Addis Ababa University

College of Business and Economics

School of Commerce

Assessing Scope Management Practices in New Product Development Projects: The case of dVentus Technologies

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Research Project Submitted to Addis Ababa University, School of commerce in Partial Fulfillment of the Requirements for the award of Masters of Arts Degree in Project Management

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October, 2021 G.C

Addis Ababa, Ethiopia

ADDIS ABABA UNIVERSITY

SCHOOL OF COMMERCE

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ENDORSEMENT

This is to certify that the research project work titled "**Assessing Scope Management Practices in New Product Development Projects: The case of dVentus Technologies**" is prepared by Getaneh Alesew and submitted in partial fulfillment of the requirements for the award of the degree of Masters of Arts in Project Management complies with the accepted standards of the university's regulations with respect to originality and quality.

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STATEMENT OF DECLARATION

I, Getaneh Alesew, declare that the research titled " **Assessing Scope Management Practices in New Product Development Projects: The case of dVentus Technologies**" is the result of my own efforts, and that all sources of materials used in the study have been acknowledged properly. I developed this research fully on my own, with the exception of the advisor's opinions and ideas. To the best of my knowledge, this study has not been submitted for a partial fulfillment of any academic study at this or any other university.

Name: Getaneh Alesew

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ACKNOWLEDGEMENT

First of all, I would like to thank the almighty God for every opportunity that I am given. Next, my deepest gratitude shall be given to my family who are with me through all challenges and to my friends who have helped me all the way. My heartfelt thank goes to my advisor, Dr Adane for his unreserved assistance since the beginning of this research project all the way to the completion. Finally, I would also like to thank the organizations and all the individuals who contributed directly or indirectly to this study and provided the necessary information and support for the realization of this study.

Table of Contents

Contents

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

NDA: Non-Disclosure Agreement

NPD: New Product Development

PMI: Project Management Institute

PMBOK: Project Management Body of Knowledge

WBS: Work Breakdown Structure

R&D: Research and Development

SPSS: Statistical Package for the Social Sciences

ABSTRACT

A project's success depends on its management. The unlimited market need should be compromised with the limited resource through an application of proper project management technique. Throughout all the phases of a project, the management team takes care of the time, cost and quality constraints of a project. There are several knowledge areas that a project manager must understand and implement in order to be successful in those constraints. This study was conducted to assess one, but most critical knowledge area of project management (project scope management) on New Product Development projects of dVentus Technologies. It examined how dVentus Technologies manage the scope of its New Product Development projects through the analysis of the elements of project scope management (Plan Scope, Define Scope, Collect Requirements, Create WBS, Validate Scope and Control Scope). A descriptive research design was employed for the study. A Census of the whole population has been involved in the data collection. Accordingly, primary data was collected through interviews and questionnaires from 42 employees working in New Product Development projects of dVentus Technologies. A mix of both qualitative and quantitative approaches were implemented to collect the primary data from respondents. Additionally secondary data obtained from a review of related literature and archived documents were utilized. After a reliability measurement of the variables by Cronbach alpha, the descriptive statistics and mean was computed to interpret the results. Accordingly, the case organization has a major problem of collecting requirements and controlling the scope with a mean value being below average. This indicates an absence of a well-organized requirement management plan resulting in uncontrolled modification of project scope. The study also touched on the challenges for effective implementation of project scope management in the case organization and found that setting unrealistic deadlines makes scope management the most challenging. The recommended solutions for the identified problems are listed in the last chapter of this document. The study recommends future research in the causes and effects of the problems identified. As there are remote teams working in NPD projects, Communication management would also be an interesting issue next to innovation and technology management.

Key words; Project Management, Project Scope Management, New Product Development, dVentus Technologies

CHAPTER ONE
INTRODUCTION

1.1 Background of the study

The adoption of good project management can help organizations meet their strategic business objectives through a successful implementation of projects. Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements (PMI, 2017, p.36). Project managers must not only aim to achieve the project's requirements, they must also make the entire process easier to follow in order to meet the needs and expectations of everyone involved in or affected by the project activities (Schwalbe, 2015). There are ten knowledge areas identified by PMBOK Guide which are required to be applied by effective project managers of most projects (i.e., Project Integration Management, Project Scope Management, Project Schedule Management, Project Cost Management, Project Quality Management, Project Resource Management, Project Communications Management, Project Risk Management, Project Procurement Management and Project Stakeholder Management) (PMI, 2017). Project scope management is the topic of interest in this literature.

A project needs an accurate mapping and defining of all sets of processes involved in order to complete and deliver the overall work on time (i.e., project scope management). Project scope as of the term, is the description of the boundaries of the project. It defines what the project will deliver and what it will not. Scope is the view that all stakeholders have from the project; it is a definition of the limits of the project (PM4DEV, 2006). Project Scope management is the process whereby the outputs, outcomes and benefits are identified, defined and controlled (Murray_Webster & Dalcher, 2019). Project Scope Management is a very important function that can impact the level of the project management success. In any project environment, project scope management is considered as one of the most important functions that need to be accomplished by a project manager.

Project scope management mainly focuses on controlling and making sure whether or not the project is being implemented as planned. It helps project managers, coordinators, supervisors and all other stakeholders to get focused on the major work and activity as well as allocate the right resource to successfully get the job done. Project scope management process contains the procedures which confirm that the project will be completed as planned and intended if it only comprises the required work (PMI, 2017).

On the other hand, New Product Development (NPD) is a critical organizational activity that involves technical, marketing, and financial risks while providing future commercial opportunities (Pons, 2007). It usually follows a product development process, often divided into stages, phases or steps, by which a company conceives of a product idea. Researching current market demand for a new product and developing the product that fills the gap is the main purpose of new product development. New Product Development is characterized by complex interrelated activities with large uncertainties about the solution, so that the full scope of the project cannot be predicted ahead of time (Pons, 2007). Project scope management receives more attention than other project management knowledge areas in such projects where little is known about future market needs.

Poor management of project scope is amongst the primary causes for project failures. Project failures usually happen either because of not giving enough time in defining the work, because of not having common understanding/consensus amongst stakeholders, lack of scope change management and so on. Project scope management should be given the highest attention because the change in scope will directly affect time, cost and quality constraints of a project (Sehgal, 2017). The effect is highly visible in new product development projects. Hence, this research assessed the scope management practice of a project engaged in a new product development taking a case of a particular company called dVentus Technologies.

1.2 Background of dVentus Technologies

dVentus Technologies PLC. is an ISO 9001: 2008 certified high technology Company of US origin incorporated in 2010 in Addis Ababa, Ethiopia. dVentus designs, develops and manufactures smart grid solutions, energy efficient power generation and distribution solutions. dVentus is situated strategically to respond to the needs of the international market with solutions specifically targeted for clean energy, energy efficiency and smart grid technology sectors.

The company produces customized solutions to its clients from concept design, R&D, to product development and manufacturing in its state-of-the-art facility, creating innovative and energy-efficient products driven by technological insights and environmental considerations. Since incorporation, dVentus has developed a range of innovative and technologically advanced products.

The company is project oriented in that it launches projects for a specific product or services. In projects whose output are services like software projects the agile project management methodology is exercised. In such projects dVentus implements scrum framework where tasks are completed within the allotted sprints. The teams work across different projects both physically and remotely as necessary. For those design teams working remotely, version control of the design release is done through different cloud platforms. Additionally, a project management tool called redmine is used by project managers and team members for task assignment and project follow up.

In dVentus, new product development undergoes through the process of opportunity identification, concept development, product design, process design and manufacturing. Before beginning the development process, the scope of the product to be developed is stated at the concept design stage. Accordingly, the project scope and its requirements are identified and mentioned. The project for a specific version of new product development ends when the design of the product is released for production. All the way through this process, until the project closure, the scope defined should be maintained. Irrespective of the type of project, scope management is one of the knowledge areas which is practiced for the effective completion of the project.

1.3 Statement of the problem

In a new product development process, changes arose frequently as a result of the product's need to fit with current market demands. The unexpected changes during the concept development process affects the scope of the project at the design stage. Those changes have a direct and indirect effect on project activities, hence on the scope of the project.

As mentioned in the introductory part, dVentus launches multiple projects. Single Phase Digital Electric Meter, Single Phase Smart Electric Meter, Three Phase Smart Electric Meter, Smart Water

Meter, Meter Data Management System are some of the NPD projects hosted by dVentus Technologies. But the projects take longer time to complete because of continual change of product features. Though it's necessary to satisfy the dynamic market need for the products, the frequent change in the requirements of the product affects the scope of the project. The shift in the project scope ultimately affects the time and cost of the project. But in dVentus the effect is highly visible on the time to market of the product. Studying how those changes are being managed in dVentus is presumed to be important to identify the problem. The researcher's interest in the topic stems from personal observation of the implementation of various NPD projects at dVentus Technologies.

Most of the NPD projects in dVentus experience time delay and scope variation due to various reasons. These variations necessitate a strong scope change management skill. Project scope management in dVentus is presumed to be applied in a traditional and informal way. The components of project scope management are not well known to the project managers. WBS is done before the scope is clearly defined and the requirements are collected. In addition, all stakeholders of the project, especially end users are not consulted in the decision making process of scope change. User involvement in managing the scope of a new product development process plays a vital but invisible role (Maha, 2018).

Empirical studies related to project scope management have been identified and analyzed. Many researches in project scope management have been focused on software and construction projects. The researcher noticed that there is a research gap on managing the scope of new product development projects.

This research was conducted at the aim of investigating the procedures followed in managing the scope of dVentus 's new product development projects. Through the assessment of the aspects of project scope management, the research tried to identify the gap where dVentus lacks to implement. Furthermore, the research attempted to demonstrate the significant problems that were experienced during the application of project scope management at dVentus Technologies NPD projects. Thus, the study was conducted to describe how project scope management is being practiced based on the following research questions.

1.4 Research questions

This particular research seeks to address the following questions to capture and meet the purpose of the study.

- How project scope management is practiced in dVentus Technologies new product development projects?
- What are the challenges encountered in managing the scope of NPD projects of dVentus Technologies?
- Which aspect of project scope management does dVentus Technologies lack to manage the scope of NPD projects?

