requirement of any award.

Mohammed Birhanu

Signature _____

Date_____

Statement of Certification

This is to certify that **Mohammed Birhanu** has carried out this research project work on the topic entitled *"*Assessing the Practices of Software Development Projects: The Case of Information Network Security Agency (INSA)*"* under my supervision. This work is original in nature and it is sufficient for submission for the partial fulfillment for the requirements of the award of Masters of Art in Project Management.

Wubishet Bekalu (PHD)

Signature _____

Date _____

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CHAPTER FIVE

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Lists of Acronyms and Abbreviations

BA/BSc: Bachelor of Arts/Bachelor of Science

HRM: Human Resource Management

ICT: Information Communication Technology

IEEE: Institute of Electrical and Electronics Engineers

INSA: Information Network Security Agency

IT: Information Technology

MA/MSc: Master of Arts/Master of Science

NGO: Non-Governmental Organizations

PHD: Doctor of Philosophy

PM: Project Management

PMBOK: Project Management Body of Knowledge

PMI: Project Management Institute

PMO: Project Management Office

SEI: Software Engineering Institute

SPSS: Statistical Package for Social Sciences

SW: Software

US: United States

WBS: Work Breakdown Structure

Abstract

The main purpose of this study is to assess the project management practices of software development projects in the case of Information Network Security Agency (INSA) using the ten project management knowledge areas defined by PMBOK. It is a descriptive research. Primary data collection was done by questionnaire, semi structured interview and observation; and as to secondary data; related books, articles, journals and related materials in the study organization were reviewed. For data collection purposive (judgmental) sampling is applied. The target population of the study was INSA's project management department. A total of 20 questionnaires were distributed and an in-depth interview were conducted with 8 employees. The response rate is 100%. For the data presentation and analysis SPSS version 20 and Microsoft Excel were used. Percentages and mean were used to analyze the data obtained. Major findings of the study revealed that most of the project management knowledge areas were not practiced effectively. Project scope, time, quality, cost, risk, integration and procurement management were the major challenges and they were not effectively practiced in the projects. Whereas project stakeholders, human resource, and communication were practiced adequately but not in complete intent. Based on those major findings and the conclusions some recommendations are given which can enable the Agency to transformation to be effective and efficient in successfully deliver its projects.

Key words: *Project, Management, Practices*

CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

People have been undertaking projects since the earliest days of organized human activity. The hunting parties of our prehistoric ancestors were projects, for example; they were temporary undertakings directed at the goal of obtaining meat for the community. Large complex projects have also been with us for a long time. The pyramids and the Great Wall of China were in their day of roughly the same dimensions as the Apollo project to send men to the moon. We use the term "project" frequently in our daily conversations.

In today's competitive business environment change and complexity are common and incorporated in the day-to-day business activity. According to Grant & Pennypacker (2006), there is dramatic and steady increase in the extent to which the modern enterprises adopt and relies upon project management to secure a competitive advantage; project management becomes the dominant way that enterprises work is accomplished, organizations strive to become good at delivering projects successfully. For companies, it's essential to innovate and be time and cost efficient in order to stay competitive and projects, which usually involve a variety of human, financial and technical variables, are one of the means that allow companies to translate strategy into results. (González, et al. 2007).

The Institute Project Management Body of Knowledge guide (PMBOK) defines a project as being a temporary endeavor undertaken to create a unique product, service, or result (PMI, 2008). Project management is defined as the application of knowledge, skills, tools, and techniques to project activities to meet the project requirement (PMI, 2008). According to the PMBOK, the increase in project management indicates that the application of appropriate knowledge, process, skills, tools, and techniques can have a significant impact on project success (PMI, 2008). The main objective of project management is to ensure a project is to be completed at the required scope defined by the stakeholders, within project budget, on time and delivers a quality product or service as the end result.

The waste on failed projects and cost overruns is estimated in the neighborhood of over billions of money. Most of the people who excel at managing projects never have the title of project manager. They include accountants, lawyers, administrators, scientists, contractors, public health officials, teachers, and community advocates whose success depends upon being able to lead and manage project work. For them project management is not a title but a critical job requirement. It is hard to think of a profession or a career path that would not benefit from being good at managing projects (Larson and Grey, 2011: P4).

Companies are now realizing that their entire business, including most of the routine activities, can be regarded as a series of projects. Simply stated, we are managing our business by projects. Project management is now regarded as both a project management process and a business process. As such, project managers are expected to make business decisions as well as project decisions. The necessity for achieving project management excellence is now readily apparent to almost all businesses (Kerzner, 2010).

Particularly, in Ethiopia, the involvement of project management in different national strategic plans as well as in different levels of micro activities becomes more visible. Nowadays, the government of Ethiopia is on the way of implementing a five years strategic plan which is also part of the national 20 years visionary plan to transform the country to the level of middle income countries. Under this strategic plan, several projects are included such as the great renaissance dam, Addis Ababa light railway project, national railway project, different national and state road projects, different mega hydraulic structures like dams and irrigations, sugar company and others. These projects have their own technical specifications, time and resource schedules as well as specified level of budget to pump.

Software is a direct product of the cognitive processes of individuals engaged in innovative teamwork. Many of the procedures and techniques used in software project management are designed to facilitate communication and coordination among team members engaged in an intellectually intensive work. Software development is often characterized as a learning process in which knowledge is gained and information generated during the project. Dealing with people, conflicts, team building, knowledge sharing, and communication will be determinants of good project management.

Software project management deals with software projects and the challenges of human-based development (as opposed to the more deterministic processes in traditional projects). The higher

flexibility in software development approaches puts new demands on the capabilities of software project management. Weaknesses in planning, organizing, staffing, directing and controlling are hard to be counter-balanced by more efficiency in technical development work. As Fred Brooks stated in 1987, "… today's major problems with software development are not technical problems, but management problems" (Brooks 1987).

Among the different problems observed by the researcher, the focus of this study is on problems that are encountered by Information Network Security Agency up on applying project management practices.

1.2. Background of the Organization

Information Network Security Agency (INSA) is one of the largest security and cyber technology organization in Ethiopia. The organization was emerged for the first time in 1999 E.C by the council of ministers regulation number 130/1999 and re-established with a broad mandate by House of People Representative in January 2014, proclamation No. 808/2013.

Information Network security agency (INSA) is a governmental organization with a vision to realize a globally competent National Cyber capability which plays a key role in protecting the national interests of Ethiopia. INSA's core mission is building National Cyber Power capable of protecting the national interest.

The objective of the agency shall be to ensure that information and computer based key infrastructures are secured, so as to be enablers of national peace, democratization and development programs.

The Agency have the powers and duties to:

- Develop and implement research and study based information and computer based critical infrastructure's security products and services;
- Draft national policies, laws, standards and strategies that enable to ensure information and computer based key infrastructures security, and oversight their enforcement upon approval;
- Support public and private institutions to formulate their own policies and standards in compliance with the national information security policy and standard frameworks, and monitor their implementation;

- Take all necessary counter measures to defend any cyber or electromagnetic attacks on information and computer based infrastructures or systems or on citizens' psychology;
- Conduct information or computer based critical infrastructures security audit at any time and provide, for those that meet the criteria, security standards approval certificate or delegate other bodies to perform such functions;
- Organize and administer a national computer emergency responding center;

Besides its mission and vision the organization actively engages in grand national technology projects. Those projects includes software development, hardware programming and network security projects. The agency undertook above 200 projects in the last 5 years. Some of the grand projects undertaken by INSA includes Commercial bank of Ethiopia core banking system, Condominium lottery system, Grand renaissance dam Electrical and computer system, Federal police biometrics system, installation of secured network and develop websites for different governmental organizations, and e.t.c

According to the Prime minister's chief security advisor minister and former director of INSA, Ato Temesgen Tiruneh, press release to the media indicates that 95% of INSA's different projects have failed during the past years. During document analysis and observation in the project office, some problems were identified. There has been an extended delay and cost overrun in the projects and there were some unattended goals of the project. These problems are believed to be due to lack of following some project management practices.

1.3. Statement of the Problem

In today's dynamic business environment, organizations find themselves in a need to manage different projects for the success of their strategies or their mere survival (Kerzner, 2009; Callahn and Brooks, 2004; Larson and Gray, 2000). Now a days Non-Project driven organizations have also embarked in project management since projects have become a common phenomenon for many businesses according to Kerzner (2009) and Wysocki (2014). However, according to Gray and Larson (2000), project management is not without problems. Because projects have different characteristics than ongoing operations, they pose a brand new set of challenges according to Verzuh (2005).

Project management has become progressively more important in the growth of any nation. Various organizations have used project management techniques as a means of bridging the gap between failure and success in the implementation of projects. Regardless of this increasing awareness of project management by organizations, projects still fail.

Project management is being regarded as mandatory for the survival and success of projects such as the one being studied. It is mandatory not only for project based organizations but also for any firm in order to survive in rapidly changing technological and market environment. Nowadays, most firms are realizing that project management and productivity are related and businesses should be managed as a series of projects (Kerzner, 2009).

Projects, be it a government project, private project or NGO project, usually encounter many problems in developing countries in general and Ethiopia in particular. In Ethiopia, 79.06 percent of projects had failed to meet their objectives. Moreover, 72 percent of projects financed by Development Bank of Ethiopia (2013) were under failure category. Implementation delay, overestimation of project return and poor manpower quality of projects were found to be statistically significant cause of project failures to meet their objectives.

Project management is a set of tools, techniques, and knowledge that, when applied, helps to achieve the three main constraints of scope, cost and time (Charvat, 2003). However, based on literatures, 52.7% of projects were not able to complete on time and over cost, and 31.1% not fulfilled the scope. (Charvat, 2003 and Clancy, 1995)

For many enterprises, sustainable success is closely linked to information systems (IS) and information technologies (IT). Despite significant efforts to improve software project success, many still fail. Current literature indicates that most of the software project problems are related to management, organizational, human, and cultural issues, not technical problems.

Previous studies have reported that there is high failure rate of software projects. The tasks of keeping projects within scope, on schedule and within budget to satisfy customers are increasing. Despite technological advancement, the failure rates of projects can range from 18% to a high of 50%. Failure rates of this magnitude have highlighted the reason why the subject of increased effectiveness continues to be an area of research and why it is important to investigate project management competency (Gelbard and Carmeli, 2009; Nwagbogwu, 2011).

Field ((2006) in his article states that, software projects fail too often because the project scope was not fully appreciated and/or user needs not fully understood‖. He developed a comprehensive

list of pitfalls that must be avoided to execute a successful software project. The list includes misunderstanding user requirements, project scope ill defined, poorly managed changes; change in the chosen technology, business needs change, deadlines unrealistic, resistant users, lost sponsorship, lack of experienced personnel, best practice and lessons ignored by managers.

Different project management related researches were conducted in the past. Particularly, there are a few researches aimed to study project management in software development sectors. Beside to the previous studies, the researcher is part of the organization and observes problems and challenges in applying the project management practices in software development projects.

1.4. Research Questions

- ✓ What is the current project management practice in Information Network Security Agency (INSA) software development projects?
- ✓ What are the challenges in practicing project management in Information Network security agency (INSA) software development projects?
- ✓ What are the areas of improvements in Information Network security agency (INSA) software development projects?

1.5. Objectives of the Study

1.5.1. General Objective of the Study

- The main objective of the study is to assess the project management practices of software development projects in the case of Information Network Security Agency (INSA).

1.5.2. Specific Objectives of the Study

Below are the specific objectives of this study;

- ✓ To assess the practices of PMBOK knowledge areas in Information Network security agency (INSA) software development projects.
- ✓ To pinpoint the areas of improvements in Information Network security agency (INSA) software development projects.
- ✓ To identify the major challenges in practicing PMBOK knowledge areas in Information Network security agency (INSA) software development projects.

1.6. Significance of the Study

Conducting this assessment has much significance for the student researcher as well as the organization under study. The student was be able to know the actual project management practices of the organization under study and it will also help for the study organization to know what its project management practices looks like by comparing with the best practices.

The researcher has also used the research project as an opportunity to see how the theoretical knowledge acquired during the duration of the course is being implemented in reality.

Since project management is an area with a growing body of knowledge, this research can contribute in adding some concepts to the existing body of knowledge with a particular emphasis on the project management practices of software development projects being currently implemented.

Different project management related researches were conducted in the past. Particularly, there are some researches aimed to study project management practices in software projects. Beside to the previous studies, this research is conducted on project management practice in software development projects and also try to assess the challenges and areas of improvements of those projects.

Finally, INSA will be benefited that the research findings are more or less mirrors of where they are standing and it will help the organization by providing tangible and concrete evidence regarding the developed objectives and the results of the research. These will help the company to design its strategy for the successful completion of its projects and will help the company to deliver the projects to its customer as per the agreed time, quality, scope and other parameters. In addition to this, recommendations forwarded in the study can serve the organization to improve their project management practice.

Moreover, the outputs will help project management practitioners by showing in which points they should give due emphasis when they implement their projects and also policy makers and professionals will also be the beneficiaries of the result (output).And also this research paper can be used as background study for future researches on Project management practices of software development projects.

1.7. Scope/Delimitation of the Study

Delimitation of a research study explains how the scope of the study is focused on one specific area. This study is only concentrated on assessing the project management practices, through the generally accepted project management knowledge areas defined by PMBOK, which will enhance the management of projects.

However, this research was limited to assessing the existing project management practices of software development projects. The major target population of the research was INSA's project management department staffs of the organization who are part of different projects.

