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**Department of Economics and Management**



**INVESTIGATING THE EFFECT OF PROJECT  
MANAGEMENT MATURITY ON PROJECT SUCCESS**

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## **ABSTRACT**

### **INVESTIGATING THE EFFECT OF PROJECT MANAGEMENT MATURITY ON PROJECT SUCCESS**

This study set out to look at the effects that project management maturity has on the project management success in the hope that knowledge of the effects that project management maturity has on ZESCO a Zambian Company project success will highlight the capability deficiency areas that the corporation has and in turn enable recommendation for improvement. The study was exploratory in nature, it took a positivistic paradigm with a deductive approach and a quantitative research design. A case study strategy was used to help in answering the question of maturity effect on project success. The study discovered that the corporation did not perform well on both cost performance and schedule performance whereas it performed well on quality and customer/stakeholder satisfaction. Using the Project Management Maturity Model (ProMMM) competence areas of Experience, Culture, Application and Process as a measure of maturity on a scale of 1-4, the study establishes that ZESCO performed poorly on project application and experience a sign of staff lacking skills and experience to drive effective Projects; the organization performed well on both culture and processes a sign of belief in project management. The Corporation was benchmarked to be at level 2.6 an Improving Novice who still is experimenting with Project Management.

The study also established that there was no correlation between ZESCO project management maturity level and project management success, a correlation was found between project management maturity with project quality and Customer Satisfaction.

It is recommended that a further study be conducted to ascertain if there are other competence areas that affect maturity other than the ProMMM four attributes and also to conduct a detailed research as to why personnel seem not to appreciate use of project tools.

## **KEY WORDS**

Project Management Maturity, Project Management Success, Competence Areas, Maturity Level.

## **DEDICATION**

This study is dedicated to my best friend and a brother **Kangwa BWEMBYA** (1975-2021) and all those who struggled against the scourge of Covid-19 but succumbed.

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## LIST OF ACRONYMS

ZESCO	Zambia Electricity Generating, Transmission and Distribution Company
ProMMM	Project Management Maturity Model
SEI	Software Engineering Institute
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
PMI	Project Management Institute
PMBok	Project Management Book of Knowledge
OPM3	Organizational Project Management Maturity Model
P3M3	Portfolio, Program and Project Management Maturity Model
OGC	Office of Government Commerce
CSF	Critical Success Factors
SPSS	Statistical Package for Social Sciences
ERB	Energy Regulation Body of Zambia
PERT	Program Evaluation and Review Technique
CPM	Critical Path Method
PLC	Project Life Cycle
RD	Research and Development
CPI	Cost Performance Indicator
SPI	Schedule Performance Indicator

## **Chapter 1**

### **Introduction**

#### **Overview**

Project management has been in existence ever since humans first started building their own abodes, in what is seen today through the Pyramids of Egypt to the Great Wall of China all these are forms of projects which used some form of management to come up with the final product which we can still admire in our modern times (Larson & Gray, 2011). The formal project management that is known now started taking shape in the heat of the second world war where the need for assembly and delivery of battle equipment was paramount to winning the war (Nicholas & Steyn, 2008).

Having gained recognition as a necessary profession for managing projects (Mullaly & Thomas, 2010), many organizations started using the profession to better position themselves for global competition and for accruing benefits to the organization (Farrokh & Mansor, 2013). With recognition came the need to measure how project management could be optimized to produce project success and how best the management could be improved, this brought about the talk of maturity in handling projects (Montero, 2013). Maturity in the context of project management refers to the perfection of the practice of the field of project management in order for the organization to yield consistent and successful project outcomes (Montero, 2013). The other way of looking at maturity would be to adopt an organic perspective in which maturity refers to the incremental structural change of a subject in question (Andersen & Jessen, 2007). The subject moves from one stage of life, which has limited capability in adapting and surviving in its environment to another advanced stage which enables the organic subject to adapt and easily survive in its environment. It is in this vein that project management maturity is considered to be a degree to which an organization practices project management within the organization. Alternatively, it can be said to be the existence of best practices in the execution of organizational projects (Alzahrani, 2015).