1.5 Objectives of the Study

1.5.1. General Objective

The overall objective of the research is to assess the implementation of project scope management at dVentus Technologies to deal with the inevitable changes encountered in NPD projects. Through the identification of knowledge gaps in the issue of scope management, the research is aimed to provide an informative input for the improvement of NPD project management, hence project success in time, cost and quality metrics.

1.5.2. Specific Objectives

The specific objective of the study is

- To assess the project scope management practice of dVentus Technologies on new product development projects.
- To identify the challenges encountered in implementing proper scope management process in dVentus NPD Projects.
- To identify the aspect of project scope management where a knowledge gap in dVentus exists.

1.6 Significance of the study

The motive behind this research is that the researcher noticed a delay of product delivery because of continuous scope changes. Assessing the practice of project scope management at dVentus provides enough information about what is going on the ground. Hence the output of the research will serve as a base in resolving knowledge gaps in successful management of NPD Projects of dVentus Technologies. The results of this research can also be adopted to other R&D companies involved in a new product development like dVentus to deliver their products on time when the market needs. Though the project area may vary, the applied principle of scope management is closely related. Therefore, other project types can benefit from the scope management technique used for new product development projects. Additionally, as this knowledge area is directly related with other project management knowledge areas, researchers may use the results of this study as an input for other knowledge areas especially for project cost management and project time management. Furthermore, by identifying the major challenges of project scope management, the research gives important information for proactive decision making of scope change. This research can also be an initial for future studies related to new product development and project management especially in Ethiopian context. Furthermore, the research will have contribution for academic institutions which offer project management course and trainings.

1.7 Scope of the study

The scope of the study was bound to research the implementation of one of the knowledge areas of project management, called scope management in projects involved in new product development taking a particular company into consideration. Though there are other project management knowledge areas to be studied, in NPD projects where scope variation is highly experienced, the issue of scope management is given the highest priorities in the eyes of the researcher. Given the time frame and available resources to complete this research, its scope is delimited to new product development projects at dVentus technologies.

1.8 Limitations of the study

The findings of this research are primarily based on data collected through questionnaire and interview from dVentus employees. Hence the study has limitation in respondents' willingness to

fill the right information because of the fear of exposing the company's operations and NDA agreements. Additionally, the difficulty in accessing well-organized project documents to strengthen the validity and reliability of respondents' data makes this study limited.

1.9 Definition of key terms

- **Project scope management:**
  - Process of ensuring that the project includes all the work required, and only the work required, to complete the project successfully (PMI, 2017).
- **Project scope**
  - The work performed to deliver the outputs of the project with the specified features and functions (PMI, 2017, p. 125).
- **Product Scope:**
  - The features and functions that characterize the product, service or result (PMI, 2017, p. 125)
- **Scope Creep**
  - The uncontrolled expansion to product or project scope without adjustments to time, cost, and resources (PMI, 2017, p. 576).
- **New Product Development:**
  - The process of conceptualization, design, development and marketing newly created or rebranded goods or services (TechTarget, 2019).
- **Sprint**
  - A certain, time-boxed period of a continuous development cycle when a scrum team works to complete a set amount of work (Kukhnavets, n.d.)

- **Agile**

  - An iterative and incremental based project management methodology, where requirements are changeable according to customer needs instead of an in-depth planning at the very beginning (Sharma et al., 2012).

- **Scrum**

  - An iterative incremental framework utilizing an agile mindset designed to implement development projects through a structured cycle of work called sprint (Sutherland, 2010).

1.10 Organization of the study

According to the proposal, the study is organized into five chapters. The first chapter which is the introduction contains background of the study, statement of the problem, basic research questions, objectives of the study, definition of terms, significance of the study and the scope. It is the major area where the situations existed and preliminary subject matter together with the objective of conducting the study is discussed.

The preceding chapter, literature review presents relevant journals pertaining to Project scope management with regard to new product development. It encompasses an introduction, theoretical review, empirical review and the conceptual framework of the study.

The type and design of the research, the subjects of the study, sources of data; data collection tools/instruments to be employed; procedures of data collection and the methods of data analysis used are discussed in the third chapter.

Chapter four summarizes the results and findings of the study and interpret and/or discuss the findings.

The final chapter, chapter five contains three sections that includes a summary of findings, conclusions and recommendations.

CHAPTER TWO
LITERATURE REVIEW

Reviewing literature related to the issue of managing the scope of NPD projects helps the researcher to identify the extent to which the topic is studied, identify the gap and contribute systematic knowledge. Accordingly, relevant literature related to project scope management in new product development are going to be reviewed in this chapter. The first part presents the general truth of the subject matter through theoretical review of related literature while the second part presents the empirical result of previous research related to project scope management.

2.1 Theoretical Review

Scope is the boundary/limitations of a product or project. The boundary limit of a project and product is set due to various reasons. Time limitation, resource limitation, budget limitation, environmental factors, technological factors, geopolitical factors, product dependencies are few to mention. In new product development projects technological factors and interdependency of requirements are dominant factors of scope change. Here, it should be understood that scope includes both project scope and product scope. Both are interdependent with each other as one has an impact on the other.

2.1.1 Project Management

A project is a temporary endeavor undertaken to create a unique product, service. In order to provide these results, a project goes through initiation, planning, execution, monitoring and closing phases. The activities involved in all phases of a project needs to be managed. Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements (PMI,2017, p.36). Those project requirements are constrained by Cost, Time and Scope. Hence, the role of a project manager is to maintain the triple constraints of a project through an application of knowledge areas of project management. The ten knowledge areas identified by (PMI, 2016) are Project Integration Management, Project Scope Management, Project Schedule Management, Project Cost Management, Project Quality Management, Project Resource Management, Project Communications Management, Project Risk Management, Project Procurement Management, and Project Stakeholder Management.

2.1.2 New Product Development

New product development is the process of researching the need for a new product, designing and releasing it for production. Its purpose is to acquire, maintain and increase a company's market share by satisfying a consumer demand (TechTarget, 2019). The NPD process consists of the activities carried out by firms when developing and launching new products (Bhuiyan, 2011). Different frameworks are adopted by organizations to effectively develop new products. New product development (NPD) process, the IDEO process, the Scorecard-Markov model, the Booz, Allen, and Hamilton (BAH) model, are some of the most popular models. The best known model (BAH), provides the following stages of new product development.

- **New Product Strategy: -** Link the NPD process to company objectives and provides focus for idea/concept generation and guidelines for establishing screening criteria.
- **Idea Generation:** Searches for product ideas that meet company objectives.
- **Screening:** An initial analysis to determine which ideas are pertinent and merit more detailed study.
- **Business Analysis**: - Evaluation of the ideas on the basis of quantitative factors, such as profits, Return-on-investment (ROI), and sales volume.
- **Development**: - Realizing the idea (concept) into a physical entity (product).
- **Testing**: - Conducting preliminary commercial experiment necessary to verify business judgements
- **Commercialization**: - Launching the product.

Zirger & Maidique (1990) simplify the NPD process into R&D, Marketing and Manufacturing stages while Bajaj et al., (2004) summarize the process into two stages: Design and Manufacturing. The design phase has the potential to influence downstream manufacturing and has been linked to cost and lead time. Harmancioglu et al. (2007) argue that the new product development is as good as your process. Having a well-structured new product development approach provides a clear roadmap for the development process, hence important to achieve a successful new product.

Depending on the type of the project, there are different types of project management methodologies from which the principle is inherited. Scope flexibility is one factor to consider while deciding the choice of project methodology. The two common and mostly applied methodologies for project management are PMBOK and SCRUM (Obrutsky, 2016). PMBOK is a methodology where all the planning process is done at the beginning and then starts the development process, whereas SCRUM methodology focuses on starting the development process and delivering iterative design release versions within a certain time frame called sprint. SCRUM is the most appropriate option for complicated, complex and chaos scenarios where requirements and technology are far from agreement and certainty. Most new product development projects fall into the scrum methodology due to continual change of product characteristics.

SCRUM projects are usually vulnerable to scope creep because of a regular change of specifications by stakeholders in every sprint. In relation to such scope creeps, unanticipated risks occur. An effective management of scope creep is found to be one of the most productive parameters which can bring in the expected level of project success. An expanding project may at first be considered "A Good Thing." but under closer scrutiny it can be seen as problematic simply because there may be no end in sight for the project (Walker, 2012). Little changes unseen at the early stage of product development will come visible later having an impact on cost and time to market the product.

2.1.3 Project Scope management

Project Scope Management is one of the project management knowledge areas which includes the processes required to ensure that the project includes all the work required, and only the work required to complete the project successfully (PMI, 2017). Accordingly, managing the project scope is primarily concerned with defining and controlling what is and is not included in the project. It involves defining and maintaining the limit of the requirements of the project so that the project will achieve its intended objective with the planned time and resources.

The project for a new product development ends when the design of the product is released for production. During the development process until the project closure, the project scope should be maintained in parallel with the product scope. In this process of development, the purpose of scope change management is to protect the viability of the approved Project Contract (or agreement) and

the approved Project Logical Framework (Log frame) (PM4DEV, 2006). The scope of the project should be managed in a controlled way to avoid scope creep. Proper scope creep management is one of the most productive elements of project management that can bring in the required level of project success (Madhuri et al., 2018).

Practitioners of project management realize that scope change is an inevitable reality for any project (Millhollan, 2008). So, project managers should not be afraid of scope change, but be careful to manage the changes and inform key stakeholders about the effect of the change on cost, time and schedule (Khan, 2006). Having the information about the effect of the scope change on other project parameters allows the stakeholders to decide the necessity of the change and prepare for the effect.