The data collection is restricted to the primary sources which are through questionnaire, interview and observation. The literature review is limited to the materials such as; existing written materials both published and unpublished research articles and from websites concerning the title are incorporated.

1.8. Limitations of the study

Any research project like any other project endeavor could not be without shortcomings. Hence the researcher faced some limitations in the course of the research project. The first and most critical pitfall was time constraint since the time given for the research project is quite short.

Since it was focused on assessing the project management practices of software development projects there were not sufficient background information about the subject matter that can highly support the study because software project management is newly emerged field for the world relative to others and also for our country.

And also INSA is a security organization and this affects the accessing of all available data in the organization. Therefore, the availability of relevant data is influenced the study. Since the study needed sufficient data to attain its objective and it needed some information to collect and analyze the data.

1.9. Organization of the Research Report

This paper comprised five chapters in which the first part illustrates introduction, the background of the study, statements of the problem, basic research questions, objectives, significance, scope and limitation of the study. The second chapter concerned with theoretical and review of related literature and the conceptual framework of the study. The third chapter describes research design and methodology of the study and the analysis used. Results and discussion would be discussed in the fourth chapter. Finally the last chapter deal with the research major findings, conclusion and recommendations.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1. Theoretical Review

Professionals and experts have stated that project management is a crucial strategic view. Project management provides entities with influential set of tools that develop their ability to apply managerial functions to accomplish specific organizational objectives. But project management is more than just a set of tools; it is a results-oriented management style that places a premium on building collaborative relationships among diverse cast of characters. Exciting opportunities await people skilled in project management (Larson and Grey, 2011: P3). In this section, issues related with project management, such as project, types of projects, project management processes, project management knowledge areas, and others are discussed.

2.1.1. Project

Many definitions had been given to project by different authors, due to the fact that project is a multidisciplinary word that has different meaning from different perspective and orientations. Engineers, Architects, Managers and so on, have their definitions coined out from their experiences as far as their professions are concerned. Their definition depends on their areas of studies and the point of view that each scholars used. But to have comprehensive understanding of a project, it is better to refer different definitions. Eric Verzuh (2005:1 cited in Modesto & Tichapondwa, 2009:P19) stated "we live in a world where change and the rate of change is constantly increasing. In order to survive and prosper, organizations need to continually modify their products and services. Projects are the means by which these innovations are effected. Greater change = more innovations = more projects." In this context, Verzuh see project as a means to cop up with changes. Accordingly, Modesto & Tichapondwa (2009:P20) define project as initiative to bring about change in order to achieve specific objectives, within a timescale, in a given context with allocated budget.

The Project management Institute (2013: P3) define project as a temporary endeavor undertaken to create a unique product, service, or result. In this study, the PMI's definition of project is used as an operational meaning. Larson and Grey (2011: P5) stated, "Like most organizational effort,

the major goal of a project is to satisfy a customer's need. Beyond this fundamental similarity, the characteristics of a project help differentiate it from other endeavors of the organization". The definition is given based on two key characteristics of project. All projects are temporary and undertaken to create a product, service, or result that is unique. These two simple concepts create a work environment that mandates different management approach from that used by an operations manager, whose work is oriented toward continuous improvement of existing processes over longer periods of time.

In contemporary business and science, Wikipedia (2015) defined a project as a collaborative enterprise involving research or design that is carefully planned to achieve a particular aim. Project can be further defined as temporary rather than permanent social system or work systems that are constituted by teams within or across organizations to accomplish particular tasks under time constraints. An ongoing project is usually called (or evolves into) a program (Wikipedia, 2015).

Many other scholars and books prefer to define and explain project by describing the common characteristics of projects instead of giving a direct definition so that anyone can define project by integrating these features of projects. Different scholars provide the unique features of projects. Nicholas and Steyn (2008) provide comprehensive characteristics of projects. The following section is the discussion on these characteristics.

2.1.2. Characteristics of a Project

Regardless of specific features of particular projects, below are some common characteristics forwarded by Nicholas and Steyn (2008: Pxxvi) for all projects:

1. A project involves a single, definable purpose and well-defined end-items, deliverables, or results, usually specified in terms of cost, schedule, and performance requirements. Larson & Grey (2011: P6) stated that this singular purpose is often missing in daily organizational life where employees carry out repetitive operations daily.

2. Every project is unique in that it requires doing something different than was done previously. A project is a one-time activity, never to be exactly repeated again. Lock (2001:P2) discussed about the uniqueness of a project that "The principal identifying characteristic of any project is its novelty. It is a step into the unknown, fraught with risk and uncertainty. No two projects are ever exactly alike, and even a repeated project will differ from its predecessor in one or more commercial, administrative or physical aspects. "In a "routine" project such as home construction,

variables such as terrain, access, zoning laws, labor market, public services, and local utilities make it unique.

3. Projects are temporary activities. Each is an ad hoc organization of personnel, material, and facilities assembled to accomplish a goal within a scheduled time frame; once the goal is achieved, the ad hoc organization is disbanded.

4. Projects cut across organizational and functional lines because they need skills and talents from multiple functions, professions, and organizations.

Larson & Grey (2011: P6) stated that instead of working in separate offices under separate managers, project participants, whether they be engineers, financial analysts, marketing professionals, or quality control specialists, work closely together under the guidance of a project manager to complete a project.

5. Given that each project is unique, it also involves unfamiliarity and risk.

It may encompass new technology or processes and, for the organization undertaking it, possess significant elements of uncertainty and risk.

6. The organization usually has something at stake when doing a project.

The work calls for special scrutiny or effort because failure would jeopardize the organization or its goals.

7. A project is the process of working to achieve a goal; during the process, projects pass through several distinct phases called the project life cycle. The tasks, people, organizations, and other resources involved in the project change as the project moves from one phase to the next.

2.1.3. **Project Management**

Project Management Institute, (2013: P5) defines Project management as an application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Similarly, Chandra (1995) define Project management as an organized venture for managing projects, involves scientific application of modern tools and techniques in planning, financing, implementing, monitoring, controlling and coordinating unique activities or task produce desirable outputs in accordance with the determined objectives within the constraints of time and cost. This Chandra's definition of project management is used as operational meaning in this study. Project management is accomplished through the appropriate application and integration of the different logically grouped project management processes, which are categorized into five Process Groups.

According to PMI (2013: P5), these five Process Groups are: Initiating, Planning, Executing, Monitoring and Controlling, and Closing. These Project management processes will be discussed below as an independent topic (section 2.1.4). McNamara (2002: P1) stated that project management is a carefully planned and organized effort to accomplish a specific (and usually) one-time effort, for example, construct a building or implement a new computer system. Project management includes developing a project plan, which includes defining project goals and objectives, specifying tasks or how goals will be achieved, what resources are need, and associating budgets and timelines for completion. It also includes implementing the project plan, along with careful controls to stay on the "critical path", that is, to ensure the plan is being managed according to plan. Project management usually follows major phases (with various titles for these phases), including feasibility study, project planning, implementation, evaluation and support/maintenance. (Program planning is usually of a broader scope than project planning, but not always.) Heerkens (2012: P11) Stated "The project management process calls for the creation of a small organizational structure (the project team), which is often a microcosm of the larger organization. Once the team has produced the desired outcome, the process then calls for the decommissioning of that small organizational structure."

2.1.4. Project Management Processes

Project management processes can be described in terms of the integration between the processes, their interactions, and the purposes they serve. As mentioned above, project management processes are grouped into five categories known as Project Management Process Groups (or Process Groups) (PMI, 2013: P3):

• **Initiating Process Group.** The processes in this grouped are used to define a new project or a new phase for ongoing project by having authorization for starting the project/phase.

• **Planning Process Group.** The processes in this group are used to set scope and objectives for a project as well as to list down course of actions used to achieve those objectives.

• **Executing Process Group.** The processes in this group are used to perform works of the project that are defined in the project management plan to achieve project requirements.

• **Monitoring and Controlling Process Group.** The processes in this group are used to follow, review, and facilitate the flow and performance of a project. The processes are also used to identify the need for changes and execute them.

• **Closing Process Group.** The processes in this group are used to finalize activities of a project or phase in a formal way

These project management process groups describe project in terms of phases.

They involve several areas of project management applications. These areas refer to as 'project management knowledge areas.

2.1.5. Knowledge areas of Project Management

Projects are divided into components, and a project manager must be knowledgeable in each area. A Knowledge Area stand for a complete set of concepts, terms, and activities that create a specialized professional field known as project management. Project teams should use these Knowledge Areas and other extension Knowledge Areas for specific project types, as appropriate. There are ten general project management knowledge areas which are: project integration management, project scope management, project time management, project cost management, project quality management, project human resource management, project communications management, project risk management, project procurement management and project stakeholder management.

PMI (2013: P60) defines the important aspects of each knowledge area and how it integrates with the five Process Groups. As supporting elements, the knowledge areas provide a detailed description of the process inputs and outputs along with a descriptive explanation of tools and techniques most frequently used within the project management processes to produce each outcome.

2.1.5.1. Project Integration Management

Project integration management includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the project management process groups.

In the project management context, integration includes characteristics of unification, consolidation, communication, and integrative actions that are crucial to controlled project execution through completion, successfully managing stakeholder expectations, and meeting requirements (PMI, 2013: P63).

According to Saylor.org (2009: P25) Flowcharts, diagrams, and responsibility matrices are tools to capture the work processes associated with executing the project plan. The first draft of the project procedures manual captures the historic and intuitional knowledge that team members bring to the project. The development and review of these procedures and work processes contribute to the development of the organizational structure of the project.

Project integration management incorporates allocation of resources, prioritizing among objectives and alternatives, managing the interactions among the rest of project management Knowledge Areas and creating an environment that encourages team members to fully engage in the project and encourages innovative approaches to developing the project plan. Project integration management processes include the following (PMI, 2013: P63):

• Develop project charter
• Develop project management plan
• Direct and manage project work
• Monitor and control project work
• Perform integrated change control
• Close project or phase

2.1.5.2. Project Scope Management

According to PMI (2013: P106), project scope management comprises the processes required to make sure that the project is armed with all the appropriate efforts to accomplish the project as need. In other word, the project scope is a document that describes the parameters that define a system and determine the behavior of the project, what work is done within the boundaries of the project, and the work that is external to the project boundaries (Saylor.org, 2009: P26). PMI (2013: P106) listed the following specific efforts as part of project scope management:

• Plan scope management
• Collect requirements
• Define scope
• Create WBS
• Validate scope
• Control scope

2.1.5.3. Project Time Management

According to Saylor.org (2009: P26), the definition of project success often includes completing the project on time. The importance of ensuring work proceeds efficiently within individual tasks, along with the interfacing of related tasks, is a key message in project time management (Hameri&Heikkila, 2002: P143, cited in Pasian, 2011: P19). The ultimate measure being project success, based on effective control of time management processes, tools and practices.

The development and management of realistic project schedule and project plan is a primary responsibility of the project manager to complete the project on time. Accordingly, project time management includes the processes required to manage the timely completion of the project such as the following (PMI, 2013: P141):

- Plan schedule management
- Define activities
- Sequence activities
- Estimate activity resources
- Estimate activity durations
- Develop schedule
- Control schedule

2.1.5.4. Project Cost Management

The definition of project success often includes not only completing the project on time, but also completing the project within budget. Developing and controlling a project budget that will accomplish the project objectives is a vital project management skill. Project cost management includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget. Project cost management processes include the following (PMI, 2013: P193):

- Plan cost management
- Estimate costs
- Determine budget
- Control costs

2.1.5.5. Project Quality Management

Hoyer & Hoyer (2001:PP55-59, Cited in Oschman, et al., 2006) defined quality as "the total composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product and service in use will meet the expectations of the customer." Project quality management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken. Project quality management uses policies and procedures to implement, within the project's context, the organization's quality management system and, as appropriate, it supports continuous process improvement activities as undertaken on behalf of the performing organization. Project quality management works to ensure that the project requirements, including product requirements, are met and validated (PMI, 2013: P227).
Project quality focuses on the end outputs that reflect the purpose of the project. The project manager is accountable for developing a project implementation mechanism that gives a clear understanding of the expected project outputs and the quality specifications. In order to do so, (PMI, 2013: P227) listed the following project quality management processes:

- Plan quality management
- Perform quality assurance
- Control quality

2.1.5.6. Project Human Resource Management

Human resource management is a branch of management which deals with people at work in an organization. Armstrong (2006: P1) defined HRM as a strategic and coherent approach to the management of an organization's most valued assets – the people working there who individually and collectively contribute to the achievement of its objectives. Storey (1989, cited in Armstrong, 2006: P1) believes that HRM can be regarded as a 'set of interrelated policies with an ideological and philosophical underpinning'. Mathis and Jackson (2006: PP11-13) stated human resource management involves several activities such as HR Planning and Analysis, equal Employment Opportunity, staffing, HR Development, compensation and benefits, health, safety, and security, employee and labor/management relations. As one wing of human resource management, project human resource management includes the organizing, managing, and leading the project team. The

project team consists of the people with assigned roles and responsibilities for implementation of the project. Staffing the project with the right skills, at the right place, and at the right time is an important responsibility of the project management team.