The subject of project management maturity models is not complete without reference to the developments which took place in the field of quality management. As the world struggled with the issue of quality produce, by 1979 one of the quality gurus came up with a five-stage quality maturity model (Montero, 2013) focusing on process improvement. In this model, the five stages are represented by uncertainty, awakening, enlightenment, wisdom and certainty. The stages represent a progressive process flow of improvement which is similar to the stages adopted in the Berkeley Project management Maturity model in which one moves from unsophisticated to sophisticated stages (Kwak & Ibbs, 2002). Further Deming another quality guru came up with the theory of continuous improvement, moving from one level of process maturity to another drawing a parallel in the project management maturity of initially benchmarking organization and allowing them to move up the maturity ladder based on process improvement.

Building on the foundation of measuring quality maturity, by 1993 the Software Engineering Institute (SEI) developed a maturity model known as Capability Maturity Model (CMM) which relied on measuring the natural process capability measurement to assess the software production. CMM was adopted by academics and practitioners around the year 2000, which led to the successful development of Project Management Maturity Models widely used (Alzahrani, 2015). In the year 1997 Ibbs and Kwak (Kwak & Ibbs, 2002) developed a maturity model known as Berkeley Project Management Process maturity, this was aimed at measurement of maturity through an established standard of attributes which described every stage of maturity from the unsophisticated to sophisticated stage which had been laid out in five stages.

The whole development process of the maturity models followed the quality movement. SEI produced Capability Maturity Model in 1993, this model was more oriented to software systems, and a further enhancement later followed it through the production of Capability Maturity Model Integration (CMMI) by the year 2000. The year 2000 saw the development of both CMMI and Kerzner's Maturity model (Montero, 2013). Hillson (2003) developed the ProMMM maturity model in the year 2003; this maturity model also had a major area of concentration projected though it broadened the scope of what was to be examined in evaluating project maturity. Other than just processes ProMMM included culture, experience and application as attributes that need to be looked at when ascertaining the maturity level (Hillson, 2003). Project Management Institute (PMI) produced

Organizational Project Management maturity Model (OPM3) in 2003 to try and standardize the processes involved in Portfolio, Program and Project Management (Montero, 2013). Further development in the field of Project maturity saw the development of Portfolio, Program and Project Management Maturity Model (P3M3) in 2004 as a product of the United Kingdom (UK) Office of Government Commerce (OGC) this was later followed by the development of Prince II Maturity Model (P2MM) all under OGC. Later on, in 2012 sustainable maturity model was developed (Alzahrani, 2015).

CMMI bases its attention largely on processes (Kneuper, 2005), stemming from the understanding that the quality of the product produced is dependent on the process used to produce and maintain it as espoused by scholars in the likes of Juran and Deming. It also outlines five levels of maturity these being Initial, Managed, Defined, Quantity managed and Optimized. All the levels outlined bear an ordinal relationship to each other thus the fact that there are five different levels does not necessarily entail an equal amount of shortfall of process points from one level to the other (Montero, 2013).

The emphasis in all these levels is process improvement for an organization to be judged mature in their project management. This view stumbles in that process improvement is managed by personnel who have certain experience and skill to manage that improvement, it is prescriptive and simplistic as it constricts the organization to think that process management is the answer when it is not the only aspect of measure in management (Montero, 2013).

Organization Project Management Maturity Model (OPM3) is a three key element model with an emphasis on knowledge, assessment and improvement (Project Management Institute, 2003a). On Knowledge, the user gets to be familiarized with concept of OPM3 best body of knowledge practice. In Assessment, organizations are compared with the standard processes which are outlined in the Project Management Institute Project Management Book of Knowledge (PMBok) (Montero, 2013) to see its position on the project management maturity model level. Improving organizations that are willing to progress on the maturity model scale can also use the results that are obtained in the assessment stage to adjust improvement.

This Model of OPM3 cover quite a vast area of maturity dimension assessment though it is quite a complex model that focuses on three project management dimensions of organization project, program and portfolio management to assess the best practices use

which have multiple capabilities and cutting across four levels of maturity (Standardized, Measured, Control and Continuously Improve) (Hillson, 2003).

For any meaningful correlation to be drawn between organization project maturity and project success, a clear definition of project success has to be achieved. Whereas there could be lack of consensus of project success definition (Shenhar et al, 1997), it should suffice for this research to simplify the definition in such a way that it almost encompasses grey areas around project success definition whilst maintaining project and project management definition; Project Management Institute (PMI) project management book of knowledge (PMBok) define a project as a temporary undertaking with a start and end time (Project Management Institute, 2013) furthermore it defines project management as the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder requirements.

