WORK BREAKDOWN STRUCTURE AND PROJECT IMPLEMENTATION IN RWANDA

A case study of the commercial construction project in HYGEBAT

UWIMANA PAULINE

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DECLARATION

This research study is my original work and has not been presented to any other Institution. No part of this research should be reproduced without the authors’ consent or that of Mt Kenya University

Students Name:   Uwimana Pauline

Sign ______________________ Date ______

Declaration by the supervisor

This research has been submitted with our approval as The Mt. Kenya University Supervisor(s).

Name: NYABERA S.Onsot

Sign ______________________ Date ______
DEDICATION

I dedicate this research project to my parents, relatives and friends for always being there to share my burden, and to provide the much needed support, encouragement and affection.
ACKNOWLEDGEMENTS

The success and indeed the completion of this research project are attributed to almighty God for enabled me through this academic struggle to reach such an achievement. I thank Mr. NYABERA S. Onsoti, my supervisor for having sacrificed most of his time to guide me positively through the whole processes of writing this project. My heartfelt gratitude goes to my beloved parent, brothers and sisters for having sacrificed their resources to support me in my education. May the almighty God reward them abundantly. I would like to take this opportunity to thank the Management of MKU to set the Kigali Campus to help Rwandans to develop their skills and careers.
ABSTRACT

The research study entitled “Work breakdown structure and project implementation” was carried out in commercial construction project in HYGEBAT, a company of construction as a case study with the general objective: To analyze the role which Work Breakdown Structure plays to the successful implementation of construction projects. Specific objectives of this study were to identify the role of Work Breakdown Structure in the successful of project implementation, to determine the element of WBS in construction project implementation and to examine the awareness of managers on usage of WBS in construction project. The research reviewed literature related to WBS giving emphasis on its relationship with project implementation; both secondary and primary data were used in this study. The researcher employed purposive sampling whereby 8 employees from management team was selected, 45 employees from professional employees were also selected. The two categories of respondents were chosen as they can provide appropriate answers to the questions contained in this study. Data collection tools were questionnaires and interviews for primary data while documentary review was used for secondary data. By findings, managers affirmed that work breakdown structure he has changed the way project is implemented. Now, time of completion is reduced and it pushed eases management of work as compared before. The possibility of delivering a successful project has been increased because resources are allocated properly and the tasks have been subdivided correctly. Some employees have difficulties in using WBS as recommendation; the managers should hire qualified employees and train them about WBS. Also government has to enforce the use of WBS in the construction industry.
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LIST OF ABBREVIATIONS AND ACCRONYMS

**HYGEBAT**: Hydraulic and Civil Engineering Building Limited

**MKU** : Mount Kenya University

**PMI** : Project Management Institution

**WBS** : Work Breakdown Structure
DEFINITIONS OF KEY TERMS

**Activity:** An element of work performed during the course of a project. An activity normally has an expected duration, an expected cost, and expected resource requirements. Activities can be subdivided into tasks.

**Deliverable:** Any measurable, tangible, verifiable outcome, result, or item that must be produced to complete a project or part of a project. Often used more narrowly in reference to an external deliverable, this is a deliverable that is subject to approval by the project sponsor or customer.

**Work Breakdown Structure:** A deliverable-oriented grouping of project elements that organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of the project work.

**Work Package:** A deliverable at the lowest level of the WBS, when that deliverable may be assigned to another project manager to plan and execute. This may be accomplished through the use of a subproject where the work package may be further decomposed into activities.
CHAPTER ONE: INTRODUCTION

1.0 Introduction

Chapter one is the introduction to the study covering the following areas: background to the study, statement of the problem, objectives, research questions, significance of the study, limitations of the study and scope of study.

1.1 Background of the Study

Construction industry in Rwanda has become increasingly complex and risky in a legal obligation, schedules cost and resources constraints. The poor infrastructures derail growth. Rwanda is currently facing what many would call a construction boom where more people are settling in the country and with that there is need for more structures in the form of homes and offices for these peoples. In the construction industry, actors need to change their attitudes and style of conducting construction businesses based on best practices and professionalism in order to succeed. Moreover, the physical infrastructure, built through construction activity, is the nation’s economic backbone as it forms the arteries for the facilitation of productive activity by enabling goods and services to be distributed within and outside the country (Lopes, 2012).

The integration of project tool has redefined the ways project were implemented. As technology is now considered as the main contribution for the organization’s success and as their core competencies. So, the construction industry investing more on providing on engineers with the new technologies through the WBS. Construction of roads, houses and servicing the republic in return of certain price all these are projects and require commitment of good planning in terms of funds, human, mental and physical labor in a
way that satisfies the promoter’s needs. Among the characteristics of a project, is an established objective that has a defined life span with a beginning and an end, specific time, cost and performance requirements as well as work break down structure (Timothy,2009).

Many people get afraid that they are going to forget the items when starting to create schedules for their projects; they are not sure to remember all the pieces. So, the best advice for them is to create a work breakdown structure before diving into making a schedule. Any project is more manageable if their managers break it down into smaller components. Smaller components are easier to define and assign to specific resources and smaller components also means that it is easier to be specific and detailed in the definition of the component (Eric, 2003).

A Work breakdown structure (WBS) builds an understanding of the complexity of a project among team members, and it offers a unique opportunity for the project manager to evaluate his or her role in the project. Creating a work breakdown structure (WBS) helps both comprehensive and specific when managing a project. Creating a quality WBS can take a substantial amount of time, but is usually worth the effort because of the additional clarity it provides for the project manager. WBS is a map of the project, the use of it is that it assures project managers all product and work elements are identified to integrate the project with the current organization and to establish a basis for control. Basically the WBS is an outline of the project with different levels of detail (Tuman, 2010).

When considering the role of WBS in facilitating project implementation, it is better to focus also on the criteria of measuring project success where the degree to which targets
of time and cost were met. The WBS provides a clear statement of the objectives and deliverables of the work to be performed. The depth of a WBS is dependent upon the size and complexity of the project and the level of detail needed to plan and manage it. It helps the project manager to understand the complexity of the project and the level at which he will need to manage the works a work break down structure that the overall characteristics of the project can be predicted and some future risks can be avoided like time, finance and resources. This therefore calls for careful planning over the project, not just to think of a project and implement it simultaneously.

A work breakdown structure provides the framework for project control, performance monitoring, and the foundation for communication with all stakeholders. A project is made more manageable by breaking it down into individual components that together are known as a Work Breakdown Structure or WBS. Such a structure defines unique work elements that can be completed independently, and facilitates other project management processes such as estimating, sequencing, and resource allocation, assignment of responsibilities, and measurement and control of the project. Some construction industries in Rwanda perform the use of work breakdown structure in order to ensure successful implementation in their project (Haugan, 2002). In regard to the above overview of WBS, the researcher is much attracted to find out how WBS plays a role in implementation of construction project.

1.2 Problem Statement

In Rwanda, most projects in today’s construction industry have not only been limited to housing and buildings but concern all other sector of infrastructures. Rapid economic growth has inspire a lively construction boom, as the government continues to court
foreign investors to transform Kigali into a regional business hub so there is need for more developed commercial buildings.

It is highly unlikely that a project will be successful without the existence of a quality WBS. In contrast, developing and applying a quality WBS will significantly increase the likelihood of successful project completion. Implementation of projects fails due to different reasons which have resulted into poor performance (Crawford, 2002).

A major challenge facing this industry has been misuse of some technical tool, lower quality material and lack of local players in the sector. These affect the success of project in construction industry where some houses are not strong and built in developed manner (Rajani, 2012a).