Although, roles and responsibilities are assigned for project team members, it is important to involve all of them in the process of project planning to add their experience to the process as well as to motivate them so that their commitment will be stronger. PMI (2013: P266) stated project human resource management processes as the following:

• Plan human resource management
• Acquire project team
• Develop project team
• Manage project team

2.1.5.7. Project Communications Management

Completing a complex project successfully requires teamwork, and teamwork requires good communication among team members. The processes of project communications management are required to ensure timely and appropriate planning, collection, organization, storage, retrieval, and management of project information. Project managers devote most of their time to communicate with team members and other involved bodies, whether they are insiders or outsiders of the organization. Effective communication creates a hinge between the different involved bodies having different background, different experience, and different viewpoints which has significant impact on the bottom line of a project. Project communications management processes include the following (PMI, 2013: P287):

• Plan communications management
• Manage communications
• Control communications

2.1.5.8. Project Risk Management

Risk is the probability of deviation of an out come from expectation. Risk exists on all projects. The role of the project management team is to understand the types and levels of risks on the project so that they can develop and implement plans to diminish these risks. The type and amount of risk varies by industry type, complexity, and phase of the project. The project risk plan will also

reflect the risk profile of the project manager and key stakeholders. People have different position on facing risks which place on a continuum from risk averse to risk taker.

The key discipline of project risk management lacks the optimality that is assumed in best practice standards. Renn (1998: P64, cited in Kutsch, 2008:P2) argues in this context that the set of assumptions of a mainly objective analysis of risk "is a virtue as much as it is a shortcoming".

The highest ranked factor for project failure (Whittaker, 1999, cited in Kutsch,2008: P2) is project risk management, the systematic process of identifying, analyzing, and responding to risks as project-related events or conditions which are not definitely known and which have the potential of adverse consequences on a project objective (PMI, 2013: P310). So, care has to be taken on the proper management of risk management.

The objectives of project risk management are to increase the likelihood and impact of positive events, and decrease the likelihood and impact of negative events in the project. Project risk management involves processes such as the following (PMI, 2013: P309):

• Plan risk management
• Identify risks
• Perform qualitative risk analysis
• Perform quantitative risk analysis
• Plan risk responses
• Control risks

2.1.5.9. Project Procurement Management

PMI (2013: P366) stated that Project Procurement Management includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team. The organization can be either the buyer or seller of the products, services, or results of a project. But, as Saylor.org (2009: P37) explained, the procurement effort on projects varies widely and depends on the type of project. So that, Project Procurement Management includes the contract management and change control processes required to develop and administer contracts or purchase orders with variety of efforts. For a successful accomplishment of Procurement, Project Procurement Management processes includes the following (PMI, 2013: P366):

• Plan procurement management
• Conduct procurements

• Control procurements

• Close procurements

Nasir (2011: P42) stated that there are six types of procurement and contract delivery systems. These are:

• Force Account

• Design-Bid-Build (DBB)

• Design-Build (DB) or Turnkey

• Finance/ Build Operate System (BOT)

• Construction/Facility Management Consultancy, &

• Alliances and Outsourcing

Selection of the type of procurement and contract management delivery system is affected by size of a project, financial capability of the client, experience, previous performance of the contractor, and other factors.

2.1.5.10. Project Stakeholder Management

Stakeholder management has been one of the core soft skills area that has been highlighted as being necessary for PM to advance (Crawford, 2005; Morris et al., 2006; Winter et al., 2006, cited in Bourne & Walker, 2007: P129). The processes of project stakeholder management necessary to identify entities those could impact or be impacted by the project, to assess expectations of stakeholders, and to develop suitable managerial strategies to be well benefited from the involvement of stakeholders. Legris and Collerette (2006, cited in Pasian, 2011: P21) emphasize stakeholder management as a contribution that can improve the implementation process. Sutter field et al. (2006, cited in Pasian, 2011: P21) echo this view when they argue that effective stakeholder management (possibly through a Strategic Management Framework) can minimize changes in project planning and increase quality specifications (as opposed to quantity specifications). It is implied in both research efforts that strategic management can impact cost control during project implementation.

Stakeholder management also give attention on smooth communication with stakeholders to recognize their expectations, deal with issues resolution of conflict of interests. Stakeholder satisfaction should be considered as the heart of any project. A well-structured project management involves the following processes (PMI, 2013: P391):

• Identify stakeholders
• Plan stakeholder management
• Manage stakeholder engagement
• Control stakeholder engagement

2.1.6. Software Project Management

The world is continuously changing. Software and software-intensive systems are among the key drivers of this trend. The speed and magnitude of all these changes is breathtaking. What would happen today if any of the existing telecommunication, health care, financial or logistic systems are not performing securely, safely and reliably?

The rapid growth in technology in combination with the strong dependence of products and services from software raises the demand on managing the development and evolution of such systems.

Software is a direct product of the cognitive processes of individuals engaged in innovative teamwork. Many of the procedures and techniques used in software project management are designed to facilitate communication and coordination among team members engaged in an intellectually intensive work. Software development is often characterized as a learning process in which knowledge is gained and information generated during the project. Dealing with people, conflicts, team building, knowledge sharing, and communication will be determinants of good project management.

The Institute of Electrical and Electronics Engineers (IEEE) (1987) defines "software project management is the process of planning, organizing, staffing, monitoring, controlling, and leading a software project". This is a common definition of project management. However, unlike hardware development or construction projects, there are three characteristics that make software project different from others. Firstly, it is not obvious until very late in the project whether or not the code meets the requirements.

Secondly, the software development process is mainly implemented in the mind and it is virtually impossible to measure progress until it is completed. Lastly, testing the software product and integrating it are neither simple nor obvious (Parth, 1999).

Software project management can be defined as the process of making visible what is invisible. Specifically, the software engineering process is invisible because its progress is not immediately

visible. Software products contain more complexity than other engineered artifacts. Software developers have to conform to the requirements of human clients.

Clients sometimes are inconsistent and organizations have lapses in their collective memory, or in communication that developers have to cater for. Lastly, software systems are likely to be subject to a high degree of changes (Hughes and Cotterell, 2002). By this definition, managing a software project is not an easy task. This is the reason why project management in the Information Technology area has had a poor success rate, an issue which will be examined in the next section. Software project management deals with software projects and the challenges of human-based development (as opposed to the more deterministic processes in traditional projects). The higher flexibility in software development approaches puts new demands on the capabilities of software project management. Weaknesses in planning, organizing, staffing, directing and controlling are hard to be counter-balanced by more efficiency in technical development work. As Fred Brooks stated in 1987, "… today's major problems with software development are not technical problems, but management problems" (Brooks 1987).

The principal nature of the challenges in software project management has not changed dramatically in the last 25 years. However, software-intensive systems of the 21st century increasingly vary in their content, size, complexity and their degree of interaction with other systems. The technological and communication infrastructure to develop these systems is hard to compare with the ones available in the past.

As a consequence, the concrete content of the project management challenges looks different from 25 years ago. Beginning from the 1970s and 1980s, traditional plan-driven software development has been replaced and complemented by more adaptive and dynamic approaches.

Global (or distributed) software development, open source development, and the application of the different variants of adaptive development techniques have proven successful under various circumstances. The Internet has dramatically enhanced the ability of individuals, teams and organizations to manage projects across continents and cultures in real time (Kwak and Anbari 2008). New paradigms (such as inner source project management) or emerging techniques (such as social media collaboration) provide new opportunities for conducting software project management more successfully than before.

2.1.7. Software Development Life Cycle

The Software Development Life Cycle (SDLC) is a framework that is used to understand and develop information systems and software successfully. It is a process used by almost all developers and software development companies as the standard in the software process development. SDLC has many models and each model has its own strengths, weaknesses, advantages and disadvantages

The typical activities involved in the software development life cycle include:

Requirements Gathering

Gauging the accurate set of requirements is the first step in software development process. System requirement may vary depending on the software product that is going to get developed.

Therefore, a careful analysis has to be made about the system requirement needed for the development of the product.

Requirement Analysis

This step is marked by undertaking a feasibility study on software requirement gathered in the first step. In this phase, development team has to communicate with the customers and make analysis of their requirements and system. An exhaustive document is prepared in this phase which has details like project plan or schedule of the project, the cost estimated for developing and executing the system, target dates for each phase of delivery of system developed and so on. This phase is the pedestal of software development process since further steps taken in Software Development Life Cycle would be based on the analysis made in this phase.

Systems Analysis and Design

This is an important phase in software development. Here analysis is made on the design of the system that is going to be developed. In other words, database design, functional specification design, low level design documents, high level design documents and so on takes place. Care must be taken to prepare these design documents because the next phase, namely the development phase, is based on these design documents. If a well-structured and analyzed design document is prepared,

it would reduce the time taken in the subsequent steps namely development and testing phases of the Software Development Life Cycle.

Code Generation

This is the phase where actual development of the software takes place. That is based on the design documents prepared in the earlier phase. Code is written in the programming technology chosen. Here, the code is converted into executable in this phase after code generation.

Testing

In order to ensure quality of the software it is extremely crucial to ensure that the software so delivered is defect free. This can be ascertained by testing the developed code. Various tools and techniques are available for testing at different levels such as regression testing, performance testing, stress testing etc. Based on the need, the testing methods are chosen and reports are prepared about bugs. After this process the system again goes to development phase for correction of errors and again tested. This process continues until the system is found to be error free.

Deployment

This is one of the last phases of software development cycle. This phase is marked by documentation of internal design of software for maintenance and enhancement.

Support, Maintenance and Enhancement

The last phase of the software development life cycle is to provide support and maintenance of the delivered software. This is an incessant process. With ever changing environment, new problems are discovered and new requirement are identified, new dimensions need to be added to the existing software. All this is covered under support and maintenance phase of software development cycle.

The entire software development cycle is constantly exposed to both internal and external risks. The risks are present in all the stages of SDLC and it is the obligation of the project manager to either remove or reduce its impact on the project. The various kinds of risks that software project is exposed to is discussed below.

2.1.8. Characteristics of SW Projects and why SW Project Management is Difficult

Software development is both human-intensive and knowledge-intensive, which makes people the most important asset in any software development endeavor. *Software projects* differentiate from other projects in a number of ways. Consequently, management of software projects cannot be done in the same way as in traditional project management and needs to be adjusted correspondingly. Following (PMI 2013b), some of the main differentiating factors are:

• Software is an intangible product.

• Software is a cognitive and human-based development process that requires sharing of documents.

• Higher degree of uncertainty in the project and product scope.

• Communication and coordination of within software teams and with project stakeholders often lacks clarity.

• Intellectual capital of software personal is the primary asset for software projects and organizations.

• Degree of change of requirements in the course of the software project.

• Creation of software requires innovative problem solving to create unique solutions.

• Initial planning and estimation of software projects is challenging because these activities depend on requirements which are often imprecise or based on lacking information.

• Development and evolution of software-intensive system is challenging because of the high complexity of software based on the enormous number of logical paths in program modules and all the combinations of interface details.

• Exhaustive testing of software is impractical because of the time and related complexity constraints.

• Software development often involves interactions to different vendor products and interfaces to other software.

• Software security is a large and growing challenge.

• Objective measurement and quantification of software quality is difficult.

• Learning and knowledge creation in software development is more difficult because processes, methods and tools are constantly evolving.

• Execution of software is platform dependent and often is an element of a system consisting of diverse hardware, other software, and manual procedures.

Software project life-cycles are models of how software projects pass through phases of development, from its initiation to its closure. The software extension of the PMBOK describes the continuum of software project life cycles ranging from highly predictive to highly adaptive (PMI 2013b). The variation between them is described by the degree of change in requirements (from being specified during initiation and planning to elaboration at frequent intervals during development), control of cost and risk, and involvement of key stakeholders (from involvement at scheduled milestones to continuous involvement).

Practically, all modern development approaches are iterative and incremental (Larman and Basili 2003) in their key nature. Kruchten (2011) has proposed a *conceptual model of software development*. The main pillars of that model are four core entities called *Intent, Product, Work,* and *People*, which are common entities across all software development projects.

2.2. Empirical Review

Many researches has been focused on problems in software development projects. Software projects have a high level of change. Change was the replacement of one thing with another, implying movement. Everything can be changed, people, situations, needs or specifications (Duvall, 1995). Hence, managing a software project always has the risk of changes.

In short, these problems in the software development process lead to the high rate of failure of software projects and they still are the concern of managers and researchers.

Many software projects have problems with meeting deadlines and cost targets. Gibbs (1994) indicated that for every six new large-scale software systems put into operation, two others were cancelled. Another study in the USA found that 31 percent of software projects were canceled before completion and more than half the projects will cost more than 189 percent of the original estimates (The Standish Group, 1995). A study which focused on meeting deadlines in software projects in Germany revealed that in 60 percent of the projects investigated, more than 20 percent were behind time, while only 5 percent were completed on time (Eversheim *et al.*, 1997).

The main problem for project personnel (including project manager, designer, programmer, etc.) is the lack of skillful and talented people (Duvall, 1995) or a shortage of programmers (Yang, 2001).

The CHAOS report from the Standish Group indicates that over the years there has been great improvement in the delivery of software systems that meet business objectives within budget and

on schedule. The report shows that in 1994, 31% of all software projects failed and only 16% of the projects were successful. Four years later, only 28% of the projects failed and the success rate had increased to 26%. Another two years later, the success rate had increased to 28% while only 23% of all projects failed. While the CHAOS report presents an encouraging view, others have argued that the measure of 'success' will vary depending on how you define it. Successful software projects have been described as projects that are completed within budget, on schedule, and that meet business objectives. Others have suggested that success depends on the perspective of stakeholders. Linberg found that there are differences of opinion between project participants (developers) and managers when it comes to defining what constitutes a successful software project. Linberg's conclusion suggests that a new theory of success might be needed. This theory would account for differences in opinions and experiences across different industries with regard to success factors in software development.