There are a series of activities or procedures followed to effectively implement project scope management. Review of literature shows that, though different authors present different models to categorize the process, the basic concept is inherited from the Project Management Body of Knowledge (PMBOK). According to (Bredillet, 2007) these processes are divided into six main steps (i.e., conceptual development, the scope statement, work authorization, scope reporting, control system Process and project closeout). Maha(2018) on the other hand groups project management processes into requirement collection, scope definition, scope verification and scope controlling. The scope verification process is renamed on the sixth edition of PMBOK into scope validation so that the process is not only about accepting deliverables but also validating that the deliverables deliver value to the business (PMI, 2017). In all models, the ideal way for regulating project scope is with a direct, basic strategy that project stakeholders understand and can follow, just as the shortest distance between two places is a straight line (Millhollan, 2008). According to Maha(2018), approval of the user is the one measurement of project scope success. Hence, user involvement is one fundamental aspect of the project scope management process. According to the well-known global standard (i.e. PMI), project scope management process includes; Plan Scope Management, Collect Requirements, Define Scope, Create WBS, Validate Scope, Control Scope (PMI, 2017). Because PMI defines itself as a "standard and guideline" among other organizations (Rankins, 2013), this definition of scope management is used as the basis for this research. Accordingly, these processes are discussed in the following sections. There are inputs, outputs and tools & techniques for each process.

2.1.4 Elements of Project Scope management

2.1.4.1 Plan Scope Management

Plan Scope Management is the process of creating a scope management plan that documents how the project and product scope will be defined, validated, and controlled (PMI, 2017, p.127). It starts with a project concept that reflects a business need and culminates with a decision on whether or not to proceed with the project execution by producing the comprehensive design (Gibson et al., 1995). Project charter, project management plan, enterprise environmental factors and organizational process assets are analyzed through meetings and expert judgments to come up with the scope management plan (PMI, 2017).

2.1.4.2 Collect Requirements

Collect Requirements is the process of determining, documenting, and managing stakeholder needs and requirements to meet objectives (PMI, 2017, p.130). Requirements are collected from stakeholders by using tools and techniques like interviews, focused group discussions, facilitated workshops, group creativity techniques, group decision making techniques, questionnaires, surveys, observations, prototypes, and review of previous similar project documentations. The key benefit of this process is that it provides the basis for defining the product scope and project scope (PMI, 2017).

2.1.4.3 Define Scope

Defining project scope is a process of identifying project information, and developing a detailed description of the project in the format of project scope package, for execution (Dumont et al., 1997). By defining which of the requirements collected will be included in and excluded from the project scope, this process clearly describes the project, service, or result boundaries (PMI, 2017). Define Scope is the process of developing a detailed description of the project and product, hence project scope and product scope.

Product scope refers to the features and functions that characterize a product, service or result while project scope is the work performed to deliver a product, service or result with the specified

features and functions (PMI, 2017). The project scope is measured with respect to the project management plan. Product scope, on the other hand, is measured against the product requirements.

Defining the scope of new products at the concept design stage is not an easy task because the product to be developed should align with the current technology. The change in technology introduces a change in the scope of the product, which in turn introduces a change in the scope of the project. In order to meet the needs of the market, companies have to manage the project creep in parallel with changes in the market need.

The tools and techniques used in defining scope are expert judgment, data analysis, decision making, interpersonal and team skills and product analysis

2.1.4.4 Create WBS

The WBS is a hierarchical decomposition of the whole scope of work that the project team must complete in order to meet the project's objectives and produce the needed deliverables (PMI, 2017). Decomposition (distribution by levels and corresponding grouping) of project works allows forming a structure of project works (Derenskaya, 2018). According to (Khan, 2006) WBS is the heart of all project scope components through which all of them interact with each other. The WBS organizes and defines the total scope of the project and represents the work specified in the current approved project scope statement (PMI, 2017).

The work breakdown structure (WBS) is used to verify the scope of a project. It works by taking user/system requirements and combining them with resources and tasks to estimate costs (Hans, 2013). However, the ability to translate requirements and tasks into deliverables is restricted. Because deliverables and tasks can be split down into requirements, these requirements may or may not be WBS-related (Tariq et al., 2020).

WBS is developed through the application of expert judgment and decomposition tools over the project management plan, project documents, enterprise environmental factors and organizational process assets (PMI, 2017). The outputs from this process are Scope Baseline and Project Document Update.

2.1.4.5 Validate Scope

Validate Scope is the process of formalizing acceptance of the completed project deliverables (PMI, 2017). The Validate Scope process uses the confirmed deliverables from the Control Quality process as an input. The Validate Scope process differs from the Control Quality process in that the former is primarily concerned with acceptance of the deliverables, while the latter is primarily concerned with correctness of the deliverables and meeting the quality requirements specified for the deliverables. The validation process is an extension of the former verification process with an addition of customer approval of the value of the deliverables. Customer acceptance documentations from this process are reviewed by project managers during project closure

The inputs for validate scope process are project management plan, project documents, verified deliverables and work performance data. Through the application of decision making and activity inspection, this process provides accepted deliverables, work performance information, change requests and project document updates

2.1.4.6 Control Scope

Control Scope is the process of monitoring the status of the project and product scope and managing changes to the scope baseline (PMI, 2017, p.152). It's used to maintain the scope baseline throughout the project. The changes and modifications in the project scope are evaluated and monitored based on the scope baseline in this phase. The uncontrolled expansion to product or project scope without adjustments to time, cost, and resources is referred to as scope creep (PMI, 2017, p.153). Through the provision of the scope baseline, WBS is one of the most valuable inputs for scope control. Control scope is concerned with monitoring the status of the project and product scope, determining whether or not a scope change has occurred, managing the actual changes that have been integrated with other project areas including schedule, cost, quality, risk, ensure that the changes are agreed and influencing the factors that can cause the scope changes (Shirazia et al., 2017, p.4).

2.2 Empirical Review

Over the past years, though it's not sufficient, a lot of empirical studies on project scope management and the issues that come with it have been done. With the aim of relating the real world experience of the topic with the theoretical agreements, the researcher reviewed the findings of previous literature about project scope management. Hence, the following section presents the empirical review of some of the studies.

Activities of new product development projects are often complex. The higher level problem is composed of sub problems. The fishbone diagram is applied to identify the constituents of the problem and the root cause. The management should be able to separate the constituents into independent entities so that the solution of one doesn't affect the other. Most of the time, decomposing the problem into completely independent sub problems is difficult (Finger & Dixon, 1989). This difficulty, the effect of the solution of one sub problem on another, imposes time and cost overrun on the solution of the master problem. Additionally, due to the inherent uncertainty nature of new product development projects, scope changes happen frequently. In more dynamic environments, such as high technology product development, scope definition becomes a continuous evolution as the impact of scope change is substantial (Abrantes & Figueiredo, 2014).

An approach popular to new product projects is to have a checkpoint or decision gate at the end of major stages, "Stage Gate " approach (Hart et al.,2003; Palmer,2002). This technique is termed in PMI as "Phase-Gate" where a review is made at the end of each gate to have a go, no go decision. In this technique the project's performance and progress is compared to project and business documents such as project business case, project charter, project management plan and benefits management plan (PMI, 2017). Stage-Gate is a value-creating business process and risk model designed to quickly and profitably transform an organization's best new ideas into winning new products (Cooper, 2001). A Project management method with its structured task definition and software tools, is generally useful for managing new product development projects which are especially characterized by unanticipated project scope (Pons, 2007). Knowing the project's final result is critical to managing the project's scope. Gain agreement on the business objectives of your projects, document the scope of work required to realize the benefits of the project, and control the scope of your projects so that your projects do not control you (Millhollan, 2008).

Zirger & Maidique (1990) conducted an empirical study on a model of new product development. The study was done on a sample of 330 new products in the electronics industry aiming at identifying the factors affecting product outcome. By differentiating the successful and unsuccessful products, the research output identified the factors for product outcome to be Quality of the R&D organization, the technical performance of the product, the products value to the customer, the synergy of new product with existing competencies, management support during the product development and introduction process and competence of the marketing and manufacturing organizations. Though the issue of scope management is not explicitly described and related with these factors, it is the most important factor among others.

A case study on analysis of project scope change management, as a tool for project success on akazi kanoze projects of Rwanda, have been conducted by Nibyiza et al. (2015). This descriptive study has been done on 30 sample employees working on akazi kanoze projects. The summary of the data collected using interview, questionnaires and published materials reveal that implementers and beneficiaries have to be involved in the decision making process of defining the project scope. Accordingly, stakeholder involvement plays a vital role in project scope definition. The output of the research further implies that changes in project activities result in changes in project cost, timeliness, and quality of the project's output (product/service). When project costs and timelines are increased, it becomes possible to provide a high-quality product by utilizing high-quality materials/services and modern technology, resulting in beneficiary satisfaction as a result of receiving a high-quality product/service.

An empirical research on the application of project scope management practices on project success has been done by Ogunberu et al. (2018). The study was done to review the importance of project scope management on the implementation of information and communication technology on telecommunication organizations in Nigeria. The study collected primary data using questionnaires on 375 samples of respondents which contains 125 project sponsors, 125 project managers and 125 project team members. With the application of descriptive and inferential statistics, the analysis of the result prevails that the major project scope management success criteria are customer satisfaction and customer expectation. According to the study, resource allocation, project duration, project costing and project quality are project scope success criteria which are less critical. The regression results of the study show that customer satisfaction,

customer expectation, resource allocation and Project duration have significant impact on the success of the project in the selected organizations.

Best practices related to project scope management have been identified by a research conducted by Helgason (2010) titled Project Scope Management. The research has been focused on scope definition methodologies for the development of scope definition for construction projects at a particular organization, Iceland Road Administration (ICERA). A case study on a sample road construction project of ICERA was conducted to assess the process the organization followed to manage project scope. However, the available project document did not give much information about how the agency manages project identification and scope definition. Hence the result of the goal of identifying the process followed for scope management couldn't be successfully achieved. This gives a clue that scope definition and project management processes are not clear. Literature review is also performed to explore best practices for defining project scope of public and private projects. According to the results of the study, ICERA fails to implement an adequate scope management process. It has been noticed that the definition of project scope at ICERA is not according to the best practices of project scope management (Helgason, 2010, p.81). The research in general has many limitations in that sufficient data was not collected, hence difficult to have a reliable conclusion.

The review results of the literature show that project scope management is a crucial knowledge area in exercising project management. A good practice of project scope management enables the project team to focus on the necessary requirements of the project, hence time and cost constraints can be achieved as planned. The uncontrolled need of all project stakeholders can be limited by implementing appropriate scope management strategy. Project scope management guarantees that project implementers and other stakeholders are on the same page about what work is and isn't part of the project.