There are many things that can go wrong in projects regardless of how successful project managers are in the planning and execution of their work. Project failures, however, can often be traced back to a poorly developed or nonexistent WBS. Construction industry is exposed to the risk caused by poor planning on how the works have to be done to favor its success so that the evolvement of some tools such as WBS may have a great contribution in changing the way the project is implemented. Therefore, the researcher fills the gap by assessing the role of WBS in facilitating project implementation.

1.3 Objectives of the Study

1.3.1 General Objective

To analyze the role which Work Breakdown Structure plays to the successful implementation of project construction.
1.3.2 Specific Objectives

The study aims:

i. To identify the role of Work Breakdown Structure in the success of project implementation

ii. To determine the elements of WBS in construction project implementation

iii. To examine the awareness of managers on usage of WBS in construction project.

1.4 Research Questions

i. What role does WBS play on success of project implementation?

ii. What the elements of WBS in construction project implementation?

iii. What is the extent of manager’s awareness about WBS usage in construction project?

1.5 Significance of the Study

The theoretical contribution of this research is in exploring the issues concerning the changes that happen in construction industry because of taking up work breakdown structure. The findings are expected to facilitate and stimulate the effective creation of WBS for increasing the successful implementation of project. The study result will help the institutions to develop the usage of WBS for successful projects implementation. The study results will serve as a reference to other researchers who will be interested and motivated in carrying out research on the WBS and successful projects implementation. Finally, it will benefit the researcher to fulfill the academic requirements.
1.6 Limitation of the Study

The researcher met a couple of challenges while conducting this work and these are:

The researcher was disappointed by some respondent’s who did not turn up their questionnaires in the scheduled time.

The researcher was limited by the doubt of respondents who doubted on research purpose. The research tried to give more explanations about the research purpose. This hindered the collection of data

1.7 Scope of the Study

The study was carried out in Kigali- Rwanda especially at HYGEBAT, a company of construction project. The study was intended to assess the role that WBS has on project implementation. The research covered the period of 2012-2014 July

1.8 Organization of the Study

The study is divided into five chapters in which introduction to the study while chapter two presents literature review and chapter three presents research methodology, the fourth chapter presents, analyses and interprets the findings of the study and the fifth chapter presents conclusion and recommendations.
CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.0. Introduction

This chapter relates to literature review that presents the ideas and views of other persons in relation to the topic identified by the researcher. It is concerned with the reviewing of other people’s work on the concept of examining the WBS and its role on successful project implementation. Therefore it set out ideas, arguments and observations that will be available to this study. The largest part of this literature was extracted from journals, books and articles written by other researchers.

2.1 Theoretical Review

2.1.1. Elements of WBS in implementation of construction project

2.1.1.1 Work Breakdown structures and project accounting

In any construction project, completion within budget is a top priority. Yet the road to occupancy of a large project can be highly complex and at times even rocky. Therefore, construction teams look for tools that will best help communicate and form linkages among the myriad aspects of the job, identifying critical points throughout the process that might endanger the end goal. One of the most effective tools is the use of the Work Breakdown Structure (WBS), a standardized system that visually divides the scope of work into manageable tasks. Making WBS a worthwhile component in the planning of any major construction project, so that it meets the ultimate goal of delivery within budget. WBS allows project managers to view smaller, manageable cost packages, making it easier to control the project’s overall budget (Schualbe, 2010).
A work breakdown structure can provide an organized approach to project accounting. A work breakdown structure helps to gain an overview of project and facilitate project accounting. With the systematic approach of the work breakdown structure, manager can establish projected costs for individual activities and control actual costs as the project incurs them.

The work breakdown structure divides the work to be done for a project into individual, self-contained tasks. Starting with major project segments like design, deliveries and installation, you divide each segment. For example, a construction project could be divided into building design, site preparation, foundation, structure and finishing. Dividing design work further, it might include architectural, electrical and mechanical drawings. By breaking the work down into activities such as preparation of the drawings for the utility connection you can identify small, individual tasks for which project accounting can assign costs (Junying, 2005).

Project accounting involves matching incurred costs against cost projections to ensure that the project comes in on budget. With a completed work breakdown structure, it is easy to calculate how much the completion of each activity or task will cost. The key purpose of project accounting is to assign the costs to the activity whose budget covers it, so you can see if the actual costs match the budgeted costs and to make sure the actual costs doesn't exceed the budget. For example, the costs for the technicians preparing the electrical drawings are paid out of the electrical drawings budget. You can immediately see when a task such as electrical drawings has used up its budget and threatens to exceed its assigned cost. The critical value for project accounting is how well the project as a whole is adhering to the overall budget. The work breakdown structure allows calculating
overall budgetary performance through the work required to be completed (Dennis, 2007).

When a WBS is done properly, useful data can be quickly extracted, such as construction and installation cost summaries for life cycle cost analysis. When it includes sufficient detail, tracking and cost control of subcontractors through a schedule of values can also be achieved.

Connecting all estimates and budgets to schedule for maximum cost control is the most important function of a WBS, which allows project managers to view smaller, manageable cost packages, making it easier to control the budget overall. While the owner may have a single bottom line number in mind, the project team internally uses costs at various levels to check for any problems that may arise. By looking at the code of accounts within the WBS, cost deviations can be found for major construction functions. By organizing each function into small, clearly defined parts, a WBS makes it easier to resolve cost deviations without analyzing from the bottom line up. Deviations of quality can also be detected and quickly addressed based on the smaller packages that a WBS provides. WBS allows project managers to view smaller, manageable cost packages, making it easier to control the project’s overall budget (William, 2003).

2.1.1.2 Work package in construction project

A construction work package is a detailed outline of a construction project in terms of scope, purpose and steps to completing the project. The package includes a budget that meets the budgetary. For this, the constructors and project managers must be familiar with creating and presenting because the better a construction work package is prepared the better chance that the project will be accepted and executed by industry (Kerzner,
2003). For this current research, researcher was motivated by determining how the works are packaged in construction industry also how this brought out the change.

2.1.1.3 Work breakdown structure and deliverables in Construction Company

A WBS is a key project deliverable that organizes the team's work into manageable sections. The work breakdown structure visually defines the scope into manageable chunks that a project team can understand, as each level of the work breakdown structure provides further definition and detail. The project team creates the project work breakdown structure by identifying the major functional deliverables and subdividing those deliverables into smaller systems and sub-deliverables.

These sub-deliverables are further decomposed until a single person can be assigned. At this level, the specific work packages required to produce the sub-deliverable are identified and grouped together. From a cost perspective, these work packages are usually grouped and assigned to a specific department to produce the work. These departments, or cost accounts, are defined in an organizational breakdown structure and are allocated a budget to produce the specific deliverables. By integrating the cost accounts from the organizational breakdown structure and the project's work breakdown structure, the entire organization can track financial progress in addition to project performance (Smith, 2003).

2.1.1.4 Project Cost

The project cost, which includes the cost of construction, professional compensation, land, furnishings and equipment, financing, and other charges. The project cost is the total project cost which includes design fees, material costs, construction costs, permit fees,
land, furnishings, financing and all other costs that were incurred in completion of the project (Verma, 1995).

In order to succeed in managing a project, the project manager needs to learn how to make cost calculations, estimate resources required for the project, develop cost spreadsheets, use cost management templates, and more. The manager should understand that all information on the need, availability and consumption and of project resources (like labor, money, time, technology) can be gathered, filtered, sorted and managed by project cost management and its special method.