Performance problems were related to the inability to deliver the product within budget and/or on schedule and to develop a high-quality product that was acceptable to the customer (Duvall, 1995). Many software project managers are either untrained or poorly trained for their work. They are also severely under equipped. The Software Productivity Research Company (USA) has indicated that less than 25% of US software project managers received any formal training in software cost estimating, planning, or risk analysis (Jones, 1999).

The problem of defining the requirements was the most difficult part of the software development process and was inefficient. There are also inherent problems with the software process. Managers complained about dissatisfaction they felt in dealing with tools for software development –that did not meet their needs and/ or were difficult to teach (Duvall, 1995).

A survey conducted by Thayer, Pyster and Wood (1981) identified the common problems in software project management. They include poor estimates and plans, lack of quality standards and measures, lack of guidance about decisions, lack of techniques to make progress visible, poor role definition and incorrect success criteria. An assessment by the Software Engineering Institute (SEI) in 1991 indicated that 93% of the companies assessed did not have a well-defined software development process and 81% did not have a quality management system. The software process has a poorer reputation than most other product development functions. The problems in managing the development process often leads to quality lapses.

2.3. Conceptual Framework

The proposed framework for this research is illustrated in the following Figure. It shows assessing project management practices with the ten project management knowledge areas.

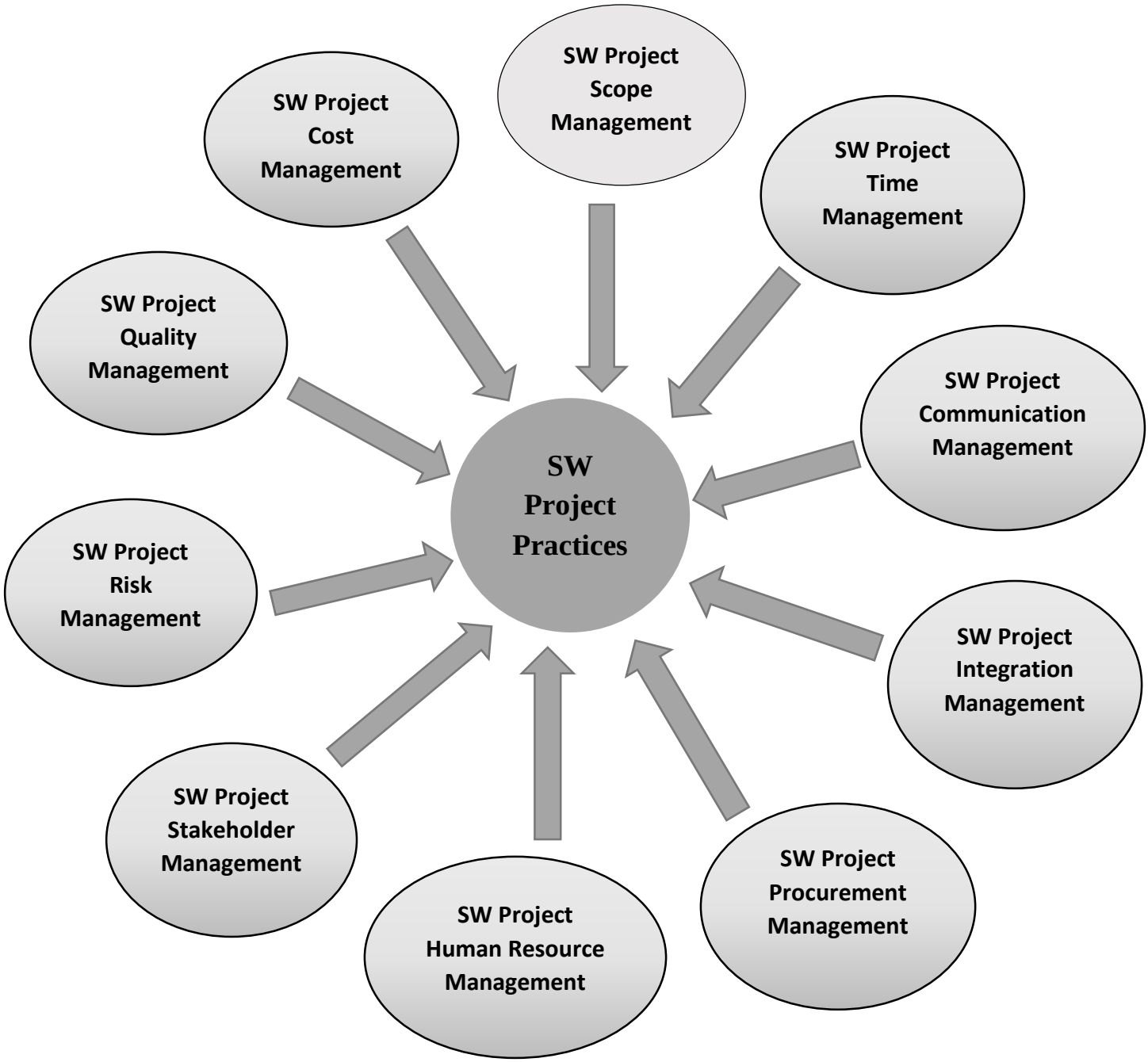

***Figure 2.1**: The Conceptual Framework*

***Source**: Prepared by Researcher (2019)*

CHAPTER THREE

3. METHODOLOGY

3.1. Introduction

The designing and methodological aspect of a particular study is the roadmap that the study should follow in its pursuit of the desired outcome. Hence, due care shall be made while spelling out these roadmap. In view of that, a detailed account has been given to the description of the particular design the research would employ; the data sources and methods of collection; the target population, unit of analysis and respondents; the types of instruments and their development procedure; the variables and corresponding measurement items; and data processing, analysis and presentation procedures.

Thus, this chapter presents the research design, target population, sampling techniques and procedure, sample size determination, sample size proportion, types of data, tools of data collection, sources of data, method and procedures of data collection and methods of data processing and analysis.

3.2. Research Design and Approach

Research design is a blue print for selecting the sources and types of data relevant to the research questions and provides the basic direction for carrying out a research project to obtain answers to research questions (Zikgmund et al., 2010). One of the types (classifications of research) is descriptive research, and according to Kothari (2004) descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group. Since this study tries to assess the project management practices, it employs a descriptive study research design.

Moreover, Based on the process of the research and the type of data involved, both quantitative and qualitative approach were followed by the researcher. Quantitative designs are plans for carrying out research oriented towards quantification and are applied in order to describe current conditions or to investigate relationships. It is quantitative since it involves statistical models such as means, standard deviations, and correlations. On the other hand, it is also qualitative research

since it describes the actual condition of project management practice in the software development projects in a non-numerical ways aided by the quantitative approaches.

3.3. Sources of Data

To collect all pertinent information for the research, both primary and secondary data sources were used. To collect relevant primary data for the study, questionnaire and in-depth interview were used as an instrument of data collection. The questionnaires were administered and interview was conducted with sample of project managers, team leaders, supervisors, technical experts and support staffs of the project being undertaken currently by INSA project management department. In addition, review of relevant documents, personal observation of the project management department and projects' working environment was carried out. Other secondary data sources including operational procedures, project plans, monitoring and periodical reports and other relevant sources related with projects were reviewed as well.

3.4. Methods of Data Collection and Instruments used

In order to achieve the objective of this research, both primary and secondary sources of data were used. The instruments engaged in order to collect primary data, semi- structured interview and questionnaire was adopted from previous researches focusing on the project management practices of software projects, benchmarking the ten knowledge areas defined by PMBOK and based on the related review of literature. The researcher has chosen to use the questionnaire survey because it is thought to be cheap and fast to administer; and even it increases the degree of reliability as well enhances the chances of getting valid data. Interviews is a one-to-one verbal communication in which one person or a group of people were interviewed at a time. In addition to the questionnaire adopted from previous research, interview was considered because it has the advantage of ensuring probing for more information, clarification and capturing facial expression of the interviewees.

Documentation cannot be underestimated as it provides necessary background and much needed context both of which make re-use a more worthwhile and systematic endeavor. Secondary data is obtained through the use of published and unpublished documents. These include various reports, tender documents, contract documents, etc.

Semi-structure interview was conducted with sample of project managers, team leaders, supervisors, technical experts and support staffs of the project being undertaken currently by INSA

project management department. Questionnaires also distributed for the project managers, team leaders, supervisors, team members and support staffs of the project. A closed- ended questionnaire was adopted from Tigist Sileshi research paper on an assessment of the project management practices and the response options for a closed-ended question was exhaustive and mutually exclusive. For this purpose a Likert scale measurement was considered. For the likert scale, the items were scored on the 5 point Likert scale ranging from strongly agree (5) to strongly disagree (1).

3.5. Sample and Sampling Techniques

Sampling techniques can be classified into probability and non-probability sampling. Probability sampling involves random selection while non-probability sampling does not. Purposive sampling or judgmental sampling is a non-probability sampling method that basically allows a researcher to select cases that are best suited to answer the research questions (Kalbasi, 2011). This form of sampling is often used when working with small samples, especially in a case study when a researcher is looking for cases that are particularly informative. Parahoo (2006) describes purposive sampling as a method of sampling where the researcher deliberately chooses who to include in the study based on their ability to provide necessary data.

In this particular study, the researcher purposely selected INSA project management department because all team members in the department are involved in the implementation of projects from inception to execution and they have the exposure to the overall practices of project management. The interviewees were selected based on purposive sampling of the researcher‘s subjective judgment which considers that the selectee gave first-hand information without any problem.

The process of selecting a portion of the population to represent the entire population is known as sampling. The target populations for the study were all project management department team members of INSA including directors, project managers, team leaders, supervisors, technical experts and support staffs of the projects.

To determine sample size of the study, the researcher used the method of sample size determination developed by Carvalho (1984, cited in Kelil, 2010: P8). Therefore, the following table is used to determine the sample size.

Table 3.1: Carvalho's Sample Size Determination

Population Size	Sample Size		
	Low	Medium	High
51 – 90	5	13	20
91 – 150	8	20	32
151 – 280	13	32	50
281 – 500	20	50	80
501 – 1200	32	80	125
1201 – 3200	50	125	200
3201 – 10000	80	200	315
10001 – 35000	125	315	500
35001 – 50000	200	500	800

According to Carvalhos sample size determination, if the population lies in between 51 to 91. The researcher took a sample size of 5 to 20. The total population of the INSA's project management department consists of a total of 88 employees. The researcher was taken 28 project management department employees as sample. Out of twenty eight samples 20 employees were selected to fill the questionnaires and the remaining 8 employees were interviewed.

Table 3.2: Total population of INSA's Project Management Department

No.	Position	Number of employees	Samples for the Questionnaire	Samples for the Interview
1	**Directors**	**2**	**0**	**0**
2	**Project Managers**	**8**	**4**	**2**
3	**Team Leaders**	**8**	**3**	**1**
4	**Supervisors**	**16**	**3**	**2**
5	**Technical Experts**	**42**	**8**	**2**
6	**Support Staffs**	**12**	**2**	**1**
7	**Total**	**88**	**20**	**8**

3.6. Method of Data Analysis

After the data were collected from different sources, it is organized and presented in different forms. Important numerical results are presented using tables and charts. Data that are used for qualitative analysis were presented in statement forms as part of the interpretation. This study uses both qualitative and quantitative analysis.

Qualitative models were applied for describing and interpreting responses from different respondents. Microsoft Excel and Microsoft Word were used to support the descriptions using charts and graphs.

The quantitative data mainly obtained using close-ended questionnaire was analyzed by simple descriptive statistics like percentage, average and etc..., and the result was summarized in the form of tables. The qualitative data such as perception, opinion, attitude etc. mainly obtained using open ended questionnaire and semi structured interview including the researcher's observation were analyzed, described and interpreted in the form of narration.

Quantitative models were also used in this study. For instance, models such as means and standard deviation were applied to measure central tendency so as to have representative values for responses of questionnaires. For the quantitative analysis SPSS 20. (Statistical package for social science) were used to simplify cumbersome mathematical efforts.

3.7. Validity and Reliability

To ensure the quality of the research and make it credible for the project management community, the researcher gave due care to both validity and reliability issues of the data, the research process in general as well as the research output. The researcher used different source of data form literature, interview, questionnaire, observation and document review to triangulate the data. The need for triangulation arises from the ethical need to confirm the validity of the processes involved. Validity defined as the extent to which data collection method or methods accurately measure what they were intended to measure (Saunders et. al., 2003). Validity is concerned with whether the findings are really about what they appear to be about. The data collection tools in this study were adopted from a previous research on the project management practices and this implies that to some extent the data collection tools measures what they are intended to measure. On the other

hand the validity of the questionnaire was done through consultations with the advisor in order to establish any built-in errors in the measurement of the questionnaire.

Reliability refers to the absence of random error, enabling subsequent researchers to arrive at the same insights if they conducted the study along the same steps again (Yin, (2003).To increase the reliability of the survey, five-scale system (Likert scale) questionnaire was used. The reliability in such scale is higher compared to a two- scale system (Hayes, 1992). The tendency toward consistency found in repeated measurements is referred to as reliability.

To make sure the research‘s reliability of the questionnaire the researcher conducted Cornbach‘s alpha reliability test by using SPSS (Statistical Package for the Social Sciences) and found that **0.836** Cornbach‘s alpha for the project management practices and it is generally considered acceptable. Cronbach’s alpha score more than 0.70 indicates that the instrument is reliable.