The answer to correlation partially comes from the definition of project success being equated to product success and project management success (Baccarini, 1999). This definition encompasses most arguments as product success covers a high-level stakeholder concern and it also covers the concerns of the customer; it also has a time frame concern covered as regards the shift of stakeholder needs with the project advancing from one phase to another. Project management success covers the concerns of the project team and handles the iron triangle well, as the project team is more concerned with cost, schedule and the quality of the project (Baccarini, 1999).

The subject of project success has not had much attention given to it in the past (Baccarini, 1999). So many measures have been used for quantifying project success by various groups or individuals whom the project affects; it does not matter whether people are on the same project team they still could have different views on what constitutes a successful project (Shenhar et al, 1997). This lack of consensus on what constitutes project success prompted the Project Management Institute (PMI) to dedicate the 1986 annual symposium to the topic of project success (deWit, 1988).

The decade between 1986 and 1997 has seen a marked improvement in project success research (Shenhar et al, 1997). This research has resulted in people grouping the various measures of project success into one common group of association, which is referred to as a dimension. A multidimensional outlook on project success identifies four dimensions of success; this is an improvement compared to earlier research conducted, which had

yielded three dimensions (Shenhar et al, 1997). The identified dimensions of success included; Project efficiency, Impact on the Customer, Business and direct organizational success and preparing for the future. In project efficiency, project success is an appreciation of ways in which the project was managed in terms of time and budget. This dimension takes on the short-term assessment approach which includes project execution and immediately after project completion. A better score in project efficiency does not necessarily mean achievement of the project success as some long term perspectives have to be taken into consideration such as the benefit to the organization (Shenhar et al, 1997); Organizations implementing a project do so with an intention to move from one position to another in terms of efficiency or financial gain. The second dimension identified is Impact on Customers; this dimension relates to the customer who ultimately has to utilize the product that has been realized through a project; as it relates to the usage of the product it thus encompasses success measures such as meeting the performance of the product, meeting the functional and technical requirements of the project product (Shenhar et al, 1997). This dimension looks at how satisfied the customer is with the project product and is a major determinant as to whether the customer will come back for more of such products, thus for contractors the level of satisfaction is also essential to them (Shenhar et al, 1997).

The third dimension identified is Business and Direct Success: this dimension looks at the immediate benefit that accrues to the project implementing organization. These benefits could be profits or in the case of non-profit making organization, an improvement in the service delivery or it could be an internal reengineering project and the benefits to be targeted would be the cycle time of yield even quality of the process; has it seen an improvement? (Shenhar et al, 1997). Assessment of this dimension takes a relatively long time, in the range of one to two years (Shenhar et al, 1997). The fourth dimension identified is: Preparing for the Future.

Whereas four dimensions are identified by Shenhar et al. (1997) to evaluate project success, Baccarini (1999) identified two components making up project success. The component was broken down as product success and project management success. Product success could be looked at as the influence that the project has on the organization benefit while project management success is seen as the actual delivery of the project. Langston et al. (2018) tried to come up with a universal method of project

success determination, this method was meant to be insulated against the size and context in which the project is carried out (Langston et al, 2018). Three phases of project success were identified these being project initiate, implement and project influence. Common to all these forms of project success definition is the element of trying to marry project success with organization success which in some way is a departure from project definition.

Most literature identify cost, time and project output as the most prevalent measure of project success (Windapo & Odediran, 2014). This research will thus restrict the definition of project success to the iron triangle and satisfaction of stakeholders.

## **Background of the Study**

Projects have been recognized globally as a way forward to positively positioning an Organization against the stiff global competition; many organizations are engaged in one project or more in order to realize their business strategies, even though management of the said projects has been carried out by experienced but unqualified project managers (Baccarini & Archer, 2001). This kind of management relies mostly on the efforts and dedication of those undertaking the projects and has no defined method and processes of carrying out project management. This has led to projects being executed informally, without structure and with mostly undesirable outcomes and some projects being completed successfully without a well-defined methodological approach which could be replicated on future projects; the successful projects are dependent on the ability of the experienced project managers other than a laid down method (Baccarini & Archer, 2001). The growing popularity of using projects as a way to meeting strategic business objectives requires a justifiable, reliable and repetitive system producing positive project results if the field of project management is to be believed as a field which would produce tangible benefits for organizations (Mullaly & Thomas, 2010).