Most literature confirms that many projects experience scope change due to various reasons. This strengthens the theory that scope change is inevitable. But those changes must be done in a controlled manner and all stakeholders must be consulted and have the information about the effect of scope change on delivery time of the product or service and budget of the project. According to the literature, project scope management is not being properly implemented. However, the findings

are generic as they don’t reveal which aspect of project scope management is missed most. This research tried to fill this knowledge gap by pinpointing the most encountered problem associated with project scope management. Though most research focuses on scope management of software, ICT, Telecom and Construction projects, the results can be extended for NPD projects as IT, Software and communication attributes are included in NPD projects.

CHAPTER THREE
RESEARCH METHODOLOGIES

3.1 Description of the study area

The study area is particularly focused on assessing project scope management practice of dVentus Technologies located in Addis Ababa, Ethiopia. The reason why dVentus is chosen for the case is because the researcher is familiar with the projects and noticed that a project scope management gap exists. Furthermore, due to a scarcity of new product development companies in Ethiopia, the researcher was compelled to rely on dVentus Technologies.

3.2 Research Design

Research is different from other observations in that it follows a designed and planned technique. Therefore, it's necessary to have a design of the research through which the implementation is based. Research design is a framework for action that bridges research questions and the execution or implementation of research questions ("Research Design," 2006). Research design is important because it allows the many research techniques to go smoothly, resulting in research that is as professional as possible, giving the most information with the least amount of work, time, and money (Akhtar, 2016).

According to Chandran (2004) and Kothari (2004), there are five types of research designs. These are observation, descriptive, exploratory, experimental and diagnostic design. According to ("Research Design," 2006), quantitative research usually follows three-unit typology consisting of descriptive, relational and comparative design. The selection of the specific research design depends on the purpose of the research, theoretical paradigm informing the research, the context or situation within which the research is carried out, and the research techniques employed to collect and analyze data ("Research Design," 2006, p.37).

In order to bring the most out of the result of this study, a descriptive design is implemented to answer research questions and attain the objectives. Descriptive research studies, according to Kothari (2004), are those that are concerned with describing the features of a specific individual or group. As the cases are small, this methodology is used to narrate the phenomena and

comprehend the study with its implications. The study has tried to give answers to the stated research questions through integrating the theoretical aspect that has been dealt with while attending the courses in the particular field of study. In addition, an extensive literature survey from various sources such as academic official and public sources are used together with the help of the advisor's feedback and recommendation.

3.3 Research Approach

The study used a mixed method approach where both qualitative and quantitative research methods are implemented to collect and analyze data. Descriptive survey method was applied to generate quantitative data and examine the project scope management processes used by the project team through a structurally developed questionnaire. Additionally, reviewing literature related to the topic area is used as a supplement for the data validation and drawing a conclusion. Accordingly, semi-structured interviews with project managers of dVentus Technologies were used to gather qualitative data about the procedures applied for project scope change management.

3.4 Population and Sampling

A population is a comprehensive group of individuals, institutions, objects and so forth with shared characteristics on which a researcher is interested in (Rafeedalie, n.d.). A sample is a subset of the larger population from which you will collect data. The best strategy in any research study is to look into the problem throughout the entire population (Acharya et al., 2013). But studying the entire population is not usually practical due to various reasons. Hence representative samples are selected from the population. Different types of sampling techniques are employed, depending on factors like population size, study area, complexity of the population, demographic mix, etc. According to Laerd Dissertation (n.d.), total population sampling is a type of purposive sampling technique where you choose to examine the entire population (i.e., the total population) that have a particular set of characteristics. The target population in this study contains employees of dVentus Technologies who are engaged in new product development projects. Total population sampling is implemented for primary data collection. Hence, 42 sample respondents working at NPD projects of dVentus Technologies are selected in the primary data collection. The sample demographic mix is categorized by gender, age group, experience level and work area.

3.5 Data sources and Types

The two kinds of sources of data used in this research are primary and secondary sources.

3.4.1 **Primary Source**: The survey questionnaire collected from project team members and the interview from the managers were used as a primary source of data. Previously developed questionnaires were customized in such a way to align with the purpose of the research. The questionnaire was distributed and collected to the respondents online via google forms while the interview was conducted physically and via phone call. Guiding questions were prepared for the interview.

3.4.2 **Secondary Source**: A review of different publications which are available and recent, related to the subject matter by government organizations and NGOs, researches made earlier, journals by different organizations & associations and the internet were of great value for this research.

Regarding the questionnaire's data collection, the researcher developed the questions in google form. A total of 38 questions were developed. The questions were divided into 3 broad sections. The first section contains 5 questions which discuss the demographic mix of the respondents. The second section is about the practice of scope management. This section contains 6 sub sections so as to study the six processes of project scope management. These are plan scope management, define scope, collect requirements, create WBS, Validate Scope and control scope. The questions were primarily developed from the inputs, tools and techniques used for each process of project scope management as described in PMBOK sixth edition. These are measured with a Likhert, 5 scale ordinal measurement technique. The final section was about the challenges of project scope management. A list of possible challenges encountered in managing the scope of projects was developed and respondents were requested to choose all applied to dVentus NPD projects. Then after a review of the clarity of the questions, the web link containing the questionnaire form is distributed to respondents with a clear description of the purpose of the research.

In the interview process, guiding questions important to the required data and topics to be discussed are prepared. The target interviewee, the communication medium and duration of the interview was first designed. With the aid of the guiding questions, the interview has been conducted by first introducing the purpose of the study. Sticky notes were taken during the interview session. It was

held with 2 project managers and 1 engineering manager who is involved as a technical lead in the projects.

3.6 Ethical Consideration

Concerning the ethical issues, the research intensively maintained authorship issues and discussed intellectual property frankly. The purpose of the study is clearly described for the case organization and the sample population. It strictly followed informed-consent rules by taking voluntary participants and respecting the confidentiality as well as privacy of the respondents and the company. Accordingly, questionnaires are distributed to the respondents and only willing participants filled and submitted the form. The same ethical consideration is taken to the interviewees.

3.7 Data Analysis

The collected data from the primary sources is analyzed both qualitatively and quantitatively. The collected quantitative data is edited, coded and then analyzed through a statistical software tool, IBM SPSS Statistics version 26. Measures such as frequency and percentage are used to present the data. Tables and charts were also used to ensure an ease of understanding. The results of the statistical analysis are finally summarized, discussed, triangulated and interpreted accordingly.

3.8 Validity

Establishing the validity of the scores in a survey helps to identify whether an instrument might be a good one to use in survey research (Creswell, 2009). In order to confirm the extent to which the results of the survey really measure what they are supposed to measure, the student researcher adopted previously developed questionnaires with some modifications to comply with the subject matter and the study area. Additionally, a review of literature shows that the questionnaire instruments are representative to measure the intended constructs. Hence content validity is ensured.

3.9 Reliability

Reliability is one important aspect in any study. When items are used in a measurement scale, they should be correlated with each other so that internal consistency is maintained (Bland & Altman, 1997). One measure of this internal consistency is Cronbach's alpha coefficient. A larger value of alpha implies redundancy while lower values show weak correlation between instruments (Tavakol & Dennick, 2011). As recommended by many researchers, the acceptable values of alpha range from 0.70 to 0.95. The table below presents the Cronbach alpha value of the items used to measure project scope management. All the values are within the acceptable range, hence ensuring the reliability of the test. The overall Cronbach's Alpha for the variable project scope management process is 0.933 with 31 measurement items. The Cronbach's Alpha for each sub variable is listed below.

Table 3-1 Reliability Statistics of Variables

Variables	Cronbach's Alpha	N of items
Plan scope management	0.746	7
Define scope	0.817	5
Collect Requirements	0.742	5
Create WBS	0.803	5
Validate Scope	0.725	4
Control Scope	0.827	5

Source: Survey result

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Overview

Out of the target 42 samples, to whom the questionnaire was distributed, 36 samples responded to the questionnaire. The collected data was reviewed and fed to IBM SPSS statistics version 26 for further analysis. Accordingly, results obtained from the analysis of the collected data is presented in this section. It's categorized into 3 subsections. In the first part the demographic mix of the respondents for the questionnaire is presented. Respondents were characterized by age group, sex, academic level, experience level and profession. The distribution of these characteristics is tabulated with frequency and percent. In the second part the data about scope management practice of dVentus Technologies obtained from the respondents is discussed. The inputs, tools and techniques in the process of project scope management are translated into a questionnaire form to serve as a measurement tool to study the practice of project scope management at dVentus Technologies NPD projects. Hence, the questionnaire is organized in 6 sub sections. The first 7 questions are associated with "Plan Scope", the next 5 questions are associated with "Define Scope", the third 5 questions are associated with "Collect Requirements", the fourth 5 questions are associated with "Creating the Work Breakdown Structure", the fifth 4 questions are associated with "Validate Scope" and the last 5 questions are associated with "Control Scope". The results of each subsection are averaged so as to compare the six processes of project scope management. Finally, the aspect of project scope management where dVentus lacks to implement is pinpointed.

4.2 Demographic mix of the respondents

Respondents were characterized by age group, sex, academic level, experience level and profession. The frequency and percentage statistics of those characteristics of respondents is shown in the following tables.

Table 4-1 Respondents by Age

		Frequency	Percent
Age	Below 25	3	8.3
	25-34	25	69.4
	35-44	6	16.7
	45-54	2	5.6
	Total	36	100

Source: Survey Result

As shown on the table above, out of 36 respondents, the majority (69.4 %) of the respondents fall in the range of 25-34 years old, while only 5.6 % of the respondents were between 45 and 54 years old. Similarly, 8.3 % of the respondents were below 25 and 16.7 % of them were in the age range of 35-44. The result show that no respondent was older than 54.

Table 4-2 Respondents by Sex

		Frequency	Percent
Sex	Male	27	75
	Female	9	25
	Total	36	100

Source: Survey Result

The analytical result of the descriptive frequency for the sexual mix of respondents is shown in the above table. Accordingly, 75% of the respondents were males while 25% of them were females.