Table 3.3: Reliability Result of the Constructs

No.	Variables	Cronbach’s Alpha	No. of Items	Scale
1	Project Scope Management Practice	**0.724**	**5**	**1-5**
2	Project Time Management Practice	**0.761**	**5**	**1-5**
3	Project Quality Management Practice	**0.734**	**4**	**1-5**
4	Project Cost Management Practice	**0.741**	**5**	**1-5**
5	Project Risk Management Practice	**0.718**	**5**	**1-5**
6	Project Integration Management Practice	**0.752**	**4**	**1-5**
7	Project Stakeholders Management Practice	**0.749**	**5**	**1-5**
8	Project Human Resource Management Practice	**0.738**	**5**	**1-5**
9	Project Communication Management Practice	**0.707**	**5**	**1-5**
10	Project Procurement Management Practice	**0.711**	**7**	**1-5**

3.8. Ethical Considerations

In the context of research, according to Saunders, Lewis and Thornhill, (2001:130), ethics refers to the appropriateness of your behavior in relation to the rights of those who become the subject of your work, or are affected by it.

Ethics are standards of behavior that guide the moral choices about our behavior and our relationship with others. All parties in research should observe ethical behavior. Research ethics were put into consideration when developing and administering data collection tools and techniques, to avoid any form of destruction or violation.

The willingness of individuals to disclose the necessary information plays significant role for the successful completion of this research. For this reason, while conducting this research the researcher agreed to make sure that treating both the respondents and the information they provide with honesty and respect.

These were done through obtaining consent before the research; safeguarding an individual participating in the study against doing anything that harm; the privacy and anonymity of the participants were guaranteed; ensuring confidentiality of data obtained and learning more about the organization's security culture before the research and necessary absolute sensitivity and caution were exercised.

CHAPTER FOUR

4. RESULTS AND DISCUSSIONS

4.1. Introduction

This chapter deals with the analysis and presentation of the data collected through questionnaire. Descriptive statistics like frequencies and mean were used to analyze the data. Interpretations are made based on the frequency and percentages of the data. The findings from the questionnaires were analyzed using Statistical Package for Social Science (SPSS) version 20 and relevant data analysis methods needed to answer the research questions were carried out. The results from the study are presented in the form of frequency, mean and standard deviation table. This analysis is conducted based on the knowledge areas and the conceptual frameworks developed in chapter two. Then major findings have been summarized and presented as follows.

4.2. Response Rate

Among the total of 20 questionnaires distributed to INSA's project management department employees all 20 questionnaires were appropriately filled and returned which gives 100% return rate which is assumed to be suitable for further analysis. The first part of the questionnaire consists of the demographic information of the participants related to personal and professional characteristics. Whereas the second part intended to obtain respondent's opinion and perception regarding the project management practices of the study organization.

4.3. Demographic Profile of the Respondents

This section summarizes the demographic characteristics of the respondents, which includes sex, age, educational level, field of specialization, position, and work experience in the projects. The main purpose of the demographic analysis in this research is to describe the characteristics of the respondents so that the analysis could be more meaningful for readers.

Table 4.1: Demographic information of the respondents'

No.	Description		Respondent		Total	
			Frequency	%	N	%
1.	Sex	Male	22	78.6	28	100
		Female	6	21.4		
2.	Age	21-30	10	35.7	28	100
		31-40	15	53.6		
		41-50	3	10.7		
3.	Educational Level	MA/MSc	12	42.9	28	100
		BA/BSc	15	53.6		
		Diploma	1	3.5		
4.	Position	Project Manager	6	21.4	28	100
		Team Leader	5	17.9		
		Supervisor	5	17.9		
		Technical Expert	10	35.9		
		Support Staff	2	7.1		
5.	Field of Specialization	Computer Science	11	39.3	28	100
		IT	4	14.3		
		Project Management	5	17.9		
		Software Engineering	4	14.3		
		Management	2	7.1		
		Business Administration	1	3.5		
		HRM	1	3.5		
6.	Work Experience in Projects	1-3 years	5	17.9	28	100
		3-5 years	10	35.7		
		5-8 years	9	32.1		
		Above 8 years	4	14.3		

Table 4.1 describes the demographic profile of the respondents. Out of twenty eight participants twenty two (78.6%) are male and the remaining six (21.4%) are female respondents. Regarding the age, fifteen (53.6%) respondents were found between 31 and 40 years old; ten (35.7%) respondents were found between 21 and 30 years old and the remaining three (10.7%) respondents were found between 41 and 50 years old.

In terms of educational level, fifteen (53.6%) respondents were holders of BA/BSc degrees; twelve (42.9%) respondents having MA/MSc Degree and one (3.5%) respondent is a diploma holder.

Among the respondents, six of them (21.4%) were project managers, five (17.9%) team leaders, five (17.9%) supervisors, ten (35.7%) technical experts and the remaining two (7.1%) are support staffs.

As to the educational background of the respondents, which is analyzed qualitatively, various fields of studies were identified i.e. Project Management, Computer Science, IT, Software Engineering, Management, Business Administration and HRM.

Regarding the project work experience of respondents, ten (35.7%) respondents have 3 to 5 years of work experience; nine (32.1%) respondents have 5 to 8 years of work experience; five (17.9%) respondents have 1-3 years of work experience, whereas four (14.3%) had above 8 years work experience in projects. This result implies, most of the respondents have been involved in the projects which helps this paper work to obtain genuine data from the responses of the questionnaire.

4.4. Assessing the major challenges in SW development projects

Table 4.2: Major challenges of software projects

No.	Description			Respondent		Total	
				Frequency	%	N	%
		Clarity in scope	Yes	14	70	20	100
			No	6	30		
			Neutral	0	0		
			Yes	17	85		

1.	**Major Challenges of Software Projects**	**Time**	**No**	**3**	**15**	**20**	**100**
			Neutral	**0**	**0**		
		Cost	**Yes**	**15**	**75**	**20**	**100**
			No	**4**	**20**		
			Neutral	**1**	**5**		
		Quality of Software products	**Yes**	**12**	**60**	**20**	**100**
			No	**6**	**30**		
			Neutral	**2**	**10**		
		Risks	**Yes**	**10**	**50**	**20**	**100**
			No	**7**	**35**		
			Neutral	**3**	**15**		
		Coordination among staffs	**Yes**	**7**	**35**	**20**	**100**
			No	**10**	**50**		
			Neutral	**3**	**15**		
		Human resources	**Yes**	**7**	**35**	**20**	**100**
			No	**12**	**60**		
			Neutral	**1**	**5**		
		Communication among staffs	**Yes**	**6**	**30**	**20**	**100**
			No	**13**	**65**		
			Neutral	**1**	**5**		
		Resources	**Yes**	**11**	**55**	**20**	**100**
			No	**7**	**35**		
			Neutral	**2**	**10**		
		Customers/stakeholders	**Yes**	**7**	**35**	**20**	**100**
			No	**12**	**60**		
			Neutral	**1**	**5**		
2.	**Success Status of Software Projects**	**Very Successful**		**0**	**0**	**20**	**100**
		Successful		**2**	**10**		
		Fairly Successful		**5**	**25**		
		Not Successful		**13**	**65**		

As shown on the table 4.2, the major challenges of software projects fourteen respondents (70%) responded that clarity in scope was the major challenge for SW projects and the remaining six respondents (30%) responded that it was not a challenge. Majority of the respondents (85%) responded that time was the major challenge and three (15%) of them replied that it was not a major challenge. Regarding Cost, Quality and risk, fifteen (75%), twelve (60%) and ten (50%) respondents respectively responded that cost, quality and risks associated with those projects are the major challenges of SW projects.

According to the responses obtained from the sample respondents, ten (50%) respondents responded that coordination among staffs were not the major challenge; seven (35%) respondents agreed as a challenge and the remaining three (15%) put the selves to neutral. Twelve (60%) of the respondents replied that Human resources were not the major challenges whereas seven (35%) respondents responded as a challenge. From the respondents thirteen (65%) responded that communication among staffs were not the major challenge and six (30%) of the replied that it was a challenge. Eleven (55%) respondents put resources as a challenge and seven (35%) of the replied that resources were not the major challenges. Twelve (60%) participants of the study responded that customers/stakeholders were not the challenge whereas seven (35%) of them replied as a challenge.

Regarding the status of the project success, thirteen (65%) respondents rated INSA SW projects as not successful; five (25%) respondents put it as fairly successful and the remaining two (10%) rated it as projects that was successful. This implies that majority of the SW projects of INSA were not successful.

As a result, the student researcher concluded that clarity in scope, time, cost, quality, risks, and resources are the major challenges of software projects. Whereas coordination and communication among staffs, human resources and customers/stakeholders are not the major challenges of SW projects.

4.5. Assessing the Project Management Practices using the PMBOK Knowledge Areas

Assessments of each of the project management knowledge areas in the project office is obtained by taking mean scores of the questions and responses of respondents under each knowledge areas and results are discussed in the following sections. Mean Values have been interpreted by adopting

the criteria suggested by (Scott, 1999). He suggested that for Likert type scale ranging from 1 (Strongly Disagree/ highly dissatisfied) to 5 (Strongly Agree/Highly Satisfied), interpretation should be like; mean up to 2.9 is considered as Disagree, from 2.9 to 3.1 means neutral or neither disagree nor agree and mean above 3.1 is considered as an agree.

Table 4.3: The Practice of Project Scope Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\overline{X}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
Plan scope management was defined	2	10	7	35	8	40	2	10	1	5	20	100	2.65	0.99
Requirements were clearly defined from the beginning	2	10	10	50	4	20	3	15	1	5	20	100	2.55	1.05
WBS was created	1	5	7	35	5	25	5	25	2	10	20	100	3	1.12
Scope was verified	3	15	8	40	3	15	4	20	2	10	20	100	2.7	1.26
Changes to the project scope was controlled	2	10	9	45	5	25	3	15	1	5	20	100	2.6	1.05
Average													2.7	1.09

n= Frequency $\overline{X}$**= Mean SD= Standard deviation**

The above table shows seven (35%) respondents disagreed that plan scope management was well defined and eight (40%) respondents were uncertain whether plan scope management was defined or not. Whereas two (10%) respondents agreed that the plan scope management was clearly defined. As the average mean ($\overline{X}$=2.65) implies that plan scope management was not defined well for the projects.

The same table shows the responses of the respondents to inquiries if requirements were defined and out of the 20 respondents, ten (50%) responded that the requirements were not defined; four

(20%) were not sure if requirements were defined, and three (15%) respondents agreed that the requirements were defined. The average mean ($\overline{X}$=2.55) shows the projects requirements were not defined cohesively.

The other question put forward to the respondents was if WBS was created and seven (35%) respondents responded that it was not created, five(25%) put themselves on neutral, five (25%) respondents agreed that WBS was created and the other two (10%) respondents strongly agreed that it was created. Based on this result, a conclusion reached that WBS was not created as good as it was supposed to be.

Respondents were asked if scope was verified as it is shown table 4.3, and eight (40%) disagreed that it was verified, three (15%) strongly disagreed, three (15%) were uncertain about it, four (20%) agreed that scope was verified and two (10%) strongly disagreed. Hence, this result shows ($\overline{X}$=2.7) that greater part of the respondents disagreed scope was verified.

In response to the question that was intended to know if changes to the project scope were controlled, nine (45%) of respondents disagreed, two (10%) of respondents strongly disagreed and five (25%) respondents were uncertain, whereas three (15%) agreed and one (5%) strongly agreed. Therefore, it can be analyzed based on the response of the majority ($\overline{X}$=2.6) that changes to the project scope were not controlled.

Hence, based on the above elaboration and the average mean of the factors under project scope management, which is ($\overline{X}$=2.7), it was shown that the practice of project scope management was not carefully done on SW development projects.

This same idea is supported by the interview conducted with the project managers, team leaders and supervisor as the plan/target was far beyond the cost and time budget of the project. Majority of the interviewees stated that in most of their projects, the scope of the projects gets changed due to request from customers during execution phase. And at times they also face change of project scope with a request from stakeholders almost at the end of project and they had to redesign the SW projects with additional budget, resources and time incurred.

Table 4.4: The Practice of Project Time Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
Time/schedule management plan was developed	2	10	9	45	7	35	2	10	0	0	20	100	2.45	0.83
Activities were defined	1	5	7	35	6	30	5	25	1	5	20	100	2.9	1.02
Activities were sequenced	1	5	7	35	7	35	5	25	0	0	20	100	2.8	0.89
Duration of activities were estimated	2	10	8	40	5	25	4	20	1	5	20	100	2.7	1.08
Changes to the projects schedule was controlled	5	25	8	40	4	20	3	15	0	0	20	100	2.25	1.46
Average													2.62	1.06

n= Frequency $\bar{X}$= Mean SD= Standard deviation

The above table shows nine (45%) respondents disagreed that time/schedule management plan was developed and seven (35%) respondents were uncertain whether time/schedule management plan was developed or not. Whereas two (10%) respondents agreed that the time/schedule management plan was developed. As the average mean ($\bar{X}$=2.45) implies that time/schedule management plan was not developed for the projects.

The same table shows the responses of the respondents to inquiries if activities were defined and out of the 20 respondents, seven (35%) responded that the activities were not defined; seven (35%) were not sure if activities were defined, and five (15%) respondents agreed that activities were defined.

Respondents were asked if activities were sequenced, and seven (35%) disagreed that it was sequenced, one (5%) strongly disagreed, seven (35%) were uncertain about it, and five (25%)

agreed that activities were sequenced. Hence, this result shows ($\overline{X}$=2.8) that greater part of the respondents disagreed activities were sequenced.