The question persists in most organizations as to how they would have the optimum results from projects (Hillson, 2001). This question begs for assessment of how project management has been perfected to bring about the organization desired results and the perfection of Project management competencies talks to the maturity of the field (Cooke-

Davies, 2004). Thus, this research aims to assess how project management maturity helps in producing a successful project outcome.

Many project management maturity models such as Capability Maturity Model (CMM), Prince II Maturity Model; Portfolio, Program, Project Management Maturity Models (P3M3), Project Management Process Maturity have been presented and could be found useful in assessing most organization's maturity level (Montero, 2013). A closer look at the maturity models reveals a similar characteristic of assessing maturity that is as most of these maturity models have been developed using CMM as a benchmark maturity model (Farrokh & Mansur, 2013). The maturity models focus on project management processes degree of utilization.

Organization Project Management Maturity Model (OPM3) creates a slight departure from the way other maturity models have been used to assess organization project maturity levels. OPM3 goes beyond the ascribed project management processes and standards by incorporating industry best practices to the three domains of project, program and portfolio management as well as the four stages of maturity level (Project Management Institute, 2003b). The four stages of capability improvement in OPM3 are: Standardize, Measured, Control and continuously improve. Over 600 best practices are identified (Project Management Institute, 2003b) and are applied to the project cycle of initiate, plan, monitoring, control and closeout. Each project phase has best practices which are unique to that phase. An improvement in maturity entails an increased capability in terms of best practices with outcomes showing that improvement and the key performance indicator (KPI) measuring that improvement. Apart from project phases having their own best practice, OPM3 also provides for project, program and portfolio management to have their own best practice. Each maturity stage on the project domains corresponds with best practices that appear on the project cycle.

With maturity models mostly focusing on the project management processes as areas for determining the maturity levels and later on as a passport to successful project outcome. These models in adopting processes as an area for determining organization maturity level neglect to look at other competency areas such as experience culture and application which are a contributing factor to the success of projects (Hillson, 2001). The project management processes look at how things are done, encompassing the methods, skills techniques and tools whereas culture looks at how people in the project organization

think. Culture is made up of their belief of what works and ultimately determine their attitude; experience looks at what the project organization and individuals know and can do, with application referring to what is being done by project personnel. Further to assume that only the processes are a reason for project success is to be mechanistic and reductionist in thinking in a world which is more inclined to adopting a complexity thinking style in trying to resolve activities involving humans (Cooke-Davies, 2004).

In a bid to gain competitive advantage and survive in an increasing competitive market most companies increasingly use projects as a way to achieve their organization objectives (Judgev & Thomas, 2002), this has been so even though projects failure rate and its associated cost overruns have been widely publicized. This has led more companies to turn to approaches that might help improve their project management practices. In light of the current position that organizations find themselves in, there is need to address the issue of project maturity not only in a unidirectional approach but in a way that tries to cover more competencies as a precursor to project success. OPM3 covers most maturity dimensions though it has more elements of best practices to cover, creating a bulk of questions to ask the respondent if a metric of measure has to be created. The bulk and seeming complexity of OPM3 limits its use in research like this one.

ProMMM as outlined by Hillson (2003) is going to be used in this research to come up with the current organization maturity and the deficiencies that the organization has and what steps would be needed in order to improve the maturity level and enhance the project success rate. Without dwelling much on project knowledge areas and process groups, the research will endeavor to be more exhaustive by looking at other competencies that enhance the organization project capability such as organization culture, skill and experience level. These elements speak to the human activities whereas the other part of implementation and application look at the practical aspect of maturity (Hillson, 2003). Further ProMMM has close resemblance to OPM3 with relatively few attributes to tackle, this makes it easier to probe project maturity and align it to the proposed research while maintaining to some extent an effectiveness similar to OPM3. The four (04) improvement stages for ProMMM also resemble OPM3. These stages are: Novice, Naïve, Normalized and Natural.