2.1.1.5 Project Schedule

In project management, schedule consist of listing of a project’s milestones, activities and deliverables, usually with intended start and finish date. Those items are estimated in terms of resource allocation, budget. Before creating a schedule, its very important to have a work break down structure as well as resource. So in this research, researcher will try to examine if the project will meet the time as planned.

2.1.2 Relationship between WBS and project implementation

WBS is the tool that defines the scope or contents or deliverables of the project, and scope drives everything. While problems with schedule, cost, or resources may be self-contained, scope problems usually lead to new problems with cost, schedule, resources, client relationships, team morale, contracts, and profitability. So it makes sense to create the strongest WBS possible. As a project management document, a well composed WBS is essential because it serves as a foundation for initiating and planning the project. It is best to think of the WBS as the roots of a tree, where the tree is your project. For a tree to
bear fruit, its roots must be deep, wide and exhaustive. And just as roots become finer as they descend into soil, the WBS should define the project’s deliverables and list supporting documentation in greater detail as it goes on to addresses the subcomponents of every deliverable between the project manager and stakeholders throughout the life of the project (Cleland, 2003).

A well crafted WBS also helps identify how a change in one aspect ripples across the product and project. In the absence of a WBS, change notification is typically limited to those who deal with the particular piece or part of the project that’s being changed. A WBS visually demonstrates the product and project-wide ramifications of making a change in one component and therefore gives the project’s stakeholders a more global understanding of the interrelationships among all components.

A work breakdown structure lets project managers plan their work more efficiently. A project is characterized by time-limited activities and is assigned fixed time frames and costs. When it is finished, a project must fulfill the stakeholder needs it was designed to address. The project management has to plan for the schedule, the fixed costs and the functional completeness of the project and assign responsibilities. The WBS helps make this planning consistent and provides for effective project execution (Bert, 2003)

Having a WBS forces the team to truly identify and understand the work that needs to be delivered; It helps identify early hidden dependencies between project deliverables; It helps test whether the project manager’s understanding of the scope and objectives of the project is sufficient; It is a strong communication tool with all project stakeholders. In the early stages of a project, all stakeholders have their own definition of the project scope,
their own expectations. It is also the first important step in getting everybody on the same page when it comes to what the project is actually going to deliver (Ciprian, 2011).

In construction industry tasks must be measurable and independent, with clearly defined limits. All the project work must be included in one of the tasks and the tasks must not include any non-project work for example installation, excavation in site, excavation in foundation, stone hardcore of foundation up to doors and windows, etc because the WBS tasks are measurable, the project management can assign specific costs to each task. In addition it is important to allocate the work among the project participants in a very precise way so that the schedule and budget constraints will not be violated and resources will be efficiently and effectively utilized but not overloaded (HYGEBAT, 2013).

The work breakdown structure (WBS) is a deliverable oriented grouping of project components that helps organize and define a project’s total scope of work. Effectively, the WBS describes a project’s product or service through what goes into what process. It also relates each of the deliverable work components to one another and to the total product or service as a whole. Today project managers are more frequently finding high value in the creation of Work Breakdown Structures (WBS) as they begin the process of project management, project success may be attributed specifically to use of a WBS (Halli, 1993).

The WBS serves many critical purposes, the most important of which is defining the work to be performed and breaking it into manageable components. Developing a work breakdown structure generates a number of other planning benefits, such as a greater ability to determine the types of resources needed; a better comprehension of their roles;
and a more accurate understanding of the skill levels required to manage the pieces of the project (Kim, 2000).

Many Project Managers are aware of the value of using the Work Breakdown Structure to help implementation of a project. However, the lack of experience and knowledge on the technique prevents them from using it in their projects and explaining it to their colleagues. Experienced project managers know that there are many things that can go wrong in projects regardless of how successfully they plan and execute their work. Component or full project failures when they do occur can often be traced to a poorly developed or nonexistent WBS. A poorly constructed WBS can result in adverse project outcomes including ongoing, repeated project plans and extensions, unclear work assignments, scope creep unmanageable, frequently changing scope, budget overrun, missed deadlines and unusable new products or delivered features. The WBS is a foundational building block to initiating, planning, executing, and monitoring and controlling processes used to manage projects (Globerson, 1994).

A well-crafted WBS also helps a project manager define the performance-measurement baseline from which he or she can judge a project’s status. It’s important to build a WBS in a team setting because different project participants might use different words to define the same components, or the same words to define different components. To eliminate potential confusion, the team must facilitate communication and agreement instead of having several versions of the same work breakdown structure done by different departments or individuals, each with their own vocabulary (Raz, 1998).

One of the key functions of the project management is to define the scope of the project. The challenge is to make sure that everything within the project scope is completed...
without carrying out any extra work. The WBS helps define scope by listing individual tasks that make up the project. The project team completes all the listed tasks but no additional work. A major criterion for project success is that it fulfills its intended purpose. The tasks of the WBS each implement a part of the overall function.

A task is only complete when it fulfills its partial function. When all tasks are finished, all the partial functions add up to a fully functional project. An important part of project management is to assign responsibility for the work. With a WBS, the project management assigns responsibility for each of the tasks. The task manager is responsible for completing the full scope of the project on time, within the budget and with all of its planned functionality intact (Rajani, 2012b). In this regard, researcher analyzed how WBS has contributed in the management of activities in such construction industry especially in Commercial Complex building implemented by HYGEBAT.

The project structure is designed to handle one-time, unique, and non recurrent endeavors. It is based on a task force assembled for a limited time to achieve a predefined goal. The members of the project team may come from different organizational units and have different educations and backgrounds. They have a common goal, the project success; and a common leader. The project manager, Organizations dealing with projects may adopt a flexible structure in which only a core group has a permanent structure while most of the organization is assigned to project groups. An advantage of the project structure is its flexibility; the project team can be assembled exactly according to the task at hand. Another advantage is the creation of a single point of contact for the customer the project manager has complete responsibility for the project and for customer satisfaction.
2.1.3 Considerations while creating a WBS

There are many ways to create a WBS. It can be developed entirely as a new document, can reuse components from existing WBSs, can be based on a template, or can follow pre-defined WBS standards. When reusing existing components, WBS elements can be drawn from similar projects or from standard project templates that the organization has determined support accepted good practices. A number of project management tools can be used to assist with the development of a WBS. These tools include outlines and organization charts, fishbone and brainstorming techniques. There are many WBS templates available and corporate standards can be referenced or copied for quick-starting WBS development (PMI, 2006).

In developing a WBS, the following basic assumptions should be considered: Each element in the WBS should represent a single tangible deliverable. The deliverables should be logically subdivided to the level that represents how they will be obtained. The partitioning of deliverables from higher levels within the WBS to lower levels must be logically related. Deliverable components must be unique and distinct from their peer components, and should be subdivided to the level of detail needed to successfully plan and manage the work related to obtaining or creating them. The WBS development process should provide a vehicle for flexibility, particularly when the scope of the project effort may change. A well-managed project, however, will incorporate a rigorous change control process to document and manage scope changes. When work scope changes do take place, the WBS must be updated (Kim, 2000).

Each entry in the WBS representing subcontracted or externally committed deliverables should directly correspond to matching entries in the subcontractor’s WBS. All
deliverables are explicitly included in the WBS. All significant reporting elements (example of review meetings, monthly reports, test reports, and so on) are included and identified in the WBS. All activities should be compatible with organizational and accounting structures. Deliverables should be clearly defined to eliminate duplication of effort within WBS elements, across organizations, or between individuals responsible for completing the work. Deliverables should be limited in size and defined for effective control but not so small as to make cost of control excessive.