In response to the question that was intended to know if duration of activities were estimated, eight (40%) of respondents disagreed, two (10%) of respondents strongly disagreed and five (25%) respondents were uncertain, whereas four (20%) agreed and one (5%) strongly agreed. Therefore, it can be analyzed based on the response of the majority ($\overline{X}$=2.7) that duration of activities were not estimated.

The final question put forward to the respondents was changes to the project schedule was controlled and eight (40%) respondents disagreed that it was controlled, five (25%) respondents strongly disagreed that it was controlled, four (20%) put themselves on neutral, and three (15%) respondents agreed that changes to the project schedule was controlled. Based on this result ($\overline{X}$=2.25), a conclusion reached that changes to the project schedule was not controlled.

Hence, based on the above elaboration and the average mean of the factors under project time management, which is ($\overline{X}$=2.62), it was shown that the practice of project time management was not carefully done with schedule on SW development projects.

The same statement is also supported by the interview result that was held with the project manager, team leaders and supervisor, during the interview it has been elaborated that the projects take longer than the time they have planned mostly due to poor planning at the beginning of the project by under estimating the tasks and other factors have negative impact on the time management through delay or unplanned phase out.

Table 4.5: The Practice of Project Quality Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
Quality standards of the projects were identified	2	10	7	35	4	20	6	30	1	5	20	100	2.85	1.14
Quality standards of the projects were reviewed	1	5	8	40	5	25	6	30	0	0	20	100	2.8	1.04
Projects performance were evaluated on regular basis	2	10	4	20	7	35	5	25	2	10	20	100	3.05	1.15
Results were monitored to check if they comply with the standards	2	10	7	35	6	30	4	20	1	5	20	100	2.75	1.07
Average													2.86	1.1

n= Frequency $\bar{X}$**= Mean** **SD= Standard deviation**

As table 4.5 indicates, respondents were asked if quality standards of the project were identified, and seven (35%) disagreed that it was identified, two (10%) respondents strongly disagreed, four (20%) were uncertain about it, and six (30%) agreed that quality standards of the project were identified. As the average mean ($\bar{X}$ =2.85) implies that quality standards of the projects were not developed for the projects.

The same table shows the responses of the respondents to inquiries if quality standards of the projects were reviewed, and eight (40%) respondents disagreed that the quality standards of the projects were reviewed; one (5%) respondent strongly disagreed; five (25%) were not sure if quality standards of the project were reviewed, and six (30%) respondents agreed that quality standards of the projects were reviewed. Hence, this result shows ($\bar{X}$ =2.8) that greater part of the respondents responded that quality standards of the projects were not reviewed on regular basis.

Respondents were asked if project performances were evaluated on regular basis, and four (20%) disagreed that it was evaluated; two (10%) respondents strongly disagreed; seven (35%) were uncertain about it; five (25%) respondents agreed and two (10%) of the respondents strongly agreed that project performances were evaluated on regular basis. As the average mean ($\bar{x}$ =3.05) implies that projects performance were partially evaluated on regular basis.

In response to the question that was intended to know if results were monitored to check if they comply with the standards, seven (35%) of respondents disagreed; two (10%) of respondents strongly disagreed and six (30%) respondents were uncertain, whereas four (20%) agreed and one (5%) strongly agreed that results were monitored to check if they comply with the standards. Therefore, it can be analyzed based on the response of the majority ($\bar{x}$ =2.75) that results were not monitored to check if they comply with the standards.

Hence, based on the above elaboration and the average mean of the factors under project quality management, which is ($\bar{x}$ =2.86), it was shown that the practice of project quality management was not fully practiced in SW development projects.

On the other hand interviewees stated that sometimes they do an on-going monitoring and control throughout the project period to check the quality of software products. Respondents also indicated that the organization lacks developing a project implementation mechanism that gives a clear understanding of the expected project outputs and the quality specifications. They also added that the software products were not met the needs, requirement and expectations of the customers and stakeholders despite the fact it might take longer time or more resources.

Table 4.6: The Practice of Project Cost Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
The quantity of the necessary resources were determined	3	15	8	40	6	30	3	15	0	0	20	100	2.45	1.41
Cost plan was well-defined	2	10	9	45	5	25	3	15	1	5	20	100	2.6	1.05
The project cost was effectively estimated	1	5	5	25	8	40	4	20	2	10	20	100	3.05	1.05
The required budget was appropriately determined	2	10	7	35	4	20	6	30	1	5	20	100	2.85	1.11
Changes to the project budget was controlled	4	20	9	35	4	15	3	15	0	0	20	100	2.3	0.98
Average													2.65	1.12

n= Frequency $\bar{X}$ **= Mean** **SD= Standard deviation** $\bar{x}$

As table 4.6 indicates, respondents were asked if the quantity of the necessary resources were determined, and eight (40%) disagreed that it was determined, three (15%) respondents strongly disagreed, six (30%) were uncertain about it, and three (15%) agreed that the quantity of the necessary resources were determined. The average mean ($\bar{x}$ =2.45) implies that the quantity of the necessary resources were not determined.

The same table shows the responses of the respondents to inquiries if cost plan was well developed, and nine (45%) respondents disagreed that cost plan was well developed; two (10%) respondents strongly disagreed; five (25%) were not sure if cost plan was well developed; five(25%) respondents agreed and one (5%) respondent strongly agreed that cost plan was well developed.

Hence, this result shows ($\bar{x}$ =2.6) that greater part of the respondents responded that cost plan were not well developed.

Respondents were asked if projects cost were estimated, and five (25%) disagreed that it was estimated; one (5%) respondent strongly disagreed; eight (40%) were uncertain about it; four (20%) respondents agreed and two (10%) of the respondents strongly agreed that projects cost were estimated. The average results of the respondents ($\bar{x}$ =3.05) implies that projects cost were partially estimated.

In response to the question that was intended to know if the required budget was determined, seven (35%) of respondents disagreed; two (10%) of respondents strongly disagreed and four (20%) respondents were uncertain, whereas six (30%) agreed and one (5%) strongly agreed that the required budget was determined. Therefore, it can be analyzed based on the response of the majority ($\bar{x}$ =2.85) that the required budget was not sufficiently determined.

The final question put forward to the respondents was changes to the projects budget was controlled; and four (20%) respondents were strongly disagreed, nine (45%) respondents were disagreed, four (20%) respondents put themselves on neutral, and three (15%) respondents agreed that changes to the projects budget was controlled. Based on this result ($\bar{x}$ =2.3), a conclusion reached that changes to the projects budget was not controlled.

Hence, based on the above elaboration and the average mean of the factors under project cost management, which is ($\bar{x}$ =2.65), it was shown that the practice of project cost management was not practiced in SW development projects.

This was supported by the interview that majority of the respondents stated that the projects final cost exceeds the planned budget due time delay, poor budget planning, inflation of technology products, unforeseen risks and delay in funding from customers or product users.

Table 4.7: The Practice of Project Risk Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{x}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
Risk management plan was developed	1	5	7	35	7	35	4	20	1	5	20	100	2.85	0.9
Risks were identified and registered	2	10	6	30	6	30	5	25	1	5	20	100	2.85	1.09
Risks were prioritized and their implication on the project was estimated	3	15	9	45	5	25	2	10	1	5	20	100	2.45	1.05
Risk response plan was developed	3	15	8	40	6	30	3	15	0	0	20	100	2.45	0.94
The identified risks were monitored and controlled	2	10	9	45	7	35	2	10	0	0	20	100	2.45	0.82
Average													2.55	0.98

n= Frequency **$\bar{x}$= Mean** **SD= Standard deviation**

As table 4.7 indicates, respondents were asked if risk management plan was developed, and seven (35%) disagreed that it was developed, one (5%) respondent strongly disagreed, seven (35%) were uncertain about it, and four (20%) agreed that risk management plan was developed. The average mean ($\bar{x}$ =2.85) implies that the risk management plan was not developed.

The same table shows the responses of the respondents to inquiries if risks were identified and registered, and six (30%) respondents disagreed that the risks were identified and registered; two (10%) respondents strongly disagreed; six (25%) were not sure if risks were identified and registered, five (25%) respondents agreed and one (5%) respondent strongly agreed that risks were identified and registered properly. The average mean ($\bar{x}$ =2.85) implies that the risks were not identified and registered.

Respondents were asked if risks were prioritized and their implication on the project was estimated, and nine (45%) disagreed that it was prioritized and estimated; three (15%) respondents strongly disagreed; five (25%) were uncertain about it; two (10%) respondents agreed and one (5%) respondent strongly agreed that risks were prioritized and their implication on the project was estimated. The result ($\bar{x}$ =2.45) implies that risks were not prioritized and their implication on the project was not estimated.

In response to the question that was intended to know if risk response plan was developed, eight (40%) of respondents disagreed; three (15%) of respondents strongly disagreed and six (30%) respondents were uncertain, whereas the remaining three (15%) respondents agreed that risk response plan was developed. Therefore, it can be analyzed based on the response of the majority ($\bar{x}$ =2.45) that risk response plan was not developed regularly.

The final question put forward to the respondents was the identified risks were monitored and controlled and nine (45%) respondents disagreed that it was monitored and controlled, two (10%) respondents strongly disagreed that it was monitored and controlled, seven (35%) put themselves on neutral, and two (10%) respondents agreed that the identified risks were monitored and controlled. Based on this result ($\bar{x}$ =2.45), a conclusion reached that the identified risks were not monitored and controlled.

Hence, based on the above elaboration and the average mean of the factors under project quality management, which is ($\bar{x}$ =2.55), it was shown that the practice of project risk management was not practiced in SW development projects.

To conclude, it can clearly be seen that the mean of each factors and average mean of the factors become below average (2.55). This implies that, the project management department has not practiced project risk management in a way that projects are expected to put into practice.

This conclusion has been further confirmed by the interview held with the project management staffs and they clearly articulates that from the beginning of the projects risk management plan was not well developed. This practice leads to difficulty in monitoring and controlling risks associated with software products such as crashes during the testing phases of software products.

Table 4.8: The Practice of Project Integration Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
Project plan was developed by taking the results of other planning processes and putting them into consistent document.	2	10	6	30	6	30	4	20	2	10	20	100	2.9	1.17
Projects work was effectively managed	2	10	7	35	5	25	4	20	2	10	20	100	2.85	1.18
Projects work was appropriately monitored and controlled	2	10	6	30	5	25	5	25	2	10	20	100	2.95	1.19
There was effective coordination of projects activities	3	15	8	40	6	30	3	15	0	0	20	100	2.45	0.94
Average													2.75	1.12

n= Frequency $\bar{X}$**= Mean** **SD= Standard deviation**

As table 4.8 indicates, respondents were asked if project plan was developed by taking the results of other planning processes and putting them into consistent document., and six (30%) respondents disagreed, two (10%) respondents strongly disagreed, six (30%) were uncertain about it, four (20%) agreed and two (10%) respondents strongly agreed that Project plan was developed by taking the results of other planning processes and putting them into consistent document. The average mean ($\bar{x}$ =2.9) implies that Project plan was partially developed by taking the results of other planning processes and putting them into consistent document.

The same table shows the responses of the respondents to inquiries if Projects work was managed, and seven (35%) respondents disagreed that Projects work was managed; two (10%) respondents

strongly disagreed; five (25%) were not sure if Projects work was managed, four (20%) agreed and two (10%) respondents strongly agreed that Projects work was managed. The average mean ($\bar{x}$ =2.85) implies that Project work was not fully managed.

Respondents were asked if Projects work was monitored and controlled, and six (30%) disagreed that it was monitored and controlled; two (10%) respondents strongly disagreed; five (25%) were uncertain about it; five (25%) respondents agreed and two (10%) of the respondents strongly agreed that Projects work was monitored and controlled. The average mean ($\bar{x}$ =2.95) implies that Project work was partially monitored and controlled.

In response to the question that was intended to know if there was an effective coordination of projects activities, eight (40%) of respondents disagreed; three (15%) of respondents strongly disagreed and six (30%) respondents were uncertain, whereas three (15%) respondents strongly agreed that there was an effective coordination of projects activities. The result ($\bar{x}$ =2.75) implies that the project management department lacks effective coordination of projects activities.

Hence, based on the above elaboration and the average mean of the factors under project quality management, which is ($\bar{x}$ =2.75), it was shown that the practice of project integration management was not practiced in SW development projects.

The above statement were supported by interviewees that the project management department critically lacks coordination and collaboration among different teams in doing projects.

Table 4.9: The Practice of Project Stakeholders Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
Projects stakeholders were identified	1	5	4	20	5	25	6	30	4	20	20	100	3.4	1.19
Stakeholder management plan was defined	2	5	5	25	5	25	6	30	2	10	20	100	3.05	1.19
There was effective communication between project stakeholders	0	0	5	25	6	30	7	35	2	10	20	100	3.3	0.98
Stakeholders engagement was controlled	2	10	4	20	7	35	6	30	1	5	20	100	3	1.08
Projects progress was reviewed frequently with the customers	0	0	4	20	6	30	7	35	3	15	20	100	3.45	1
Average													3.25	1.09

n= Frequency $\bar{X}$**= Mean** **SD= Standard deviation**

According to table 4.9, respondents were asked if Projects stakeholders were identified, and four (20%) disagreed that it was identified, one (5%) respondent strongly disagreed, five (25%) were uncertain about it, six (30%) agreed and four (20%) strongly agreed that Projects stakeholders were identified. Hence, this result ($\bar{X}$ =3.4) shows that greater part of the respondents responded that Projects stakeholders were identified.