Table 4-3 Respondents by Academic Level

		Frequency	Percent
Academic level	Bachelor's Degree	28	77.8
	Master’s Degree	8	22.2
	Total	36	100

Source: Survey Result

The academic level of all the respondents is bachelors and master’s degree. The majority, which is 77.8% of the respondents, had a bachelor's degree, while the remaining 22.2% was a master's degree holder.

Table 4-4 Respondents by Experience level

		Frequency	Percent
Experience	Junior (0-2) years	7	19.4
	Intermediate (3-5 years)	13	36.1
	Senior (6-8 years)	12	33.3
	Managerial (9-11)	3	8.3
	Executive (>11 years)	1	2.8
	Total	36	100

Source: Survey Result

The work experience level of the respondents was also recorded and analyzed. The result of the analysis is presented on the above table. Accordingly, one of the respondents is in the executive level, while the majority of the respondents are in the intermediate and senior level. Only 8.3% of the respondents are in the managerial position and 19.4% were junior workers. This shows that

most of the respondents have good experience with projects hence can provide reliable data for the research

Table 4-5 Respondents by profession

		Frequency	Percent
Profession	Electrical Engineering	17	47.2
	Software Engineering	8	22.2
	Mechanical Engineering	6	16.7
	Others	5	13.9
	Total	36	100

Source: Survey Result

As the case organization is involved in NPD projects, most of the respondents are in the engineering profession, specifically electrical engineering, mechanical engineering and software engineering. Only a few are from other backgrounds. Hence the respondents are categorized into electrical engineering, software engineering, mechanical engineering, and others. The frequency analysis of the response shows that, out of the 36 respondents, 47.2% were Electrical Engineers, 22.2% were software engineers, and 16.7 were mechanical engineers. the survey result shows that, the profession of most of the respondents is closely related to new product development, which is the subject matter of the research.

4.3 Project Scope Management Practice at dVentus Technologies

Though it's theoretically accepted that scope change is inevitable, the validity of the inevitability is verified through a questionnaire and interview. Out of the 36 respondents, most of them (80.6%) experience scope change in the projects they are involved in. Only 19.4 % of them don't experience scope change. However, the interview results of the project managers and the technical lead show that almost all projects have experienced frequent scope change due to various reasons. As mentioned by the interviewee some of the reasons for scope change are change in customer's

requirement, change in the technology, the variability nature of consumer products, the technical approach used for NPD, entry of anticipated features, dependency of the product on other related products/accessories.

According to the interviewee, scope change in dVentus is initiated by filling an Engineering Change Order and sending the request to the project manager. The form contains all the information about the change including source of change, pros and cons of the change, requested by, date requested, resources required for the change, etc. Meetings are arranged to review the requested change. Product design teams, business development managers, technical lead, project manager, and the owner of the project are involved in the meeting. The major issues discussed in the review are

1. Analysis of the technical feasibility of the change
2. The effect of the change on other basic features
3. Resource requirement for the change
4. The extra time due to the change,
5. Business feasibility
6. Social, environmental and other impacts of the change.

Taking the collective decision and overall feasibility into consideration, the executives approve or reject the change. Reallocation of resources and hence replanning is necessary if the change is approved. Not all but major changes pass through this process. In order to avoid scope changes, the future trend curve about the product is studied before the development process begins. With this information, the development of the products is done with a sense of future proofing so that the future market change will not affect the product under development, hence scope change will be minimized.

Furthermore, the interviewees was asked about the challenges they faced in managing scope changes. Most of them mentioned that, reduced team energy because of frequent changes is the major challenge they face in the process of project scope change management. They also revealed, the interdependency of product features makes change management challenging in NPD projects of dVentus Technologies.

The interviewees were also asked a recommendation on project scope change management techniques. They replied that minimizing the dependency of features, continuous delivery of small features, and future proofing a product will highly minimize the challenge in scope change management.

Table 4-6 Scope change experience

		Frequency	Percent
Do you ever experience any scope change in your project?	Yes	29	80.6
	No	7	19.4
	Total	36	100

Source: Survey Result

Regarding the scope management process, the analysis of the questionnaire is presented in the following section. As described in the literature review section, scope management process includes plan scope management, define scope, collect requirements, create WBS, validate scope and control scope (PMI, 2017). The questionnaire survey is constructed based on this foundation. The inputs tools and techniques are used as measurement parameters for testing the implementation of each of the processes.

4.3.1 Plan Scope Management

Plan Scope Management is the process of creating a scope management plan that documents how the project and product scope will be defined, validated, and controlled. This is the basic step in the process of project scope management. The implementation of this stage in NPD projects of dVentus Technologies is measured through the questionnaire developed. The result of the SPSS analysis is depicted in the following table.

Table 4-7 Plan Scope Management

Questions	**Agreement level**										**Mean**
	Strongly Disagree		**Disagree**		**Neutral**		**Agree**		**Strongly Agree**		
	N	%	N	%	N	%	N	%	N	%	

There is a document (a master plan) that compiles the needs, resources, assumptions, risks and constraints that the project is intended to satisfy.	2	5.6	5	13.9	12	33.3	12	33.3	5	13.9	3.4
There is a description of project life cycle, quality management plan and the development approach (waterfall, iterative, adaptive, agile, hybrid)	2	5.6	6	16.7	11	30.6	15	41.7	2	5.6	3.3
During the planning process the following factors are considered. (Organizational culture, structure, Geographic distribution of facilities and resources; Government standards, Infrastructure, human resources, Personnel administration, and Market conditions)	1	2.8	13	36.1	8	22.2	13	36.1	1	2.8	3.0
Due consideration is given to plans, processes, policies, procedures, and knowledge bases while planning the scope of the project.	1	2.8	9	25	9	25	16	44.4	1	2.8	3.2
Expertise judgment with specialized education, knowledge, skill, experience, are involved while project scope planning.	1	2.8	5	13.9	7	19.4	18	50	5	13.9	3.6
During the project scope planning process, analysis is performed on alternative ways of collecting requirements, elaborating the project and product scope, creating the scope, validating the scope and controlling the scope.	2	5.6	9	25	12	33.3	11	30.6	2	5.6	3.1
Meetings are held with the stakeholders of a project for the purpose of project scope plan preparation.	2	5.6	3	8.3	6	16.7	20	55.6	5	13.9	3.6
Grand Mean											**3.3**

N: Frequency %: Percent

Source: survey result

According to the results of the questionnaire, the majority of the respondents agree with the existence of a master plan document that compiles the needs, resources, assumptions, risks and constraints that the project is intended to satisfy. 33.3% of the respondents agreed that there is a description of the project life cycle, quality management plan and the development approach in the company. Regarding enterprise environmental factors such as Organizational culture, structure, Geographic distribution of facilities and resources; Government standards, Infrastructure, human resources, Personnel administration, and Market conditions, the majority of the respondents doubt

the consideration of these factors in the scope planning process. The mean value shows that the respondents gave a neutral response.

The tools and techniques used to plan scope management are expert judgment, data analysis and meetings. The utilization of these tools and techniques in dVentus NPD projects was also studied through the questionnaires. The results show that 50 % of the respondents agreed that expert judgment is implemented for scope planning. It's also confirmed from the majority (55.6%) of the respondents that meetings were arranged to develop the scope management plan. 33.3% of the respondents were neutral about the analysis of alternative ways of collecting requirements, elaborating the project and product scope, creating the scope, validating the scope and controlling the scope during the project scope planning process, while 30.6% of the respondents agreed with it.

With all mean values of the measurements greater than 3, the grand mean/pool mean of the variable becomes 3.3. From this, it can be concluded that the first process of scope management (Plan Scope Management) is practiced in a fairly good way. But the process needs some improvement regarding the inputs, tools and techniques.

4.3.2 Define Scope

The survey results regarding the assessment of scope definition process are presented in the following table.

Table 4-8 Define Scope

Questions	Agreement level										Mean
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	
Project scope and its impact on critical factors of the project is clearly defined.	1	2.8	13	36.1	9	25	10	27.8	3	8.3	3.0
Scope management tasks associated with scope are well documented and accessible to everyone within the project team.	5	13.9	10	27.8	11	30.6	7	19.4	3	8.3	2.8

Expertise judgment provided was given due attention while project scope definition of the project.	3	8.3	8	22.2	13	36.1	11	30.6	1	2.8	3.0
There is an approach to distinguish the exact content of activities within the scope and explain this to team members.	1	2.8	7	19.4	9	25	15	41.7	4	11.1	3.4
There is a consultant for design and manufacturability issues.	8	22.2	13	36.1	7	19.4	8	22.2	0	0	2.4
Grand Mean											**2.92**

N: Frequency %: Percent

Source: survey result

According to the survey result 36.1% of the respondents disagree about the clear definition of project scope and the impact of scope change on critical factors, while 27.8% of them agree with it. Referring to the mean value of 3, the respondents are neutral about this specific issue. Regarding the second question, the mean value (2.8) shows that scope management tasks associated with scope were not well documented and accessible to everyone within the project team. The respondents were neutral about the provision of due attention for Expertise judgment while project scope definition of the project. About activity definition, most of the respondents agreed (41.7% agree and 11.1% strongly agree) that there is an approach to distinguish the exact content of activities within the scope and explain it to team members. On the other hand, 36.1% of the respondents disagreed with the existence of a consultant for design and manufacturability issues. Additionally, the mean value of 2.4 tells that there was a wider gap in implementing this procedure during project scope definition.

The grand mean of these measurements gives the mean of scope definition. As seen from the table the grand mean was 2.92, showing that the agreement level of respondents concerning this issue was less than average. This shows that the second process of scope management (define scope) is practiced in a poor way. Hence there is some gap in the implementation of the process.

4.3.3 Collect Requirements

Requirement collection deals about determining, documenting, and managing stakeholder needs and requirements to meet project objectives.