2.1.4 Building high Quality Work Breakdown Structure

The WBS provides a clear statement of the objectives and deliverables of the work to be performed. It represents a clear description of the project’s deliverables and scope of the project. It is not a description of a process or schedule that defines how or when the deliverables will be produced, but rather is specifically limited to describing and detailing the project’s outcomes or scope. The WBS is a foundational element, and as such is a critical input to other project management processes and deliverables such as activity definitions, project network diagrams, project and program schedules, performance reports, risk analysis and response, control tools or project organization (Pritchard, 1998).

A high quality WBS is one that has been created so that it satisfies the purpose for which it was created and there are two basic principles that govern the quality of a WBS. A quality WBS is a WBS constructed in such a way that it satisfies all of the requirements for its use in a project. There are two sub-principles that pertain to satisfying requirements for a WBS.

These describe core characteristics and use-related characteristics. There are a set of core characteristics that must be present in every WBS, as these characteristics enable the
WBS to satisfy project needs that are present in every project. A WBS either exhibits the Core Characteristics or it does not, and, as such, these characteristics represent the minimum set of specific attributes a WBS must contain. When evaluating or developing a WBS, the absence or presence of these core characteristics will dictate whether or not it is quality WBS. There is an additional set of use-related characteristics that may vary from one WBS to another. These characteristics enable the WBS to be used for purposes that are unique to a specific project, industry or environment, or are applied in a particular way to individual projects (Haugan, 2002).

The quality of a WBS depends on how well the specific content of the WBS and the type of WBS elements included meet all the needs for which the WBS has been developed. The more project needs that are met by the WBS, the higher its quality. A WBS is broken down to a level of detail sufficient for managing the work. The appropriate level of detail to enable effective management can differ from organization to organization or project to project and provides sufficient detail for communicating all work. A WBS provides a good balance between complexity, risk, and the project manager’s need for control. A WBS elements as needed for each project enables assignment of accountability at the appropriate level where some projects can require assignment of accountability at a detailed level, while others might be satisfied with accountability at a summary rollup level, it has a succinct, clear, and logically organized structure to meet project management and oversight (PMI, 2006).

2.1.5 Factors of Project Success

Project success is concerned with increasing quality levels and raising productivity. As for raising productivity, organization measures productivity on site by calculating the
amount of finished work divided by the number of hours used to complete the work. Proper monitoring and timely feedback help in controlling the workmanship and they enhance the success of a project. If each part of the activity of a project is monitored effectively, poor workmanship of resources are identified, labor and machinery are reported promptly, and it aids project success (Hunt and Daniel, 1993).

The theoretical literature on project management tends to assume that certain organizational rules, executive procedures, and environmental conditions (called critical success factors) are essential to the success of all types of projects. Meanwhile, management practitioners frequently ignore such general rules, because they are convinced that their particular projects pose entirely unique kinds of problems. In Pinto's research participants were asked to consider a successful project with which they had been involved and then to put themselves in the position of a project manager charged with the responsibility of successful project implementation. Ten factors formed the basis for the conceptual model and the diagnostic instrument for measuring relative strength of each factor. Those factors are Project Mission, Top Management Support, Project Schedule/ Plans, Client Consultation, Personnel issues , Technical Tasks , Client Consultation, Monitoring and Feedback , Communication , Trouble Shooting (Pinto, 1986).

The study shows that the degree of management support for construction industry will lead to significant variations in the client’s degree of ultimate acceptance. Project schedule refers to the importance of developing a detailed plan of the required stages of implementation process. These refer to the degree which time schedules, manpower and equipment require are specified (Pinto and Slevin, 1987).
In the present study the researcher detected how WBS contribute to use properly time and resources as well as other factors required by breaking tasks into smaller tasks in order to implement a project in construction industry. The client must be involved in a project and manager must hire the skilled employee and organize the training for them because it is so important that the implementation be well managed by people who understand the project and tools.

Some critical success factors appear to be common to both types of projects, there also exist significant differences; and, furthermore, that these factors tend to vary with stages in the life cycle. researcher conclude that practitioners may derive benefit from paying attention to normative project-management theory, but that theoreticians must also descend from the level of broad generalizations to take into account the peculiarities of various classes of projects (Rosario, 2000)

2.1.6 Criteria for measuring Project Success

Project success is commonly defined as the levels of adherence of the four management factor such us: Project scope, project cost, and project time and stakeholder satisfaction. Project scope is defined as the sum of products, services and results. To ascertain that a project includes all the work required, project manager use a process called project scope management. This process consists of scope planning, scope definition, work breakdown structure, scope verification and scope control. A project is on scope when the outcome of the final verification process confirms that work has indeed been carried out in accordance with applicable regulations, contracts and design documents (Atkinson, 2004).
Project time consists of the total number of work period required to complete a project. A project is on time when the overall project duration does not exceed the initially planned project time.

2.2 Empirical Review

A project is characterized by time limited activities and is assigned fixed time frame and costs. When it is finished, a project must fulfill the stakeholder needs. In his research on the role of WBS Rifat (2013) conclude that running a project without WBS is like going to a strange land without a road map.

In their research to the issues raised in construction industry, Nath (2001) find that the lack of WBS results in more inefficiency, schedule slippage and cost overruns on project than any other single cause. The WBS is the basis of the contract between the project managers and the sponsoring organization. It is the tool that defines the scope, the contents and deliverables of the project as well as scope drives everything while problems with schedule, cost or resources may be self-contained, scope problems usually lead to new problems with cost, schedule, resources, client relationship, team morale as well as profitability. So it makes sense to create the strongest possible WBS.

Studying on budget utilization in his book Budget and WBS Khlar (2009), he found the WBS lets project managers to distribute the project budget into defined packages linked to the tasks and check to make sure that the task costs in total don’t exceed the total budget cost.

Toklu (2007) examined the impact of WBS on project success and concluded that majority of the project managers are also interested and started using work breakdown structure in
the implementation of their project. Also there should be a well strategy to create a good work breakdown structure.

Farrington (2001) in his research on constructability analysis in the design firm conclude that WBS has a positive impact on the project implementation. According to their study it has show the way the project management can determine how advanced the project is by checking which of the tasks are finished. With the WBS the project management assigns responsibility for each of the tasks manager is responsible for completing the full of the project on time, within budget and with all of its planned functionality intact.

In USA the introduction of WBS was done by the US defense in support of the Palaris missile program. This was to help their project to be successful. In their research, Wong (2006) analyzed the effect of project tool on the performance of construction project and their findings concluded that WBS improved the profitability of entertainment building.

In their researcher, they concluded that a project is generally considered to be successfully implemented if it Comes in on schedule; Comes in on-budget; Achieves basically all the goals originally set for it; is accepted and used by the clients for whom the project is intended. At the end of a project, success criteria can be used as basis for evaluating project performance. And, if you looked at success from a single perspective, you would miss important indicators for future performance improvements. A projects can fail or succeed on any number of elements, and can still be considered a success if overall priorities and objectives are met. Project implementation success has been defined many ways to include a large variety of criteria (Van, 2004).

Across Europe, Kloppenborg continues to profess that success is measured more easily when the objectives are clearly stated at the outset of the project corresponding the use of
WBS. successful project implementation is meaningful only if considered from two vantage points: the degree to which the project's technical performance objective was attained on time and within budget; the contribution that the project made to the strategic mission of the enterprise. Project success may be assessed by different interest groups stockholders, managers, customers, employees, and so on. Targeting the main problems and issues using the key success factors as a focus could make a significant difference to the effectiveness of project management. In order to ensure that a project is completed successfully, project plans need to be updated regularly (Kloppenborg, 2002).