The same table shows the responses of the respondents to inquiries if Stakeholder management plan was defined, and five (25%) respondents disagreed that Stakeholder management plan was defined; two (10%) respondents strongly disagreed; six (25%) were not sure if Stakeholder management plan was defined, six (30%) respondents agreed and two (10%) respondents strongly

agreed that Stakeholder management plan was defined. The average mean ($\bar{x}$ =3.05) implies that Stakeholder management plan was partially defined.

Respondents were asked if there was effective communication between project stakeholders, and five (25%) respondents disagreed; six (30%) were uncertain about it; seven (35%) respondents agreed and two (10%) respondent strongly agreed that there was an effective communication between project stakeholders. This implies that majority of the respondents ($\bar{x}$ =3.3) replied that there was an effective communication between project stakeholders.

In response to the question that was intended to know if Stakeholders engagement was controlled, four (20%) of respondents disagreed; two (10%) of respondents strongly disagreed and seven (35%) respondents were uncertain, whereas the remaining three (15%) and one (5%) respondents agreed and strongly agreed that Stakeholders engagement was controlled. Therefore, it can be analyzed based on the response of the majority ($\bar{x}$ =3.0) that stakeholder's engagement was partially controlled.

The final question put forward to the respondents was projects progress was reviewed frequently with the customers and four (20%) respondents disagreed that it was reviewed frequently with the customer, six (30%) put themselves on neutral, seven (35%) agreed and three (15%) respondents strongly agreed that projects progress was reviewed frequently with the customer. Based on this result ($\bar{x}$ =3.45), a conclusion reached that the projects progress was reviewed frequently with the customers.

Hence, based on the above elaboration and the average mean of the factors under project quality management, which is ($\bar{x}$ =3.25), it was shown that the practice of project stakeholder management was practiced in SW development projects.

This conclusion has been further confirmed by the interview conducted with project managers and team leaders indicates that similar results regarding the practice and confirmed that all the stakeholders were identified and communication between them was effective, and all the stakeholders were engaged as there was a frequent meeting with stakeholders and customers to assure clear communication and mutual understanding.

Table 4.10: The Practice of Project Human Resource Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
Project roles, responsibilities and required skill were identified	**1**	**5**	**4**	**20**	**6**	**30**	**6**	**30**	**3**	**15**	**20**	**100**	**3.3**	**1.13**
Organizational chart and position descriptions were clear	**2**	**10**	**5**	**25**	**4**	**20**	**7**	**35**	**2**	**10**	**20**	**100**	**3.1**	**1.21**
Availability and assigning human resource	**0**	**0**	**2**	**10**	**8**	**40**	**8**	**40**	**2**	**10**	**20**	**100**	**3.5**	**0.83**
Project team was developed	**0**	**0**	**3**	**15**	**5**	**25**	**8**	**40**	**4**	**20**	**20**	**100**	**3.65**	**0.94**
Project team was managed and controlled	**1**	**5**	**4**	**20**	**6**	**30**	**7**	**35**	**2**	**10**	**20**	**100**	**3.25**	**1.07**
Average													**3.47**	**1.04**

n= Frequency $\bar{X}$**= Mean** **SD= Standard deviation**

According to table 4.10, respondents were asked if Project roles, responsibilities and required skill were identified, and four (20%) disagreed that it was identified, one (5%) respondent strongly disagreed, six (30%) were uncertain about it, six (30%) agreed and three (20%) strongly agreed that Project roles, responsibilities and required skill were identified. Hence, the average mean ($\bar{x}$ =3.3) shows that greater part of the respondents responded that project roles, responsibilities and required skill were identified.

The same table shows the responses of the respondents to inquiries if organizational chart and position descriptions were clear, and five (25%) respondents disagreed that organizational chart

and position descriptions were clear; two (10%) respondents strongly disagreed; four (20%) were not sure if organizational chart and position descriptions were clear, seven (35%) respondents agreed and two (10%) respondents strongly agreed that organizational chart and position descriptions were clear. This implies ($\bar{x}$ =3.1) that organizational chart and position descriptions were clear.

Respondents were asked to know the availability and assigning of human resources in the department, and two (10%) respondents disagreed; eight (40%) were uncertain about it; eight (40%) respondents agreed and two (10%) respondent strongly agreed that there was available HRs and assigned in different teams. This implies that majority of the respondents ($\bar{x}$ =3.5) replied that there was available HRs and they were assigned to different teams.

In response to the question that was intended to know if the project teams were developed, three (15%) of respondents disagreed; five (25%) respondents were not sure about it, whereas the remaining eight (40%) and four (20%) respondents agreed and strongly agreed that project teams were developed respectively. Therefore, it can be analyzed based on the response of the majority ($\bar{x}$ =3.65) that project teams were developed accordingly.

The final question put forward to the respondents was whether project teams were managed and controlled; and four (20%) respondents disagreed that it was managed and controlled, one (5%) strongly disagreed; six (30%) put themselves on neutral, seven (35%) agreed and two (10%) respondents strongly agreed that project teams were managed and controlled. Based on this result, which is ($\bar{x}$ =3.25), a conclusion reached that the project teams were managed and controlled.

Hence, based on the above elaboration and the average mean of the factors under project HR management, which is ($\bar{x}$ =3.47), it was shown that the practice of project HR management was practiced in SW development projects.

This conclusion has been further confirmed by the interview conducted with respondents and explained that there were skilled and experienced man power in the project management department which is a good opportunity in undertaking difficult SW projects effectively. In addition, available HRs were assigned to different teams and projects teams were developed and controlled in a regular manner.

Table 4.11: The Practice of Project Communication Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{X}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
The information and communication needed for the project were determined	2	10	4	20	6	30	6	30	2	10	20	100	3.1	1.17
Making needed information available to project stakeholders	1	5	3	15	7	35	7	35	2	10	20	100	3.3	1.03
Collecting and disseminating performance information	2	10	4	20	7	35	6	30	1	5	20	100	3	1.08
Generating, gathering, and disseminating information to formalize phase or project completion	2	10	4	20	6	30	6	30	2	10	20	100	3.1	1.17
Control Communication	1	5	4	20	6	30	7	35	2	10	20	100	3.25	1.07
Average													3.15	1.1

n= Frequency $\bar{X}$**= Mean** **SD= Standard deviation**

As table 4.11 indicates, respondents were asked if the information and communication needed for the project were determined, and four (20%) respondents disagreed, two (10%) respondents strongly disagreed, six (30%) were uncertain about it, six (30%) agreed and two (10%) respondents strongly agreed that the information and communication needed for the project were determined. The average mean ($\bar{x}$ =3.25) implies that the information and communication needed for the project were determined.

The same table shows the responses of the respondents to inquiries that making needed information available to project stakeholders, and three (15%) respondents disagreed that needed information is available; one (5%) respondent strongly disagreed; seven (35%) were not sure that making needed information available to project stakeholders, seven (35%) agreed and two (10%) respondents strongly agreed that making needed information available to project stakeholders. The result ($\bar{x}$ =3.3) implies that the needed information was available to project stakeholders in regular basis.

Respondents were asked about collecting and disseminating performance information, and four (20%) disagreed; two (10%) respondents strongly disagreed; seven (35%) were uncertain about it; six (30%) respondents agreed and one (5%) of the respondents strongly agreed that performance information was collected and disseminated. The average result ($\bar{x}$ =3) implies that performance information was partially collected and disseminated.

In response to the question that was intended to know about generating, gathering, and disseminating information to formalize phase or project completion, four (20%) of respondents disagreed; two (10%) of respondents strongly disagreed and six (30%) respondents were uncertain, whereas six (30%) respondents agreed and two (10%) strongly agreed that they generate, gather, and disseminate information to formalize phase or project completion. The average result ($\bar{x}$ =3.1) implies that they generate, gather, and disseminate information to formalize phase or project completion.

Respondents were asked about if communications were controlled, and four (20%) disagreed; one (5%) respondent strongly disagreed; six (30%) were uncertain about it; seven (35%) respondents agreed and two (10%) of the respondents strongly agreed that communications were controlled. The average mean ($\bar{x}$ =3.25) implies that communications were controlled.

Hence, based on the above elaboration and the average mean of the factors under project communication management, which is ($\bar{x}$ =3.15), it was shown that the practice of project communication management was practiced in SW development projects.

Table 4.12: The Practice of Project Procurement Management

Factors	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total		$\bar{x}$	SD
	n	%	n	%	n	%	n	%	n	%	N	%		
Resources needed for the project were determined	3	15	7	35	5	25	3	15	2	10	20	100	2.7	1.22
Requirements of the project materials was documented	4	20	8	40	5	25	3	15	0	0	20	100	2.35	0.99
Potential sources were identified	2	10	4	20	8	40	5	25	1	5	20	100	2.95	1.05
Appropriate quotations, bid, offers or proposal were obtained	1	5	5	25	6	30	6	30	2	10	20	100	3.15	1.09
Choosing from among potential sellers	2	10	4	20	6	30	6	30	2	10	20	100	3.1	1.17
The relationship with the seller was managed	3	15	4	20	8	40	3	15	2	10	20	100	2.85	1.18
Contract was completed and settled properly	2	10	8	40	8	40	2	10	0	0	20	100	2.5	0.82
Average													2.82	1.07

n= Frequency $\bar{x}$**= Mean** **SD= Standard deviation**

As table 4.12 indicates, respondents were asked if resources needed for the project were determined and seven (35%) disagreed that it was determined, three (15%) respondents strongly disagreed, five (25%) were uncertain about it, three (15%) agreed and two (10%) strongly disagreed that the resources needed for the project were determined. The result ($\bar{x}$ =2.7) implies that the resources needed for the project were not determined.

The same table shows the responses of the respondents to inquiries about requirements of the project materials was documented, and eight (40%) respondents disagreed that requirements of the project materials was documented; four (20%) respondents strongly disagreed; five (25%) were

not sure whether requirements of the project materials was documented; and three (15%) respondents agreed that requirements of the project materials was documented. Hence, this result ($\bar{x}$ =2.35) shows that greater part of the respondents responded that requirements of the projects materials were not documented.

Respondents were asked if projects potential sources were identified, and four (20%) respondents disagreed that it was identified; two (10%) respondents strongly disagreed; eight (40%) respondents were put themselves as neutral; five (25%) respondents agreed and one (5%) of the respondent strongly agreed that potential sources were identified. The average mean ($\bar{x}$ =2.95) suggests that some sources were identified.

In addition respondents were asked if appropriate quotations, bid, offers or proposal were obtained, and five (25%) disagreed that it was obtained; one (5%) respondent strongly disagreed; six (30%) respondents put themselves as neutral; six (30%) respondents agreed and two (10%) of the respondents strongly agreed that appropriate quotations, bid, offers or proposal were obtained. The average mean ($\bar{x}$ =3.15) implies that appropriate quotations, bid, offers or proposal were obtained.

Respondents were asked about choosing from among potential sellers, and four (20%) disagreed; two (10%) respondents strongly disagreed; six (30%) were uncertain about it; six (30%) respondents agreed and two (10%) of the respondents strongly agreed that potential sellers were chosen. The average mean ($\bar{x}$ =3.1) implies that some potential sellers were identified.

In response to the question that was intended to know about the management of relationship with the seller, four (20%) of respondents disagreed; three (15%) of respondents strongly disagreed and eight (40%) respondents were uncertain, whereas three (15%) and two (10%) respondents agreed and agreed respectively that the relationship with the sellers were managed. Therefore, it can be analyzed based on the response of the majority ($\bar{x}$ =2.85) that the relationship with the sellers were not managed.

The final question put forward to the respondents was whether contract was completed and settled properly; and eight (40%) respondents disagreed that was completed and settled properly, two (10%) strongly disagreed; eight (40%) put themselves on neutral, and two (10%) respondents agreed that contracts were completed and settled properly. Based on this result ($\bar{x}$ =2.5), a conclusion reached that contracts were not completed and settled properly.

Hence, based on the above elaboration and the average mean of the factors under project procurement management, which is ($\bar{x}$ =2.82), it was shown that the practice of project procurement management was not fully practiced on SW development projects.

In addition half of the interviewees (50%) added the organization don't have structured purchasing or contract administration methods, doesn't have well established purchasing/ procurement and the remaining respondents explained they have less knowledge about the concept of project procurement.

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter is the final part of the study. First, important findings are summarized from the previous chapter. Then, based on the summary of findings conclusions are inferred. Finally, recommendations are provided for the study organization and for further study.

5.2. Summary of the Major Findings

- The response rate is 100 percent which is out of the 20 questionnaires distributed, all 20 were returned. In addition eight INSA's project management department employees were interviewed.
- Most respondents were male (22 out of 28) and female (6 out of 28), having 78.6 % and 21.4% of the total, respectively.
- With regards to level of education of the respondents, there were twelve (42.9%) respondents were MA /MSc holders and thirteen (53.6%) respondents were BA/BSc holders.
- In relation to the position of the respondents, six (21.4%) respondents were project managers, five (17.9%) respondents were team leaders, five (17.9%) respondents were supervisors, ten (35.7%) were technical experts and the remaining two (7.1%) respondents were support staffs.
- Regarding the major challenges of software projects, respondents responded that clarity in scope, time, cost, quality, risks, and availability of necessary resources are the major challenges of software projects.
- In relation to the areas of improvements, majority of the respondents agreed that coordination and communication among staffs, human resources and customers/stakeholders management were practiced in SW development projects.