Table 4-9 Collect requirements

Questions	Agreement level										Mean
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	
Project complete requirements are adequately defined	2	5.6	12	33.3	8	22.2	13	36.1	1	2.8	3.0
The contractors are informed and also involved in project scoping.	4	11.1	10	27.8	14	38.9	8	22.2	0	0	2.7
Responsible actor for scope management is assigned and documented in the project documents.	3	8.3	15	41.7	12	33.3	5	13.9	1	2.8	2.6
There is a system of organizing workshops and interview with the stakeholders to ensure thorough stakeholder involvement, and improve the collection of requirements	4	11.1	12	33.3	14	38.9	6	16.7	0	0	2.6
There is an organized listing and prioritizing all the requirements categorized by stakeholder	3	8.3	4	11.1	13	36.1	13	36.1	3	8.3	3.3
Grand Mean											**2.8**

N: Frequency %: Percent

Source: survey result

Collecting requirements is the third step in the process of project scope management. The above questions are developed at the aim of measuring how this process is exercised at dVentus NPD Projects. According to the survey result 36.1% of the respondents agree and 2.8% disagree that project complete requirements are adequately defined. However, 33.3 % of the respondents disagree and 5.6% strongly disagree with it, giving the mean of the response to be 3(neutral). The respondents are also asked if contractors are informed and also involved in project scoping. Most of the respondents disagreed (27.8% disagree and 11.1% strongly disagree). Majority of the respondents disagreed about the assignment and documentation of responsible actors for scope management (41.7% disagreed, 8.3% strongly disagreed). However, 13.9% agreed and 2.8%

strongly agreed with the argument, implying that there is a gap in practicing this procedure. Regarding the improvisation of requirement collection through stakeholder involvement, majority of the respondents disagreed with the existence of a system of organizing workshops and interviews (33.3% disagreed and 11.1% strongly disagreed). Only 16.7% agree with the existence of such a system in the organization. However, most of the respondents agreed (36.1% agreed and 8.3 strongly agreed) that there is an organized listing and prioritizing of all the requirements categorized by stakeholder.

According to the survey result, the grand mean of the arguments regarding requirement collection is found to be 2.8, showing that there is a deficiency of using appropriate inputs, tools and techniques in the collection of requirements.

4.3.4 Create Work Breakdown Structure

The issues regarding the development of the work breakdown structure are raised in this section. The results of the assessment are depicted in the following table.

Table 4-10 Create Work Breakdown Structure

Questions	Agreement level										Mean
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	
A proper document that provides detailed activities, and scheduling information about each component of the work is available.	1	2.8	7	19.4	8	22.2	15	41.7	5	13.9	3.4
The executive managers are involved when dividing the work package in to activities and elements	1	2.8	0	0	7	19.4	19	52.8	9	25	4.0
Historical information related to design information, available from past projects relevant to the current project are considered.	0	0	3	8.3	3	8.3	19	52.8	11	30.6	4.1

Due attention is given for activity duration, cost estimation and activity sequencing.	1	2.8	4	11.1	15	41.7	14	38.9	2	5.6	3.3
Project members are aware of possible information loss between stakeholders of the project.	1	2.8	4	11.1	22	61.1	7	19.4	2	5.6	3.1
Grand Mean											**3.6**

N: Frequency %: Percent

Source: survey result

According to the survey result, the majority of the respondents agreed that a proper document is available to provide detailed activities and scheduling information about each component of the work (13.9% strongly agreed, while 41.7% agreed). However, some of the respondents disagree with it (2.8% strongly disagree, while 19.4% disagreed). Regarding the breakdown of packages into activities and elements, 52.8%of the respondents agreed that executive managers are involved. Additionally, most of the respondents agreed that historical information related to design information, available from past projects relevant to the current project are considered (52.8% agreed and 30.6% strongly agreed). This shows organizational process assets are taken as an input in the process of developing the work breakdown structure. Additionally, respondents were asked if due attention is given for activity duration, cost estimation and activity sequencing. The response shows that 5.6% strongly agreed, 38.9% agreed, 11.1% disagreed and 2.8% strongly disagreed. Regarding the awareness of project members about information loss between stakeholders, 19.4% agreed that they were aware of it, while most of them (61.1 %) remained neutral about the issue.

The grand mean of the issues about work breakdown structure creation is 3.6, which implied the good implementation of the process in the NPD project. Still minor corrections might be required.

4.3.5 Validate Scope

The scope validation tools and techniques used at the case organization are assessed together with the inputs considered in the validation process. The following table contains the response of the respondents regarding the scope validation process.

Table 4-11 Validate Scope

Questions	Agreement level										Mean
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	
Inspections of qualities such as measuring and examining whether deliverables meet requirements and performance criteria are considered.	0	0	8	22.2	8	22.2	15	41.7	5	13.9	3.5
Updates on work performance information that define the project's report status on the project completion are communicated and documented.	2	5.6	4	11.1	4	11.1	21	58.3	5	13.9	3.6
There are clear agreements between the client and the contractor concerning how to verify the activities with what is stated in the contract on a regular basis.	4	11.1	10	27.8	12	33.3	8	22.2	2	5.6	2.8
Regular meetings are held between the client and the contractor to ensure that both actors are up to date about the state of the project.	0	0	7	19.4	18	50	10	27.8	1	2.8	3.1
Grand Mean											**3.3**

N: Frequency %: Percent

Source: survey result

Most of the respondents agreed (13.9% strongly agreed and 41.7% agreed) that inspection of qualities such as measuring and examining whether deliverables meet requirements and performance criteria are considered in validating scope. Similarly, the mean value of the second question (3.6) shows the majority of the respondents agreed that updates on work performance information that define the project's report status on the project completion are communicated and documented. About scope verification, 27.8% of the respondents disagree and 11.1 % of the respondents strongly disagree about the availability of clear agreements between the client and the contractor concerning how to verify the activities with what is stated in the contract on a regular basis. This indicates lack of a formal documented agreement to be referred to if the task is performed according to the agreement or not. On the other hand, half of the respondents were neutral about the arrangement of regular meetings between the client and the contractor to ensure

that both actors are up to date about the state of the project. Considering the percentage of 2.8% strongly agreed, 27.8% agreed and 19.4% disagreed respondents, it can be inferred that this activity of scope validation is implemented to some extent.

In general, the process of scope validation in NPD projects of dVentus Technologies is exercised moderately. Interpretation of the grand mean value (3.3) shows that most of the respondents agreed with the implementation of proper scope validation techniques in the project scope management process.

4.3.6 Control Scope

Control Scope is the process of monitoring the status of the project and product scope and managing changes to the scope baseline. The scope controlling practice of dVentus Technologies is assessed through the following questionnaires and the results are presented in the following table.

Table 4-12 Control Scope

Questions	Agreement level										Mean
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	
There is a system to monitor the scope creep and change requests within the defined boundaries considering the delay and cost incurred.	6	16.7	10	27.8	11	30.6	7	19.4	2	5.6	2.7
Project performance measurements to assess the magnitude of scope variation in terms of cost and time frame from the original scope baseline are available.	2	5.6	14	38.9	11	30.6	8	22.2	1	2.8	2.8
There is a system to track scope changes and draw patterns.	6	16.7	9	25	10	27.8	8	22.2	3	8.3	2.8
There is a formal agreement between project stakeholders on scope changes.	3	8.3	11	30.6	18	50	3	8.3	1	2.8	2.7

There is a proper awareness that change in project activities results in change in Project schedule/time cost and quality.	6	16.7	4	11.1	10	27.8	13	36.1	3	8.3	3.1
Grand Mean											**2.8**

N: Frequency %: Percent

Source: survey result

The mean value (2.7) about the existence of scope monitoring systems indicates an absence of a system to monitor scope creep and change requests within the defined boundaries considering the delay and cost incurred. Similarly, most of the respondents doubt the availability of project performance measurements to assess the magnitude of scope variation in terms of cost and time frame from the original scope baseline (38.9% disagreed and 5.6% strongly disagreed). Furthermore, the response of the majority of the respondents indicates lack of a system to track scope changes and draw patterns. 30.6% of the respondents disagree with the availability of a formal agreement between stakeholders on scope changes while 8.3% of them strongly agree with it. This indicates there is a gap in having a guiding rule about scope changes, resulting in an uncontrolled scope change. About the awareness of the effect of scope change in schedule/time cost and quality, 36.1% of the respondents agree that there is a proper awareness that change in project activities results in change in Project schedule/time cost and quality.

The grand mean of this process of scope management is low compared to others, telling that there is an absence of well-organized system and formal procedures to control project scope and minimize the risk of scope creep

A summary result of the grand mean of all aspects of project scope management is presented in the following table and depicted in the chart preceding it.

Table 4-13 Grand mean of variables

Project Scope Management Process	No of questions	Total Respondents	Grand Mean
Plan Scope Management	7	36	3.3

Define Scope	5	36	2.92
Collect requirement	5	36	2.8
Create the work breakdown structure	4	36	3.6
Validate Scope	5	36	3.3
Control Scope	5	36	2.8

N: Frequency %: Percent

Source: survey result

The chart below summarizes the grand mean of the variables in the project scope management process

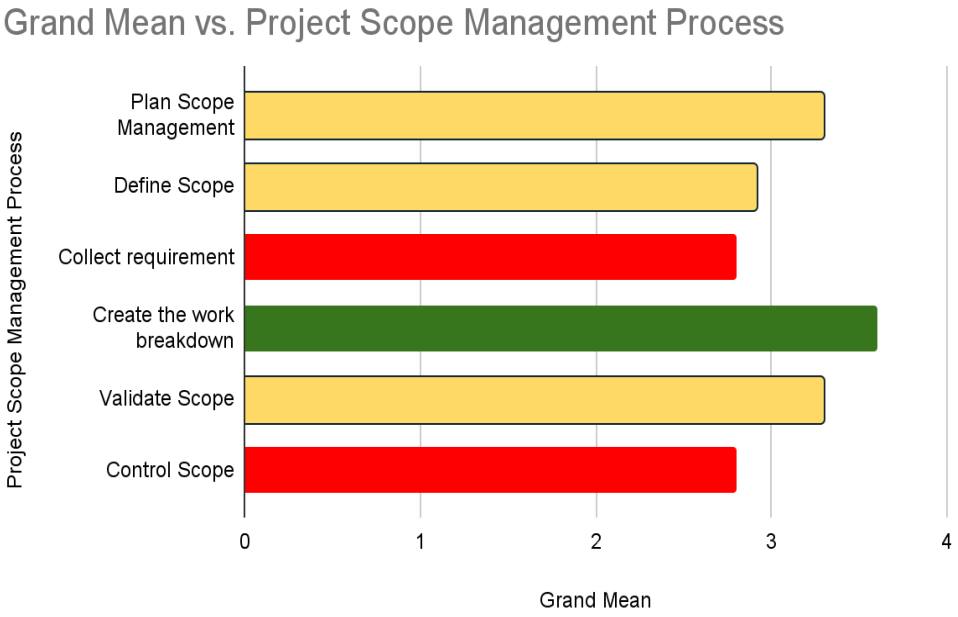

Figure 4.1 Grand mean of project scope management processes

4.4 Challenges in the implementation of project scope management

One of the most common causes of project failure is poor project scope management. Like other professions there are challenges encountered during the implementation of scope management.