## **Problem Statement**

The problem to be studied could be stated as follows:

There has been a continuous increase in the number of organizations that are undertaking projects with a vision to increasing corporation market share and competitive advantage (Mullaly & Thomas, 2010) and this requires project delivery on time, within schedule and of good quality. However, the effects of enhancing project management capability (Project Management Maturity) on the project success is not fully understood in the Zambian energy sector with the specific focus on ZESCO (a Zambian electricity generation, transmission and distribution company). Therefore, this research examines how project management maturity helps in producing a successful project outcome. Knowledge of the influence that Project management maturity has on the project success will enable evaluation of the energy sector capability deficiency and enable improvement recommendations to enhance project successful project delivery.

## **Research Question**

The research questions to be addressed is as follows:

What is the relationship between project management maturity level and project success?

## **Research Aim**

The intended aim of this research is to investigate the relationship that exists between project management maturity level and Project success in the Zambian energy sector projects and evaluate whether project maturity could be used to enhance project success.

## **Research Hypothesis**

This research will try to confirm the following hypothesis:

H<sub>0</sub> or Null Hypothesis: There is no relationship between an Organization Project Management Maturity Level and its level of project Success.

H<sub>1</sub> or Alternative Hypothesis: An organization with high project management maturity level have a higher level of project success; conversely those with lower project management maturity levels have lower levels of project success.

## **Research Objectives**

This research intends to achieve the following objectives:

- i. Establish the Organization project success criteria and determine the performance of the Organization projects.
- ii. Establish the failure areas of the Organization projects and map the failure areas to ProMMM (Hillson, 2003) competence areas.
- iii. Index and Benchmark the maturity level of Organization project management.
- iv. Determine the Organization project success and correlate Organization project management maturity levels to project success.

## **Research Method**

The study was exploratory in nature, it took a positivistic paradigm where a deductive approach and quantitative research design. A case study research strategy was employed and quantitative data was obtained through questionnaire distribution to generation, transmission and distribution engineering personnel that have been involved in ZESCO projects. Secondary information was obtained through ZESCO corporate project office and provided collaboration on financial, schedule and quality data. Using a statistical package SPSS, the data collected using the structured questionnaire was analyzed for the mean score standing of each project variable that was being investigated. A correlation analysis was carried out between project management maturity and project management success.

## **Research Significance**

Zambia through its parastatal energy body ZESCO is undertaking a lot of energy capacity growing projects as espoused in the corporation vision 2025 which states "to be the hub of electricity trading in the region and beyond by the year 2025". A number of Generation,

Transmission and Distribution projects were underway. It is envisaged that by studying ZESCO maturity level later on its project success rate the study will be able to point the corporation into the direction of the competence factors that could have been neglected hence enable the country make improvements and score more success in the yet to be undertaken energy projects.

## **Research Scope**

This study is anticipated to have the following Scope:

- i. The study will be focused on project maturity other than program and portfolio management.
- ii. The study will be based on the projects that have been undertaken by ZESCO limited thus does not cover other corporations hence offering different context.
- iii. As this research depends on the response from those who have or are working on projects, the researcher intends to engage the help of the ZESCO Human Resource (HR) department in distributing the questionnaires to identified respondents.

## **Limitations of the Study**

A single case study might not be able to give general results applicable to the whole Zambian energy sector.

## **Structure of Research Report**

The thesis was organized and compiled in five Chapters as follows:

Chapter one shall outline the research problem, research question and research proposition, and it shall further include the aim of the research, objectives of the research and a research method which shall be followed in the execution of the research.

Chapter two contains a critical literature review on what has been done so far on the subject of project management maturity models and the subject of measuring project

success to level down to a situation where at least a meaningful measuring instrument will be achieved, which will enable the researcher to come up with a basis for empirical study.

Chapter three outlines the research approach that shall be taken in order for the researcher to answer the research questions. This chapter is a roadmap; practical steps taken in order to answer research questions. It outlines the research paradigm, design, and the role of the researcher in the study, data analysis strategy and limitation of the study.

Chapter four presents the analysis of the data obtained from the respondents. The finds of the research are also discussed in this chapter.

Chapter five shall present the concluding discussion of the research and shall also highlight the recommendations which could be used to assist in improving the current organization project management practice. This will be followed by a list of references and an appendix containing the research instruments and Ethics Approval.