- Regarding the status of the project success, thirteen (65%) respondents rated INSA software projects as not successful; five (25%) respondents put it as fairly successful and the remaining two (10%) rated it as projects that was successful.
- The findings of the analysis for the project scope management shows that requirements were not clearly defined from the beginning phase of the project; scope was not verified, and changes to the project scope was not controlled.
- The response of the respondents on the intent to know project time management practice, it has been clearly seen that time/schedule management plan was not developed, duration of the activities were not estimated and changes to the project schedule was not controlled.
- In the analysis of the responses of the respondents to figure out if project quality management was practiced in the project, it was identified that practice of project quality management was not practiced. Respondents also indicated that the organization lacks developing a project implementation mechanism that gives a clear understanding of the expected project outputs and the quality specifications. They also added that the software products were not met the needs, requirement and expectations of the customers and stakeholders despite the fact it might take longer time or more resources.
- Based on the finding of the analysis made on project cost management, majority of the respondents disagreed that the practice of the cost plan management were performed in the project. Majority of the respondents stated that the projects final cost exceeds the planned budget due time delay, poor budget planning, inflation of technology products, unforeseen risks and delay in funding from customers or product users. In addition changes to the projects budget was not controlled.
- In response to the questions about the project risk management, it has been found out that the project management department were not practiced project risk management in a way that projects are expected to perform. Respondents clearly articulates that from the beginning of the projects risk management plan was not well developed and it's difficult to monitor and control risks associated with software products such as crashes during the testing phases of software products.
- The finding on the practice of project integration management also revealed that the project critically lacks coordination and collaboration among different activities and teams of the project management department.

- With respect to the practice of project stakeholder management results suggests that the practice was well performed. Respondents replied that all the stakeholders were identified and communication between them was effective, and all the stakeholders were engaged as there was a frequent meeting with stakeholders and customers to assure clear communication and mutual understanding.
- In relation to project human resource management, the project management department have skilled and experienced man power; available HRs were assigned to different teams; and projects teams were developed and controlled in a regular manner.
- In the analysis of the responses of the respondents to figure out if project communication management was practiced in the project, it was spotted that project communication management was partially practiced.
- Regarding the project procurement practices of the project, respondents responded that resources needed for the project wore not fully determined from the beginning; the requirements of the project materials were not documented; and contracts were not completed and settled properly.

In general, the findings of the study shows that majority of the PMBOK knowledge areas were poorly practiced, whereas some of the knowledge areas were partially practiced.

5.3. Conclusions

In the above section of summary, major findings are listed. Based on the findings, conclusions are inferred in the study. In this section, the driven conclusions are discussed below.

The major objective of the study was to assess the project management practices of software development projects in Information Network Security Agency based on the ten PMBOK knowledge areas and findings of this study have led to the following conclusions.

- Poor project management practices and applications leads majority of INSA software development projects to unsuccessful.
- Regarding project scope management the organization under study has a poor project scope management practice. Plan scope management were not defined, requirements were not clearly defined from the beginning and scope was verified in undertaking project activities.

- Project time management is also not practiced. According to the data obtained and the analysis made based on it, most of the projects in the study organization are delayed from their planned completion time. Duration of activities in the projects were not well determined and as result it is impossible to determine the actual time needed for each activity and the whole project schedule of completion. So there was a poor time management practice in the study organization.
- Project quality management was not well practiced by INSA software projects. The organization lacks developing a project implementation mechanism that gives a clear understanding of the expected project outputs and the quality specifications. Software products were not met the needs, requirement and expectations of the customers and stakeholders despite the fact it might take longer time or more resources.
- Project cost management was also not well practiced. The projects final cost exceeds the planned budget due to time delay, poor budget planning, inflation of technology products, unforeseen risks and delay in funding from customers or product users. Changes to the project budget was not controlled properly.
- Regarding project risk management the organization under study has a poor project risk management practice. Risks were not properly identified, quantified, prioritized and planned even if project risk plan is one of the most important component of the overall project.
- Regarding the project integration management in the study organization that there is no as such good integration practice in the projects that the organization runs.
- With respect to the practice of project stakeholder management results suggests that the practice was well practiced. Stakeholders were identified and communication between them was effective, and all the stakeholders were engaged as there was a frequent meeting with stakeholders and customers to assure clear communication and mutual understanding.
- Regarding project human resource management the study organization was well practiced project HRM. The study organization have skilled and experienced man power; available HRs were assigned to different teams; and projects teams were developed and controlled in a regular manner.
- In the study organization the project communication management is also partially practiced. There is an established system for transferring and disseminating information to the

concerned bodies in the project. The result of the analysis confirms that the communication system of the study organization is organized.

- Project procurement management practices were not fully practiced. Resources needed for the project were not fully determined from the beginning; the requirements of the project materials were not documented; and contracts were not completed and settled properly.

To conclude, the study organization have major challenges in practicing the project management knowledge areas. Out of the project management knowledge areas; Project scope, time, quality, cost, risk, integration and procurement management were the major challenges and they were not effectively practiced in the projects. Through the findings of this study some of the project management knowledge areas were practiced and identified as an areas of improvements. Of the knowledge areas; project stakeholders, human resource, and communication were practiced adequately but not in complete intent.

5.4. Recommendations

To enhance the project management practices and bring effectiveness in project management, improvement efforts need to be undertaken to improve the existing practices. Based on those major findings and the conclusions, it is recommended that the study organization should take the following measures:

- To improve the project scope management practices the organization should define and prepare project scope management, which incorporates definition of plan scope management, requirement and scope definition, creating WBS and methods to control changes to the project scope.
- The agency should develop time/schedule management plan to define and sequence activities, estimate the duration of activities, developing schedule and controlling changes to the project schedule.
- The organization should identify the quality standards and specifications of the projects, regularly review and evaluate the projects performance and monitor the results to comply with the quality standards and specifications.

- INSA should also practice project cost management by determining the resources needed, estimating the project cost in relation to the budget allocated and controlling changes to the project budget with a well-defined cost plan.
- Major concern should also be given to project risk management by preparing the risk management plan to identify, register, prioritize risks and their implication on the project; and develop risk response plan, so as to monitor and control the identified risks.
- Project integration management should extensively be applied in the project to effectively coordinate the project activities and teams to facilitate the overall project performance.
- The organization under the study should determine the resources needed for the projects, document the required materials, identify potential sources and settle and complete contracts properly.
- The organization under this study should consolidate the partially practiced project management practices.
- The agency should train all staffs of the project management department about how to manage projects

5.5. Suggestions for Further Research

It would be interesting to do a study in order to validate or contradict what was found here. It would also be interesting to conduct a future study to see if these findings remain constant or will be changed with times. Since the purposive judgmental sampling method is one limitations of the study, it would be interesting to conduct a large scale study to analyze a statistically significant sample. This would allow for greater reliability and for generalizations to be made based on the findings.

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Appendix A: Questionnaire

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

DEPARTMENT OF PROJECT MANAGEMENT

Research Questionnaire

Dear respondents:

This questionnaire is conducted to collect data for the research thesis on: ***An Assessment of the Project Management Practices of Software Development Projects: The case of Information Network Security Agency (INSA).*** The information is going to be used as a primary data for this research believing that your frank and genuine responses will contribute vastly to the quality of the findings of this study. The researcher would like to ask you to kindly complete this questionnaire, as truthfully as possible as the responses you provide will be kept confidentially and will be used only for the study under consideration.

Thank you in advance for taking part in this endeavor.

Kind Regards

Mohammed Birhanu

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General Direction

- *Please DO NOT write you name since the identity of the respondent is not necessary.*
- *Put "✓" or "X" mark on your choice;*
- *All your responses will be analyzed anonymously, thus will NOT be traceable to you.*
- *If you cannot get any satisfying choice among the given alternatives, you can write your answer in the space provided at the end of the questionnaire;*

Part I: Demographic characteristics and general background of the respondents

1. **Sex**:

Male ☐ Female ☐

2. Age:

21-30 ☐ 31-40 ☐ 41-50 ☐ Above 50 ☐

3. Educational Level

PHD ☐ MA/MSc ☐ BA/BSc ☐ Diploma ☐ High School completed ☐

If other, please specify_____

4. Field of Specialization (The field you have studied) _____

5. Position:

Director ☐ Project Manager ☐ Team Leader ☐

Supervisor ☐ Technical Expert ☐ Support Staff ☐

6. Service period in the project work

Below 3 years ☐ 3-5 years ☐ 5-8 years ☐ Above 8 years ☐

Part II. Major Challenges of Software Project

No.	Major Challenges of Software Projects	Yes	No	Neutral
1	**Clarity in scope**			
2	**Time**			
3	**Cost**			
4	**Quality of Software products**			
5	**Risks**			

6	**Coordination among staffs**			
7	**Human resources**			
8	**Communication among staffs**			
9	**Resources**			
10	**Customers and stakeholders**			

If you have an opinion on other challenges, you can mention it

. _____

. _____

. _____

_____

2. Success Status of Software Projects

Very successful ☐ Successful ☐ Fairly Successful ☐ Not Successful ☐

Part III: Questions related to the 10 Knowledge Areas of Project Management according to PMBOK

Based on your experience in the INSA, please feedback to what extent do you think the following factors listed under each project management knowledge areas are exercised/practiced in the project management department.

1=Strongly Disagree	***2= Disagree***	***3= Neutral***	***4= Agree***	***5=Strongly Agree***

No.		**1**	**2**	**3**	**4**	**5**
	1. Project Scope Management					
1	Plan scope management was defined					
2	Requirements were clearly defined from the beginning					
3	WBS was created (Work Breakdown Structure is a key project deliverable that organizes the team's work into manageable sections)					
4	Scope was verified (formalizing acceptance of the project scope)					
5	Changes to the projects scope was controlled					

	2. Project Time Management					
1	Time/schedule management plan was developed					
2	Activities were defined					
3	Activities were sequenced					
4	Duration of activities were estimated					
5	Changes to the projects schedule was controlled					
	3. Project Quality Management					
1	Quality standards of the projects were identified					
2	Quality standards of the projects were reviewed					
3	Projects performance were evaluated on regular basis					
4	Results were monitored to check if they comply with the standards					
	4. Project Cost Management					
1	The quantity of the necessary resources were determined					
2	Cost plan was well-defined					
3	The project cost was estimated					
4	The required budget was determined					
5	Changes to the project budget was controlled					
	5. Project Risk Management					
1	Risk management plan was developed					
2	Risks were identified and registered					
3	Risks were prioritized and their implication on the project was estimated					
4	Risk response plan was developed					
5	The identified risks were monitored and controlled					

	6. Project Integration Management					
1	Project plan was developed by taking the results of other planning processes and putting them into consistent document.					
2	Project work was managed					
3	Project work was monitored and controlled					
4	There was effective coordination of project activities					
	7. Project Stakeholder Management					
1	Project stakeholders were identified					
2	Stakeholder management plan was defined					
3	There was effective communication between project stakeholders					
4	Stakeholders engagement was controlled					
5	Project progress was reviewed frequently with the customer					
	8. Project Human Resource Management					
1	Project roles, responsibilities and required skill were identified					
2	Organizational chart and position descriptions were clear					
3	Availability and assigning human resource					
4	Project team was developed					
5	Project team was managed and controlled					
	9. Project Communication Management					
1	The information and communication needed for the project were determined					
2	Making needed information available to project stakeholders					
3	Collecting and disseminating performance information					
4	Generating, gathering, and disseminating information to formalize phase or project completion					
5	Control communication					

	10. Project Procurement Management					
1	Resources needed for the project were determined					
2	Requirements of the project materials was documented					
3	Potential sources were identified					
4	Appropriate quotations, bid, offers or proposal were obtained					
5	Choosing from among potential sellers					
6	The relationship with the seller was managed					
7	Contract was completed and settled properly					

If you have an opinion for other factors, please describe;

- _____
- _____
- _____

_____

********** ***Thank you for your time*** **********

Appendix B: Interview Questions

ADDIS ABABA UNIVERSITY

COLLEGE OF BUSINESS AND ECONOMICS

SCHOOL OF COMMERCE

DEPARTMENT OF PROJECT MANAGEMENT

Interview Questions

Dear respondents:

This interview is conducted to collect data for the research thesis on: ***An Assessment of the Project Management Practices of Software Development Projects: The case of Information Network Security Agency (INSA).*** The information is going to be used as a primary data for this research believing that your frank and genuine responses will contribute vastly to the quality of the findings of this study. The researcher would like to ask you to kindly complete this interview session, as truthfully as possible as the responses you provide will be kept confidentially and will be used only for the study under consideration.

Thank you in advance for taking part in this endeavor.

Kind Regards

Mohammed Birhanu

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Interview Questions

1. Tell me about your educational background, specialization, position and experience?
2. How do you observe the practice of project management in software development projects?
3. What are the major challenges in practicing project management?
4. Were the project requirements (scope), constraints and specific schedule dates clearly identified and communicated to all stakeholders?
5. Do roles and responsibilities, clearly communicated to all team and stakeholders?
   - If your answer is no, how did you manage it?
6. Did the project take longer than planned?
   - If yes, what kind of related costs does the project incur?
   - If no, how did you manage it?
7. Did the final cost of the project exceed the initial budget?
8. Was there a project scope change during the execution phase?
9. Were the time schedule, budget and quality of the deliverables monitored closely throughout the project's life-cycle? And how?
10. Did you notice early warning signs of problems that occurred in the project, and did you responded in time?
11. Did the final deliverables of the project satisfy the needs or requirements of all stakeholders?
12. Tell me other problems that are available in software development projects?
13. Please forward any additional comments (ideas) you have on the implementation of Project Management in software development projects undertaken by INSA.

Thank You!