These challenges were identified and the effectiveness of those challenges in managing the scope of NPD projects were tested through questionnaires. The frequency is analyzed with multiple response frequency analysis with dichotomous variables. Out of the 36 respondents, there were 34 valid cases with regard to this issue. The percentage is calculated with regard to total response and total valid cases. The survey result is depicted in the following table.

Table 4-14 Challenges of project scope management

Challenge	Responses		Percent of Cases
	N	Percent	
Increased risks	15	9.5%	44.1%
Reduced team morale	23	14.6%	67.6%
Managing increased work in a short time	22	13.9%	64.7%
Reorganize the project budget	12	7.6%	35.3%
Unrealistic deadline	29	18.4%	85.3%
Insufficient technical skill of the team	7	4.4%	20.6%
Interdependency of product features	17	10.8%	50.0%
Team members resistance of change	13	8.2%	38.2%
Lack of scope change management skill	20	12.7%	58.8%
Total	**158**	**100.0%**	**464.7%**

N: Frequency %: Percent

Source: survey result

As can be seen on the table, an unrealistic deadline is the major challenge in the scope management practice of dVentus NPD projects. This challenge has received 18.4% of the response and 44.1% of the valid cases. Scope change and its proportional impact in time change was not given due attention, resulting in an unrealistic scheduling of activities. A project team aspires to see its effort through the outputs of the project. But due to the continuous change in the scope of the project,

it’s difficult to have a concrete output. Hence the team's morale is reduced. 14.6% of the respondents mentioned that it's challenging to incorporate a scope change with a reduction of team morale. The other major challenge as noted by 58.8% of the respondents is lack project scope management skill (12.7% response rate). Most of the project managers were not professional enough to know the techniques of project management. This makes scope management of NPD projects challenging as shown on the table. Features of NPD products are closely interdependent, that the change in one feature affects the other. Changing a specific feature while keeping the impacted one makes product scope management difficult as cited by 58.8% of the respondents.

Compared with other challenges, the challenge with respect to risk, budget, team resistance, technical skill due to scope change were given low ratings (9.5%,8.2%,7.6%, and 4.4% respectively). It’s clear that a change in scope results in the addition of risk. But its challenge in managing the scope change of dVentus NPD projects is found to be low as can be seen from the response table. Managing a scope change in a resistive team is also challenging. But in this case organization team members were not resistant to change. Hence this problem contributes less to the challenges of scope management (8.2%) at NPD projects of dVentus Technologies. Project budgets reorganized to compromise scope change and cost change. 35.3% of the respondents mentioned that reorganizing the project budget is challenging in the scope management process. This shows that project budget reorganization is flexible and the effect in scope management is not a critical issue at dVentus ’s NPD projects. The other major challenge in the implementation of scope management is the technical skill of project teams. The new scope change may require a new technical skill. In a team, where dynamic technical skill is not available, scope change management might be challenging. Referencing the above survey result, only 20.6% of the respondents mentioned that lack of sufficient technical skill is a problem in managing scope change. Hence lack of technical skill of the team doesn’t contribute much to the challenges of the organization’s project scope management practice.

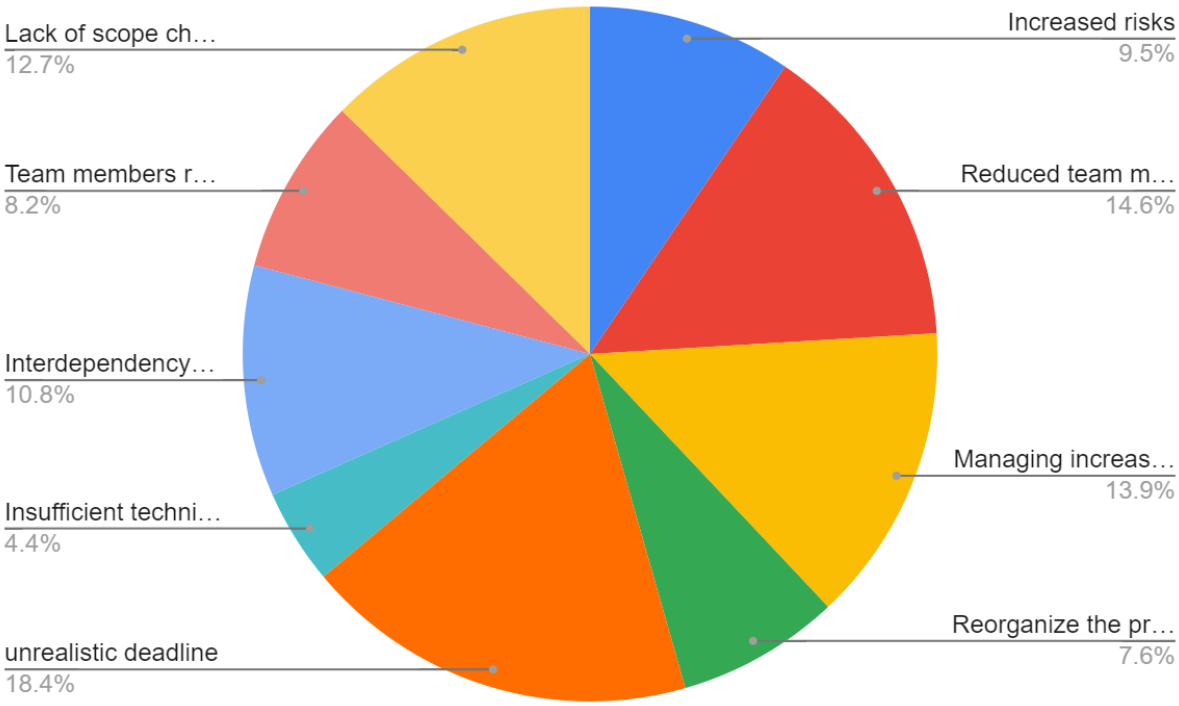

Figure 4.2 Challenges of project scope management

CHAPTER FIVE
FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

This chapter contains the findings of the study, conclusions drawn and recommendations about the issue. It also provides future research suggestions to be studied in relation to project scope management and new product development.

5.1 Findings

The findings of the study show that scope change occurs frequently in NPD projects of dVentus Technologies due to various reasons. The management practice of those scope changes has been studied and compared with the global standard (PMBOK Guide, sixth edition). The analysis of each aspect of project scope management and the challenges faced in managing the scope of projects was done. The major findings of the study are summarized as follows.

- Demographic characteristics of the respondents
  - Most of the respondents working in the NPD projects of dVentus Technologies were in the age of 25-34 and while few of them are in the range of 45-54
  - Regarding the sexual mix 75% of the respondents were Male while the rest 25% were Female
  - The academic qualification of the majority of the respondents were Bachelor's degree with an intermediate and senior position
  - The profession of the majority of the respondents were identified as engineering background specifically electrical, software and mechanical engineering while a few of them are from other background
- The practice of project scope management process
  - Plan Scope Management
    - Even though there was a master plan document that compiles the needs, resources, assumptions, risks and constraints that the project is intended to satisfy, enterprise environmental factors were not given due consideration

in the planning process. The available document is not also referenced frequently by project managers.

- ➢ Define Scope
  - ■ Scope definition is done regularly as a result of continual requirement changes. This is expected in such NPD projects where very little is known about the future market value of the product under development. But there is a minor gap in applying the inputs, tools and techniques used for defining scope.
- ➢ Collect Requirements
  - ■ The survey results show that, there is no well-organized document which tells how requirements are collected, analyzed, prioritized and selected.
  - ■ Since all concerned stakeholders were not involved in the scoping process, project complete requirements were not well defined. Hence sufficient information about the scope of requirements was not available.
- ➢ Create Work Breakdown Structure
  - ■ Proper documents are available to provide detailed activities and scheduling information about each component of the work. Stakeholders including executive managers involved in breaking the work packages into tasks and activities.
  - ■ Historical information related to design information of previous projects were used in the process of WBS development. Furthermore, activity duration, cost estimation and activity sequencing are somehow clear to the project managers and practiced in a good way.
- ➢ Validate Scope
  - ■ The results regarding scope validation show an absence of clear agreement between the client and the contractor on how to verify requirements for final

acceptance. Hence validating the requirements is challenging with the absence of such documents.

- ➢ Control Scope
    - ■ There was an absence of a formally agreed scope baseline document where the magnitude of actual results is measured and compared with. As a result, new features are added on a regular basis without the awareness of important stakeholders. Due to this, project scope is expanded, resulting in scope creep.

- ❖ Challenges of Project Scope Management
    - ➢ The major challenges encountered in managing the scope of a project occurs due to unrealistic deadlines. The extra time required to rearrange and adopt the change is ignored in the schedule. Furthermore, design teams are given less attention in estimating the time taken for project activities.
    - ➢ Reduction of team morale due to a continuous change of features is also another major challenge in the implementation of project scope management.
    - ➢ Team resistance to change and lack of sufficient technical skill were not considered as critical challenges in NPD projects of dVentus Technologies.

5.2 Conclusions

The statistical methods were of great help in getting findings of the study. The main purpose of the research was to assess the implementation of project scope management at dVentus Technologies to deal with the inevitable changes encountered in NPD projects and provide an informative input for the improvement of NPD project management through the identification of knowledge gaps in the issue of scope management by taking evidences from the employees of dVentus Technologies. The project scope management elements that were included in this research were scope management planning, scope definition, requirement collection, scope definition, WBS creation, scope validation and scope control.