## **Chapter 2**

### **Literature Review**

#### **2.1 Introduction**

By undertaking this literature review the researcher intended to identify some studies done on the subject of maturity models' impact on project success with the view to appreciating the effects that maturity has on project success and to further understand the dimensions that are used to measure project management maturity in various maturity models so as to come up with one maturity model which would best suit the current research. This literature review covers the origins of project management maturity models, their development and target area of use. The chapter further explores the field of project success, the many proposed framework of ascertaining project success and narrowing the study to project oriented success criteria other than the organizational success criteria. The ultimate goal being to enable the researcher identify and hopefully fill up the gaps or indeed provide affirmation or dismissal for the usefulness and positive effect that project management maturity might have on project success.

##### **2.1.1 Overview of the Zambian Energy Sector**

Energy is largely considered a large driving factor for any country's economy (Osario et al, 2014) and this inference has not been any different for the Zambian economy. The Zambian energy sector could be said to be composed of petroleum and electricity with electricity being singled out to be the major driver for the country as it is responsible for the running of the mining sector which is the largest foreign exchange earner (United-States-Agency-for-International-Development, 2021). The electricity generation for the country was mostly targeted at running the mining sector which was the largest industry in the country and by early 1970 was consuming about 50% of the total generation of the country and currently stands at slightly over 70%; the private households account for about 28% of consumption of which 62% is urban population and 5% is rural population.

The Zambian Government maintains a stance of 51% rural electrification by the year 2030 (Energy, 2019).

Zambia's electricity mix is dominantly hydropower with the large and small hydro-electrical power plants making up 95% of the installed country capacity and fossil fuel covering 4%.

In the Year 2015 Zambia's electricity sector was hammered a devastating blow as the country succumbed to the pressures of climate change resulting in subsequent droughts from 2015. This reduced the country's generating capacity and affected the financial standing of the generating company (Energy-Regulation-Board, 2018). Additionally, due to demographic and socio-economic factors the country's energy demand continued increasing at a rate of 6% (150MW-200MW) average per annum of the current installed capacity which is 2,354MW (Energy, 2019).

The effects of drought coupled with the ever increasing demand for electricity has sent the generating company ZESCO to go into an over drive in trying to stave off an eminent full scale shortage of electricity by embarking on a number of projects which are taking advantage of the less affected rivers by establishing cascade hydropower schemes and inevitably diversifying into solar, wind power and thermal power (Energy, 2019).

These other sources of power (Solar, wind power and Thermal Power) were less popular in the country's electricity sector and one would say have been forced on the country due to the demand of nature. Furthermore, the electricity sector in Zambia does not have cost reflective tariffs and that electricity is heavily subsidized; this leaves the development of alternative energy sources to the vertically integrated Zambian Government electricity generating company ZESCO (Energy, 2019).

In light of the outlined, ZESCO has committed to undertaking projects with a view to increase generation capacity by engaging in a setup of new generating plants, diversifying into solar plants so as to avert drought effects on power availability. The corporation also recognizes the need to interconnect with the neighboring countries to ease both importation and export of power by putting up transmission lines to facilitate power transactions; furthermore, with the envisaged upscaling of power access the corporation is undertaking expansion projects of the distribution network. Considering that there are

very few private players in the electricity sector due to the non-cost reflective tariffs (United-States-Agency-for-International-Development, 2021), ZESCO undertakes these projects under very difficult business environment with the government helping to facilitate financial closure on these projects; thus, most of projects are under the scrutiny of the general public and as such the projects must be properly managed.

## **2.2 Project Management**

The practice of undertaking projects has been around the Globe from time immemorial, this is readily appreciated by the marvel that the great pyramids provide, the great wall of China and other ancient structures witnessed world over (Project Management Institute, 2003a). Formal project management started taking shape during the heat of the second world war with an aim of delivering military might to the western world through planning, scheduling and control of complex projects (Morris & Hough, 1987) the practice sprang to life with the emergence of techniques like Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM); and has been in existence for over 60 years (Osario et al, 2014). After the second world war around 1950 onwards to the 1980s, working in a project manner was considered in industry and production of goods.

With formal project management coming into existence; according to (Project Management Institute, 2003a) a project was defined to be a temporary endeavor undertaken to create a unique product, service or result. Of interest and to be noted are the words 'temporary' which has an implication of the project having a starting and ending times coupled with certain constraints, the starting and ending of a project amplifies the fact that a project has a life cycle of its own referred to as project life cycle (PLC)-this life cycle is decomposed into initiating, planning and execution, control and closing processes; 'unique', in this definition refers to the fact that this is not a routine operation rather it's a singular goal oriented set of specific operations which is carried out by people who might not necessary work together on a regular basis. In the project life cycle, processes are similar to those as witnessed in a manufacturing industry; these being a set of related activities with inputs and outputs and they are same activities which are subject to standardization for a predictable output.