2.3 Critical Review and Research Gap Identification

In the construction industry, project management demands professionals with reliable competence in the fields of engineering, finance and building trades. Well-developed communication skills are a necessity to effectively organize workers and inform customers (Kamel, 2007). The higher technology pushed construction industry in Rwanda to use some tools such as work breakdown structure to ensure success in their projects. This is the reason why researcher is interested to find out that role.

Managers should have strong skills for creating and using work break down structure. Budget play an important role in the entire process of project management, it is clear that budgeting procedures must associate resource use with the achievement of project goals. This research analyzed how well budget are well utilized in construction project via the use of WBS.

Creating a Work Breakdown Structure is such a great process to go through. WBS is constructed by dividing the project into its major parts, with each of these being further
divided into sub-parts. This is continued till a breakdown is done in terms of manageable units of work for which responsibility can be defined. It can be presented in either graphic or outline form (Turner, 2003). In this regard, creating a WBS means showing how much the project manager and his/her team understands the project.

By creating WBS, each work package should identify the data relevant to WBS and list the personnel and department responsible for each task. All work package information should be reviewed with the individuals or organization that has responsibility for design or supporting the work in order to verify the WBS’s accuracy. By a schedule, each task must indicate the start date, day, precedence relationship and name of person responsible for completing the task (Wai-ching, 2008).

Building a WBS help construction industry especially to provide a detailed illustration of project scope, monitor progress, and create accurate cost and schedule estimates and effective planning by dividing the work into manageable elements which can be planned, budgeted and controlled.

Researchers assert that WBS is an important tool which help to keep an overview of the project where it forms the basis for industry and its coordination in the project and it shows the amount of work, the time required and the costs involves in the whole project. For this contribution, financial and skills still an important issue. The project failure or near-failures could be caused by poor communication and unanticipated shortage of resources (Edwards, 1996).

Project implementation appears to be one the most difficult aspects of a manager’s job. Managers lack the ability to implement strategies successfully project is designed to
deliver a specific deliverable and is dissolved once the deliverable has been produced. Project schedule refers to the importance of developing a detailed plan of the required stages of the implementation process (Richman, 2006). For this statement, the existing misunderstanding is a negative impact on the construction industry in Rwanda due to inadequate technology inside the industry. The researcher tried to show how integration of WBS changed the way project is implemented and the benefit from this.

The knowledge gap is that concerning WBS’s contribution to the project implementation. The implementers take a longtime to meet the procedures of implementing their project. In this research, the researcher put a particular attention to verify if it could not act as a barrier of effective construction process. On other hand theory reviewed talk on WBS as mechanism for effective project success others talked about project success factors and others criteria for measuring project success but they have not examined the effect of WBS on implementation of construction project in Rwanda.

2.4 Theoretical Framework

Being one of the biggest industries worldwide, the construction industry plays a significant role towards social and economic development at national and international level. It contributes towards providing communities with places for housing, education, culture, business, etc. in addition it constructs the infrastructure projects that are essential for these facilities to perform their intended functions. Due to its nature construction is a complex, risky, fragmented industry and has negative impacts on the environment. In current research which aimed to analyses the role of work break down structure in project implementation, the researcher adopt the theory of “constructability” in order to provide more knowledge and makes comparisons between both studies.
The concept of constructability was first emerged in the UK and the States of America during the late 1970’s as a result studies aimed to maximize the efficiency, productivity, cost effectiveness and quality in construction industry. This is a project management technique that encompasses a detailed review of construction process. It helps identifying obstacles before a project is actually built to reduce or prevent errors.

Saram (1970), in his research he indicate that the construction industry has begun to address more purposefully the concern and difficulties of actively managing the interface between various stage of building process. In this way constructability is becoming important and powerful concept which can be applied to the total construction process. He continues to advise that project managers should use the project tool in their implementation and construction knowledge and experience should achieve the early project planning.

**2.5 Conceptual Framework**

Conceptual frameworks demonstrate the theory of the sequences of causes and effect that ultimately lead to a particular problem or, turned around to a positive view, a particular ultimate result. They typically trace out several layers of causality as well as lateral relationship.

This represents the cause and effect that researcher should explore and test through data collection. They will help researcher to foresee how a change in context might influence eventual outcomes. The conceptual framework shows the relationships that exist between the dependent, independent and intervening variables under study.
Figure 2.1: Conceptual Framework

INDEPENDENT VARIABLE

WORK BREAKDOWN STRUCTURE

- Project deliverables
- Project sub-deliverables
- Lowest sub-deliverables
- Project cost

DEPENDENT VARIABLE

PROJECT IMPLEMENTATION

- Project completion on schedule
- Project completion on budget limit
- Project goals met
- Project accepted

INTERVENING VARIABLE

- Political factors
- Socio-cultural factors
- Technological factors

Source: Researcher, 2015

Dependent variable

The dependent variable is project implementation whose main indicators are completing project on schedule, and on budget, goals must be achieved to ensure success of its implementation then acceptance of project. It is expected that the integration of WBS and its associated as independent variables will improve the way project is implemented and as such reasonable the cost of unexpected circumstance will be reduced.
Independent variables

The independent variable that will be investigated to establish their level of influence on the dependent variable is work breakdown structure its indicator will be project deliverables, sub deliverables, work package and cost account.

Cost account aims to capture all cost for each task to be performed because each has a specific period to ensure well utilization of budget and well implementation of project.

Intervening variables

Intervening variables is the one that has a strong contingent effect on the independent variables and dependent variables relationship. In this case researcher mention political factors, socio cultural factors and technological factors as intervening variables. Political factors represent how government can have an influence on construction industry by fixing the master plan. Socio-cultural factors concerned with a society’s attitude and cultural values. These variables shape the way people live, work, produce and consume. Technological factors deals with technical change among construction equipment, materials and information systems among construction activities and process

2.6 Summary

According to the information from different authors in this chapter, WBS has made profound role on the project implementation in construction industry. Despite its role to the project implementation, WBS has its pitfalls like lack of skills to managers, financial issues and, these make a WBS questionable as a contributor tool to the project implementation. In conclusion therefore, WBS has improved the successful project implementation. This evidenced in helping the lives of managers in implementing their project.
CHAPTER THREE: RESEARCH METHODOLOGY

3.0. Introduction

This chapter concerns the overall approach to the research process from theoretical underpinning to the collection and analysis of the data. It narrates why the researcher collected certain data, what data the researcher collected, from where she collected it, and how the data analyzed. This chapter consists of the following: research design, target population, sample design and procedure, data collection methods and data analysis.

3.1. Research Design

A research design is the arrangement of conditions for collections to the analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure or a conceptual structure within which research will be conducted (Kothari, 2011). Descriptive and analytical design is used in this study in order to clearly establish the relationship between WBS and project implementation in Rwanda. Descriptive research describes data and characteristics about the population being studied. However it does not answer questions like how and why which is done under analytical research. This explains the reasons why the researcher used both design.

3.2. Target Population

Population is a group of individuals, persons or items from which samples are taken for measurement (Grinell, 1990). For the case of this study, the target population was the employees and management team of construction project named HYGEBAT and constitutes a total of 147 persons.
3.3 Sample Design

Sample size is the number of objects or people which are selected to take part in a research study. It is recommended that researchers use the largest sample possible because statistics calculated from a large sample are more accurate, other things being equal, than those from small samples (Kasomo, 2007). The researcher selected sample size using Slovin’s formula. This stated below;

\[ S = \frac{N}{(1+N \times e^2)} \]

Where:  \( S \) = Number of samples elements.