Based on previous theories of PMBOK, a good project scope management practice begins by identifying business needs. This includes elicitation, documentation and management of

stakeholder requirements. Then identify various alternatives solutions which strategically satisfy the needs and requirements. This process continues with the measurement of those outputs, verification with the stated agreement and maintaining the scope. Assigning dedicated staff with project management knowledge results in a project scope that is well aligned with the business objectives of the organization.

New Product development projects are vulnerable to continuous change due to various reasons. Hence scope management should be given due attention in the management process of such projects.

Comparison of the grand mean values show that the major knowledge gap in managing the scope of NPD projects of dVentus Technologies lies on collecting requirements and controlling the scope. Through the preparation of a clear requirement management plan, which describes how requirements are collected and analyzed, the company can overcome the issue of requirement collection. All concerned stakeholders should be consulted so that the freedom to add extra features is limited. This results in a scope which is controlled within the agreed requirements.

On the other hand, the good practice noticed from the study is the process of creating the work breakdown structure. Detailed activities and scheduling information about each component of the work were listed out and project stakeholders were involved in breaking the work packages into tasks and activities with a due consideration of design information of previous projects from project repositories

The results obtained show that there exists a challenge especially in setting unrealistic deadlines. In setting the deadlines of the changes, the project manager should consider the time taken for the project team to familiarize itself with the new task. It's also critical to consider the moral degradation as a result of product delivery delay due to continuous changes. This reduces the efficiency of the team.

5.3 Recommendations

This research has studied the project scope management practice of dVentus Technologies in developing new products. It also showed the various challenges encountered in managing the

scope of NPD projects. In light of the findings and conclusions made above, the following possible conclusions are suggested as being valuable to dVentus Technologies.

- In the planning process, it was found that there is a master plan document that compiles the needs, resources, assumptions, risks and constraints but it is not referenced frequently. But the interviewees explain that this document is not referred frequently. Hence, project managers should refer back to the documents before deciding to plan and define the scope.
- The findings show that requirement collection is a critical issue in the scope management process of dVentus Technologies. So, it is advised to develop a requirement management plan which describes how requirements are collected, analyzed and documented.
- Stakeholders shall be involved in not only breaking the work packages into tasks and activities, but also in developing the means of validation of requirements.
- It is recommended for dVentus to have a clear agreement letter between the client and the contractor on how to verify requirements for final acceptance.
- Regarding the scope control phase, there has been identified an absence of a formally agreed scope baseline document where the magnitude of actual results is measured and compared with. Preparation of such baseline documents allows the project manager to control the scope of the project.
- Setting up a realistic deadline of project activities provides a sense of achievement and increases the morale of project teams.

- It’s advised not to take too much time waiting until the project meets the market need through a continuous addition of features. Instead, it’s advised to have design release versions with some basic requirements. So continuously delivering a product with somehow incomplete market requirement increases the team efficiency.

Scope change in new product development arose due to lack of sufficient forecasted information about the future. To minimize frequent scope changes in new product development, future proofing is one strategy recommended by respondents. Future-proof development is a development strategy that forecasts the future trend and future challenges with respect to the new product under development.

5.4 Summary and Future Research

The two fundamental variables studied in this research were project scope management process and new product development. The components of project scope management process as described in PMI (2017) (i.e., Plan Scope Management, Collect Requirements, Define Scope, Create WBS, Validate Scope and Control Scope) were sub variables under study. The study was framed to focus on the assessment of project scope management practice at dVentus Technologies and associated challenges encountered in implementing project scope management on NPD projects. The processes followed in managing the scope of NPD projects were analyzed through a measurement of variables. By measuring the sub variables through previously developed instruments and the PMBOK, sixth edition, the study assessed the practice of project scope management and identified the challenges encountered in the implementation of the right project scope management process. Hence, dVentus Technologies' knowledge gap in successful project scope management was observed.

With this fundamental information, future researchers can continue assessing the causes of the problems and the various effects of those problems. It's also possible to extend the research to other project management knowledge areas especially, Time management and Cost management. Communication Management, Technology and Innovation management are also recommended research areas as there are virtual project teams working remotely on NPD projects.

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APPENDIX I: QUESTIONNAIRES AND INTERVIEW QUESTIONS

Dear Sir/Madam;

First of all, I would like to thank you for your time and effort you will spend to answer this questionnaire.

I am conducting research entitled "**Assessing Scope Management Practices in New Product Development Projects: The case of dVentus Technologies"** for the partial fulfilment of the compilation of my post graduate degree. Gathering information from project managers and the project team as a whole is a vital part of this study in order to get appropriate understanding and give recommendations. Hence, I kindly request you to fill this questionnaire while assuring you that the information that you provide will be treated with confidentiality and shall only be used for the purpose of this academic research.

Thank you very much for your time and assistance

Regards;

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Section 1; Personnel and Organizational profile of the respondent

Please tick the right sign on the answer

1.1 Age Group ((Below 25), (25-34), (35-44), (45-54), above 54))

1.2 sex (Male Female)

1.3 Highest academic level (Diploma/TVET, Bachelor's Degree, Master's Degree, Other))

1.4 Experience level (Junior (0-2) years, Intermediate (3-5 years), Senior (6-8 years), Managerial (9-11), Executive (>11 years))

1.5 work area (Electrical Engineering, Software Engineering, Mechanical Engineering, others)

1.5 Project team membership (open ended)

Section 2: Project Scope Management practice of dVentus Technologies

Read the following statements thoroughly and show the extent to which you agree with it by marking a right sign.

Scale your agreement level through the following 5 scale measurement from strongly disagree to strongly agree

NB: -

1= Strongly Disagree

2 = Disagree

3= Neutral

4=Agree

5= Strongly Agree

2.1 Plan Scope Management

No	Measurement parameters	Scale				
		1	2	3	4	5
2.1.1	There is a document (a master plan) that compiles the needs, resources, assumptions, risks and constraints that the project is intended to satisfy					
2.1.2	There is a description of project life cycle, quality management plan and the development approach (waterfall, iterative, adaptive, agile, hybrid),					
2.1.3	During the planning process the following factors are considered. (Organizational culture, structure, Geographic distribution of facilities and resources; Government standards, Infrastructure, human resources, Personnel administration, and Market conditions)					
2.1.4	Due consideration is given to plans, processes, policies, procedures, and knowledge bases while planning the scope of the project					
2.1.5	Expertise judgment with specialized education, knowledge, skill, experience, are involved while project scope planning.					
2.1.6	During project scope planning process, analysis is performed on alternative ways of collecting requirements, elaborating the project and product					

	scope, creating the scope, validating the scope and controlling the scope					
2.1.7	Meetings are held with the stakeholders of a project for the purpose of project scope plan preparation.					

2.2 Define Scope

No	Measurement parameters	Scale				
		1	2	3	4	5
2.2.1	Project scope and its impact on critical factors of the project is clearly defined.					
2.2.2	Scope management tasks associated with scope are well documented and accessible to everyone within the project team.					
2.2.3	Expertise judgment provided was given due attention while project scope definition of the project.					
2.2.4	There is an approach to distinguish the exact content of activities within the scope and explain this to team members.					
2.2.5	There is a consultant for design and manufacturability issues.					

2.3 Collect Requirements

No	Measurement parameters	Scale				
		1	2	3	4	5
2.3.1	Project complete requirements are adequately defined					
2.3.2	The contractors are informed and also involved in project scoping.					
2.3.3	Responsible actor for scope management is assigned and documented in the project documents.					
2.3.4	There is a system of organizing workshops and interview with the stakeholders to ensure thorough stakeholder involvement, and improve the collection of requirements					
2.3.5	There is an organized listing and prioritizing all the requirements categorized by stakeholder.					

2.4 Create Work Breakdown Structure

No	Measurement parameters	Scale				
		1	2	3	4	5
2.4.1	A proper document that provides detailed activities, and scheduling information about each component of the work is available.					
2.4.2	The Executive managers are involved when dividing					

	the work package in to activities and elements					
2.4.3	Historical information related to design information, available from past projects relevant to the current project are considered.					
2.4.4	Due attention is given for activity duration, cost estimation and activity sequencing.					
2.4.5	Project members are aware of possible information loss between stakeholders of the project.					

2.5 Validate Scope

No	**Measurement parameters**	**Scale**				
		1	2	3	4	5
2.5.1	Inspections of qualities such as measuring and examining whether deliverables meet requirements and performance criteria are considered.					
2.5.2	Updates on work performance information that define the project's report status on the project completion are communicated and documented.					
2.5.3	There are clear agreements between the client and the contractor concerning how to verify the activities with what is stated in the contract on a regular basis.					
2.5.4	Regular meetings are held between the client and the contractor to ensure that both actors are up to date about the state of the project.					

2.6 Control Scope

No	Measurement parameters	Scale				
		1	2	3	4	5
2.6.1	There is a system to Monitor the scope creep and change requests within the defined boundaries considering the delay and cost incurred.					
2.6.2	Project performance measurements to assess the magnitude of scope variation in terms of cost and time frame from the original scope baseline are available.					
2.6.3	There is a system to track scope changes and draw patterns.					
2.6.4	There is a formal agreement between project stakeholders on scope changes.					
2.6.5	There is a proper awareness that change in project activities results in change in Project schedule/time cost and quality.					

3. Do you ever experience any scope change on your project? (Yes, No)
4. What are the challenges encountered, when managing scope change (check all that apply)?
    a. Increased risks

b. Reduced team morale
c. Managing increased work in a short time
d. Reorganize the project budget
e. unrealistic deadline
f. Insufficient technical skill of the team
g. Interdependency of product features
h. Team members resistance of change
i. Lack of scope change management skill

Guidance interview questions

1. What procedures you follow in managing your project scope (check if the right procedure is applied) >**Management of project scope change process**
   From where you start? Where do you go? How?
2. Do you ever experience project scope changes in your project?
   a. If yes, how do you manage those changes
3. What are the challenges you face in implementing the project scope management process?
4. What improvements do you recommend for project scope management?