\( N \) = Total population of 147 persons

\( e \) = Error tolerance of 11%

\[ S = \frac{147}{(1+ 147 \times 0.11^2)} \]

\[ S = \frac{147}{2.7787} \]

\[ S = 53 \]

Table 3.1 Population and Sample selected

<table>
<thead>
<tr>
<th>Categories of population</th>
<th>Total</th>
<th>Sample selection</th>
<th>Sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional employees</td>
<td>135</td>
<td>45</td>
<td>Purposive sampling and stratified simple random</td>
</tr>
<tr>
<td>Management team</td>
<td>12</td>
<td>8</td>
<td>Purposive sampling</td>
</tr>
<tr>
<td>TOTAL</td>
<td>147</td>
<td>53</td>
<td></td>
</tr>
</tbody>
</table>

Source: Researcher, 2015
3.3.1 Sample Size

The researcher used a sample size of 53 respondents selected from the total population using purposive sampling technique.

3.3.2 Sampling Technique

It is a method of drawing a portion of a population so that each member of the target population has a known and a non-zero chance of being selected into the sample (Kasomo, 2007). The researcher used stratified simple random and purposive sampling for some employee to be selected and sample was selected based on the categories they are in also they knowledge and the purpose of study. 45 Professional employees are selected out of 135 and 8 management team are selected out of 12.

3.4 Data Collection Methods

The researcher used both primary and secondary sources of data. To collect primary data, questionnaires were used. In secondary data collection, different books and documents related to the topic as report and internet were consulted. The researcher also used interview as techniques of data collection.

3.4.1 Data Collection Instrument

The researcher used questions include closed questions where the respondents choose from the alternative answers given as well as open ended questions in obtaining the detailed information on Work breakdown structure and its role to the implementation of construction project. Also researcher tries to get the information from the interviewee. This method was used to respondents of HYGEBAT who claim not to have time to
answer questionnaires. For collecting secondary data, researcher used books, various reports and journals with information related to the WBS in facilitating implementation of construction project.

3.4.2 Administration of Data Collection Instrument

The researcher used the technique of distributing the questionnaire and picks them later. The questionnaires were sent in hard copy and the respondents were expected to read the question and write down the responses in the space provided. This technique was used because it allows the researcher to collect more info within little time.

3.4.3 Validity and Reliability Instrument

Validity refer to how exactly a scientific investigation is carried out and how accurate the instruments and method are according to purpose of study. Reliability deals with the consistence of the findings. A measurement procedure is considered reliable to the extent that it produces stable, consistent measurement. That is a reliable measurement instrument produces the same or nearly the same scores when the same individuals are measured under the same conditions (Gravetter, 2007).

The researcher tried to maximize the reliability and validity of data. The quality of the research study mainly depended on the accuracy of the data collection procedures. The researcher tested the population validity by trying to analyze how the sample used can be extrapolated to all population. The two validity techniques were balanced to ensure that the results obtained are not only accurate but they are also generalized to the target population.
3.5. Data Analysis Procedure

The data to be presented are those most central to the goal of the study. After the researcher receives the questionnaire filled by the respondents, the data collected was summarized, classified into categories and interpreted through Ms Excel.

Tabulation was involved in putting data into statistical tables and determination of the frequency of the responses to a particular question than their percentage. Data collected was analyzed and summarized in such a way that it reflects the objectives of the study.

The coding frame was conducted in relation to response categories that were preceded to the open-ended question; a range of answers was developed for the question which was manually exhaustive and purely exhaustive for all the possible answers. Immediately, the process of editing was done after meeting with the report. The process was carried out to ensure that the information given was accurate.

3.6 Ethical Consideration

It is the responsibility of the researcher to ensure that ethical standards are mentioned. Therefore, in this study, measures were taken while planning and conducting the study to ensure the rights and security of each would be protected and that nobody will be harmed or hurt in any way during the research process. To render this research ethical, the researcher observed several safeguards including privacy, self determination, anonymity, confidentiality and informed consent. The researcher presented a letter from Mount Kenya University to seek permission from research site to get data needed.
CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.0 Introduction of the data analysis

In this chapter the researcher presents the analysis of the data using tables. The descriptive statistics were used to summarize the objectives. Frequencies and percentage were used in order to present the majority response on each variable. The researcher sampled 53 respondents and all of them responded accordingly. The data was interpreted in line with the objectives whereby narratives were written using simple English for easy understanding. Additionally, the analysis was done based on the objectives of the study.

4.1 Demographic characteristics of respondents

General data

Fifty three questionnaires were distributed to forty five professional employees and eight head of department from HYGEBAT. All questionnaires were collected in total and the response rate was 100%.

Table 4.1 Representation of respondent by position

<table>
<thead>
<tr>
<th>Position</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management team</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Professional employees</td>
<td>45</td>
<td>85</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

The tableau 4.1 shows that 53 respondents, only eight representing 15 percent of the respondents and forty eight representing 85 percent participated in this research.
This percentage considered to be good to the researcher to get enough information needed for this study.

4.2 Presentation of Findings

General data

Table 4.2 Frequency of working in HYGEBAT

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2 years</td>
<td>3</td>
</tr>
<tr>
<td>3-5 years</td>
<td>14</td>
</tr>
<tr>
<td>6-8 years</td>
<td>20</td>
</tr>
<tr>
<td>Above 8 years</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

Tableau 4.2 indicate that 6% of those interviewed worked at HYGEBAT less than two years, 26% worked there from three to five years, 38% worked there from six to eight years and 30% worked with HYGEBAT above eight years. The number of years those employees worked with HYGEBAT show how experienced they are in this construction company so that they provide the best information about WBS.
Table 4.3 What do you understand by WBS

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work management</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>The ability to plan, manage and control work</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Decomposition of work to be executed by team</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Subdividing work</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Tool for assigning work to employees</td>
<td>28</td>
<td>53</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Primary data, 2014)

According to table 4.3, 53% understand WBS as ability to plan, manage and control work, 24% understand WBS as a tool for assigning work to employees, and 7% understand it as a tool for work management and 10% consider WBS as sub-dividing work into manageable pieces of work. All those interviewed started understanding the meaning of WBS.

Table 4.4 The main reason you typically use WBS in HYGEBAT

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>To manage time and track the cost of each element</td>
<td>30</td>
<td>57</td>
</tr>
<tr>
<td>To monitor progress by completion of tasks</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>To identify relationship between tasks</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>To ensure success of project implementation</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)
According to tableau 4.4, 57% use WBS to manage time and track the cost of each element, 7% use WBS to monitor progress by completion of tasks, 15% use WBS to identify relationship between task, and 21% interviewed use WBS to ensure success of project implementation. Implementers started using this tool in their project because they understand its role. This has prompted them to use WBS to implement their project. It’s clearly indicated that when time is managed fully within a certain project, all objectives of the project are meeting and fulfilled.

**Table 4.5 Frequency of project have been used WBS in HYGEBAT**

<table>
<thead>
<tr>
<th>Project</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>1 to 3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>3 to 5</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>Above 5</td>
<td>30</td>
<td>57</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

Tableau 4.5 indicate that 4% of respondent assert that zero to one project executed by HYGEBAT used WBS, 7% confirm that one to three projects used WBS, 32% confirm that three to five projects used WBS and 57% of respondents confirm that above five projects used WBS. HYGEBAT has started understanding the importance of using WBS in their project since it play a great role in implementing project.
Table 4.4 The challenge that HYGEBAT meets in the use of WBS

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool is expensive</td>
<td>25</td>
<td>47</td>
</tr>
<tr>
<td>It takes a lot of time</td>
<td>18</td>
<td>34</td>
</tr>
<tr>
<td>Less skills of implementers</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

According to tableau 4.6, 47% of the respondents confirm that the tool is expensive, 34% responded that it takes a lot of time, 19% confirm the less skills of implementers as the challenges that HYGEBAT meets in the use of WBS.

Table 4.5 WBS is not appropriate with non educated people

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>31</td>
<td>58</td>
</tr>
<tr>
<td>Agree</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>Undecided</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

The tableau 4.7 indicate that 58% of those interviewed strongly agreed, 23% agreed, 11% undecided while 8% were strongly disagreed that WBS was not appropriate with no educated.
4.2.1 Objective 1 The role of WBS in the successful of project implementation

This objective looked at how WBS played a great role in project implementation. As it was shown in the tables, researcher found that WBS has played a significant role in the project implementation in different manner.

Table 4.6 WBS has relationship with project implementation

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>32</td>
<td>60</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

The tableau 4.8 indicates that 60% interviewed affirm that WBS has relationship with project implementation and 40% affirm that WBS has no relationship with project implementation.

Table 4.7 WBS contribute in proper allocation of resources material

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>26</td>
<td>49</td>
</tr>
<tr>
<td>Agree</td>
<td>20</td>
<td>38</td>
</tr>
<tr>
<td>Undecided</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Disagree</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Strongly disagreed</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)
According to tableau 4.9, 49 strongly agreed, 38% agreed while 7 were disagreed, 4% undecided and 2% strongly disagreed that WBS contributed in proper allocation of resources material. The sum of strongly agree and agree which is 87% give a picture that WBS contribute effectively in resources allocation. This enables the managers to allocate their resources in order to ensure successful implementation.

**Table 4.8 WBS facilitate proper utilization of budget**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agreed</td>
<td>27</td>
<td>51</td>
</tr>
<tr>
<td>Agreed</td>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Undecided</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

According to tableau 4.10, 51% strongly agreed, 40% agreed while 7% were undecided and 2% strongly disagreed that WBS facilitated proper allocation of budget. The budget proposed is effectively meet, project activities are implemented as planned by responsible.
Table 4.9 WBS help to divide task into manageable tasks

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agreed</td>
<td>25</td>
<td>47</td>
</tr>
<tr>
<td>Agreed</td>
<td>23</td>
<td>43</td>
</tr>
<tr>
<td>Disagree</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Undecided</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

The tableau 4.11 indicates that 47% of those interviewed strongly agreed, 43% agreed while 6% were disagreed and 4% undecided that WBS helps to divide task into manageable tasks. This is profitable because activities are manageable through WBS where every employee knows her/his task.

4.2.2 Objective 2 The element of WBS in construction project

The second objectives consists of determining the element that construction project consider to ensure well implementation.

Table 4.10 The element of WBS in construction project at HYGEBAT

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of project</td>
<td>26</td>
<td>49</td>
</tr>
<tr>
<td>Deliverable of project</td>
<td>19</td>
<td>36</td>
</tr>
<tr>
<td>Work package of project</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)
The tableau indicate that 49% interviewed confirm cost of project as an essential element of WBS that HYGEBAT use, 36% mentioned deliverables as an element in construction project and 15% mentioned work package as element of WBS at HYGEBAT. Those entire elements enable company to execute their project where they are sure that everything is calculated its cost and work are sub-divided. These helped Company to implement the project successfully.

Table 4.11 Sub-deliverable contributed in implementation of construction project in HYGEBAT

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agreed</td>
<td>20</td>
<td>38</td>
</tr>
<tr>
<td>Agreed</td>
<td>15</td>
<td>28</td>
</tr>
<tr>
<td>Undecided</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Disagree</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

According to the tableau 4.13, 38% strongly agreed, 28% agreed while 19% were undecided, 9% disagreed and 6% strongly disagreed that sub-deliverables contributed in implementation of construction project in HYGEBAT. The sum of strongly agreed and agreed which is 66% proves that sub-deliverables are powerful to implement the project. This enables the implementers to take considerations of that to ensure success.
4.2.3 Objective 3 The view of managers on usage of WBS in a construction project at HYGEBAT

This objectives aim to examine the view of managers on the usage of work breakdown structure in construction project especially at HYGEBAT.

**Table 4.12 WBS is profitable to the company**

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>29</td>
<td>55</td>
</tr>
<tr>
<td>Agree</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>Undecided</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Disagree</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

The table 4.14 indicates that 55% of those interviewed strongly agreed 32% agreed while 6% were undecided and 7% disagreed that WBS is profitable to the company (HYGEBAT). WBS’s role is really appreciated by HYGEBAT through it use even if is expensive but powerfully helping project to be succeed. This encourages company to keep on using.
Table 4.13 WBS eases work

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>21</td>
<td>40</td>
</tr>
<tr>
<td>Agree</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>Undecided</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Disagree</td>
<td>8</td>
<td>15</td>
</tr>
<tr>
<td>Strongly disagree</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

The tableau 4.15 indicates that 40% of those interviewed strongly agreed, 19% agreed while 17 were undecided, 15% disagreed and 9% strongly disagreed that WBS eases management of the work.

Table 4.14 WBS eases management

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Agree</td>
<td>27</td>
<td>51</td>
</tr>
<tr>
<td>Undecided</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Disagree</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

According to the tableau 4.16 25% strongly agreed, 51% agreed
while 13% were undecided and 11% disagreed that WBS eases management of construction like preliminary works, floor finishing, building wall, fencing and landscaping.

Table 4.15 WBS promote efficiency of resources utilization at HYGEBAT

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>27</td>
<td>51</td>
</tr>
<tr>
<td>Agree</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>Undecided</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Disagree</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>53</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: Primary data, 2014)

The tableau 4.17 indicates that 51% strongly agreed, 32% agreed while 9% were undecided and 8% disagreed that WBS has promoted efficiently the use of resources in HYGEBAT. Through this efficiency, the company has succeeded its implementation of building a commerce complex.

Empirical studies show that work break down structure is very important in construction project, Nath said. It solves the issues raised in construction industry where without work break down structure there is cost overruns, etc.

The project managers are interested and started using WBS in the implementation of project. In his study, Khlar conclude that work break down structure lets project managers to distribute the project budget.
In the current study, the researcher found that 51% of respondent were strongly agreed that WBS facilitate proper utilization of budget, 60% say that it facilitate project implementation. Comparing the past studies and findings of this research, researcher conclude that WBS play a great role in project implementation.
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter highlights some of the important point raised in chapter four and thereafter presents a conclusion line of what have been observed during the research process and thereafter come up with recommendations.

5.1 Summary of findings

The study was conducted at HYGEBAT, a construction company while seeking to examine WBS and project implementation in Rwanda. Most of the respondents sampled mentioned that the company use WBS in implementing their project. Any project needs a work break down structure that the overall characteristics of the project are predicted. This therefore calls for the projects not to focus on just think a project and implement it.

The WBS is a view into the project which shows what work the project encompasses. It is a tool which helps to easily communicate the work and processes involved to execute the project. The main reason why they use WBS was to manage time and to track the cost of each element as 57% of respondent said, to identify relationship between tasks, to monitor progress by completion of tasks. Even if the tool (WBS) seems very important in the construction project, the 47% of respondent mention that the tool is expensive. WBS is very important as the 15% of respondents prove that work break down structure has a relationship with project implementation. These relationships have leaded the HYGEBAT to meet its objectives.
5.1.1 Objective one

Objective one was the role of WBS in the successful of project implementation. The researcher tried to establish role WBS played at HYGEBAT and result have been revealed. Having WBS in construction project is very important because it increases the possibilities of delivering a successful project and it is valuable instrument to set the scope so that activities are implemented as it was planned.

The head of department (managers) of HYGEBAT affirmed that WBS has changed the way projects were implemented. 49% of respondent affirmed that resources are allocated properly and the tasks have been subdivided correctly through the use of WBS as 47% of respondent affirmed. The introduction of WBS at HYGEBAT is an important thing so that it helps preliminary work such as excavation in site, excavation in foundation also retaining wall in stone masonry is easier through the use of WBS.

5.1.2 Objective two

Objective two was to determine the elements of WBS in construction project. In this objective researcher determined the element that HYGEBAT considered most in their implementation of project. It was also observed that 49% of the respondents mention cost of project, deliverables and sub deliverables as an element that HYGEBAT consider in implementing the project.

By considering the cost, the tool facilitates the proper utilization of budget from preliminary work to the end of project. After breaking down every aspect of the project, the manageable pieces to which project is resolved using the WBS techniques are
assigned to project resources in effort to facilitate costing. The company keeps using the tool (WBS) so that for employees are direct to the job description

5.1.3 Objective three

Objective three was to examine the view of managers on usage of WBS in construction project. The respondents said that work is easily performed with responsible people. 55% of respondent agreed that WBS is profitable to the company and this has encouraged HYGEBAT to keep use WBS. The managers also says that WBS eases work and 25% of respondents affirmed that it help management. Now construction has become real fast, works become eases because of WBS’s usage.

5.2 Conclusion

Based in the summary of the major findings the following conclusions are drawn:

The adoption of work break down structure has enhanced HYGEBAT efficiency by making it more effective. The WBS has also a strong impact on managing time. The use of WBS has changed more on the company because previously, HYGEBAT used a lot of energy to subdivide tasks among its employees but now, WBS have give the possibility to break tasks into smaller pieces and that make it easier to follow and manage the work. With the WBS managers are able to determine the cost of each activities and this has a lot to contribute on the use of budget for the entire project implemented by HYGEBAT. In general conclusion the work break down structure is very important in construction industry in Rwanda and it’s clearly that plan, manage and control work is a good answers that HYGEBAT consider in implementing the project.
5.3 Recommendations

On the basis of research findings, the following strategies are recommended for further follow up:

The projects cannot be successful without trained personnel about the work to be accomplished, the project managers should train employees about a certain kind of job they are entitled to do. Also project should hire qualified people who have full knowledge on the basis of project implementation and management of it so that the proposed vision should be accomplished.

Government should put more effort in use and teaching Information, communication and Technology so that the tools will be more used at high level in the construction industry.

5.4 Suggestion for further research

The research was not exhaustive; therefore the researcher recommends the following areas for further research:

Further studies could be conducted to explore the barriers to use work breakdown structure in construction project.
REFERENCES


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APENDICES
APPENDIX I: AUTHORIZATION LETTER

Mount Kenya University

SCHOOL OF POST GRADUATE STUDIES
RESEARCH AUTHORIZATION

11th July, 2014

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

MS. UWIMANA PAULINE - MBA/3527/12

This is to confirm that the above named person is a bona fide student of Mount Kenya University (Kigali Campus). She is currently carrying out research work to enable her complete her Master of Business Administration (Project Management) degree program. The title of her research is:

WORK BREAKDOWN STRUCTURE AND PROJECT IMPLEMENTATION
A CASE STUDY OF HYDRAULIC AND CIVIL ENGINEERING BUILDING LIMITED

The information received will be confidential and for academic purpose only.

Any assistance accorded her to complete this study will be highly appreciated.

Thank you.

[Signature]

Meryline, Kuminide, PhD
COORDINATOR, SCHOOL OF POST GRADUATE STUDIES
Dear respondent,

My name is UWIMANA Pauline, I am doing a master’s degree in public administration and management in Mount Kenya University, Kigali campus, currently carrying out a research on the topic “Work Breakdown Structure and its role to the successful project implementation” to fulfill the requirements of a good research, I need your support.

With high consideration of your limited time, by answering the following questionnaire, you are requested to please assist the researcher to respond adequately from your review point and concept from this questionnaire. It is an academic questionnaire and the views you give will not be used for any other purpose apart from the research.

Thank you for your kind assistance

Regards,

UWIMANA Pauline.
APPENDIX III: QUESTIONNAIRE

INSTRUCTIONS

i. For the questions that require choosing, tick in the box that corresponds to your choice.

ii. For the questions that require your own views, use the dotter lines space provided.

GENERAL DATA

1. What is your position?
   Head of department
   Professional employees

2. How long have you worked with HYGEBAT?
   a) Less than 2 years
   b) 3-5 years
   c) 6-8 years
   d) Above 8 years

3. What do you understand by Work breakdown structure?
   a. Tool for assigning work to employees
   b. Work management
   c. Decomposition of work to be executed by the project team
   d. Sub-dividing work into manageable pieces of work
   e. The ability to plan, manage and control and implement the work

4. What is the main reason that you typically use WBS in implementing project?
   To manage time and track the cost of each element
   To monitor progress
To identify relationship between asks

To ensure success of project implementation

5. How many project used WBS tool in your company?
0-1

1-3

3-5

Above 5

6. What claims do raises against the use of work break down structure?
Use the following rating: strong agree =1, agree =2, undecided =3,

disagree = 4, strongly disagree =5 to identify the perspective of employees
7. What are other challenges your company meets in the use of work breakdown structure?

........................................................................................................................................
........................................................................................................................................

Objective: To identify role WBS play in construction project implementation

8. What role does WBS played in HYGEBAT?

Use the following ratings: strongly agree = 1, Agree = 2, Undecided = 3, Disagree = 5, to identify the perspective.

<table>
<thead>
<tr>
<th>Perspectives</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBS contribute in proper allocation of resources</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBS facilitate proper utilization of budget</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBS help to divide tasks into manageable tasks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Do you think there is a relationship between WBS and project implementation?
a) Yes
b) No

Give a reasons

........................................................................................................................................
........................................................................................................................................
10. According to you, what other things do you think construction project should do to become more successful?
........................................................................................................................................
........................................................................................................................................
........................................................................................................................................

Objective: To determine the elements of WBS in construction project

11. What are the elements of WBS do you consider to ensure effective project implementation in HY Gebat?

a) Cost of project work
b) Deliverables of project
c) Work package of project

12. Is sub-deliverables contributed in implementation of your project?

Use the following ratings to give answers

Agree
Strongly agree
Undecided
Disagree
Strongly disagree
Objectives: To determine the views of managers on usage of WBS in a construction project

13. Managers views on whether WBS contributes to success of construction project. (Using a scale 1-5 where: 1 is strongly agree; 2 is agree; 3 is undecided; 4 is disagree; 5 is strongly disagree to give your view.)

<table>
<thead>
<tr>
<th>IEWS</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBS is profitable to the</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBS eases work</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBS eases management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBS promotes efficiency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>use of resources.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thanks for your effort, time and cooperation