With the word project in perspective, project management is said to be the application of knowledge, techniques, skills and tools to a project with the aim of achieving the intended objectives (Project Management Institute, 2003a); thus being a versatile tool that could be used on any project with intent to achieve a desired goal irrespective of the industry (Larson & Gray, 2011; Yildiz & Kocabas, 2010). The practice of project management has been increasingly gaining in prominence to match other practices like finance, marketing and human resource management (Kenny, 2003). The field has developed from being a set of operational tools and techniques to a management field which is used to manage a company and achieve corporation strategic goals. Corporation through management of projects from within the organization are able to achieve strategic objectives using these managed projects; throughout history every kind of organization whether government, charitable organizations, companies or otherwise spend considerable time and resources to come up with their short term and long term project objectives (Yildiz & Kocabas, 2010). These objectives which they come up with are enshrined in the mission, vision statements which when broken down for the interpretation of the lower ranks results into goals to be achieved and these could only be done through projects. On the other hand, other corporations will by choice choose to have a management style that facilitates management by projects-this style entail that each department is run like a project and this offer them greater leverage as most corporation are under pressure to downsize and keep lean (Dinsmore, 1996; Frame, 1995).

Research has established a veritable correlation between efficient project management and gaining of a competitive advantage for organizations (Farrokh & Mansor, 2013). It's the gaining of competitive advantage and lucrative profits which assure a long term existence for organizations thus organization are always in pursuit of competitive advantage through financial investment, introduction of novel products and services, and marketing; all these ventures are done through initiating projects (Farrokh & Mansor, 2013).

### **2.2.1 Project Management Methodologies**

Survival or gaining a competitive advantage alongside lucrative profits is the major driving force for organizations, it is imperative that they conduct business in a project manner in

order for them to realize benefits quickly (Ozmen, 2013), with this realization organizations need to optimize usage of project management methodology before they lose track of their overall effectiveness in terms of knowledge management, repeatability, comparability, quality and future impact. Furthermore, a choice of a singular project management methodology helps to consolidate previous project management efforts in an organization (Ozmen, 2013).

Project Management Methodologies are a set of practices, techniques, procedures and rules which are used by those undertaking projects, it is essentially a set of principles and processes for managing projects. The choice of which methodology to use on a project is dependent on the type of the project, team and the scope. The choice of which project methodology to use is made early on in the project life cycle and they are sensitive to which tool to adopt in their use. Project management methodology goes beyond just formation of process groups and its starting point is the definition of project characteristics and establishment of common metric of project success.

Two types of project management methodologies exist currently and these are Traditional Project management methodology and Agile Project management methodology. In traditional methodology we have a sequential outlook of project life cycle where one phase of the project has to be finished before the next phase is started. Agile methodology as the name might imply is a more flexible methodology where the steps to accomplishing the project goal are incremental and iterative in nature (Concalves & Heda, 2011). The iterative nature of Agile project management entail that there is continuous update of project requirements whereas the traditional methodology has a fixed project requirement which are determined at the beginning of the project. It would be said that the traditional project management is front loaded whereas the agile methodology is evenly loaded. Some examples of tradition project management methodology include Waterfalls Methodology and Six Sigma whereas Agile Methodology include Scrum, Kanban and Lean Methodology.

## **2.2.2 Project Management Tools and Techniques**

As speed in the development of new products and services is key to staying competitive, many organizations wish to reduce time-to-market as research shows that products delayed to hit the market are more likely to make less profit compared to products that hit the market over budget even as high as 50% (Milosevic & Iewwongcharoen, 2004), and to achieve this feat project management tools and techniques play a major role. By definition a tool is an instrument or an apparatus used to perform an operation necessary in a vocation or a profession whereas a technique is defined to be a method of accomplishing a desired aim. This logically opens the subject to mean that tools are instruments such as decision tree, work breakdown structure, Gantt charts and responsibility assignment matrix. Some examples of techniques include program evaluation and review techniques (PERT), progress reports, scope statements and project postmortem review. Figure 2.1 shows how Project management tools and techniques are combined with other project dimensions to deliver the desired project output effectively and efficiently.

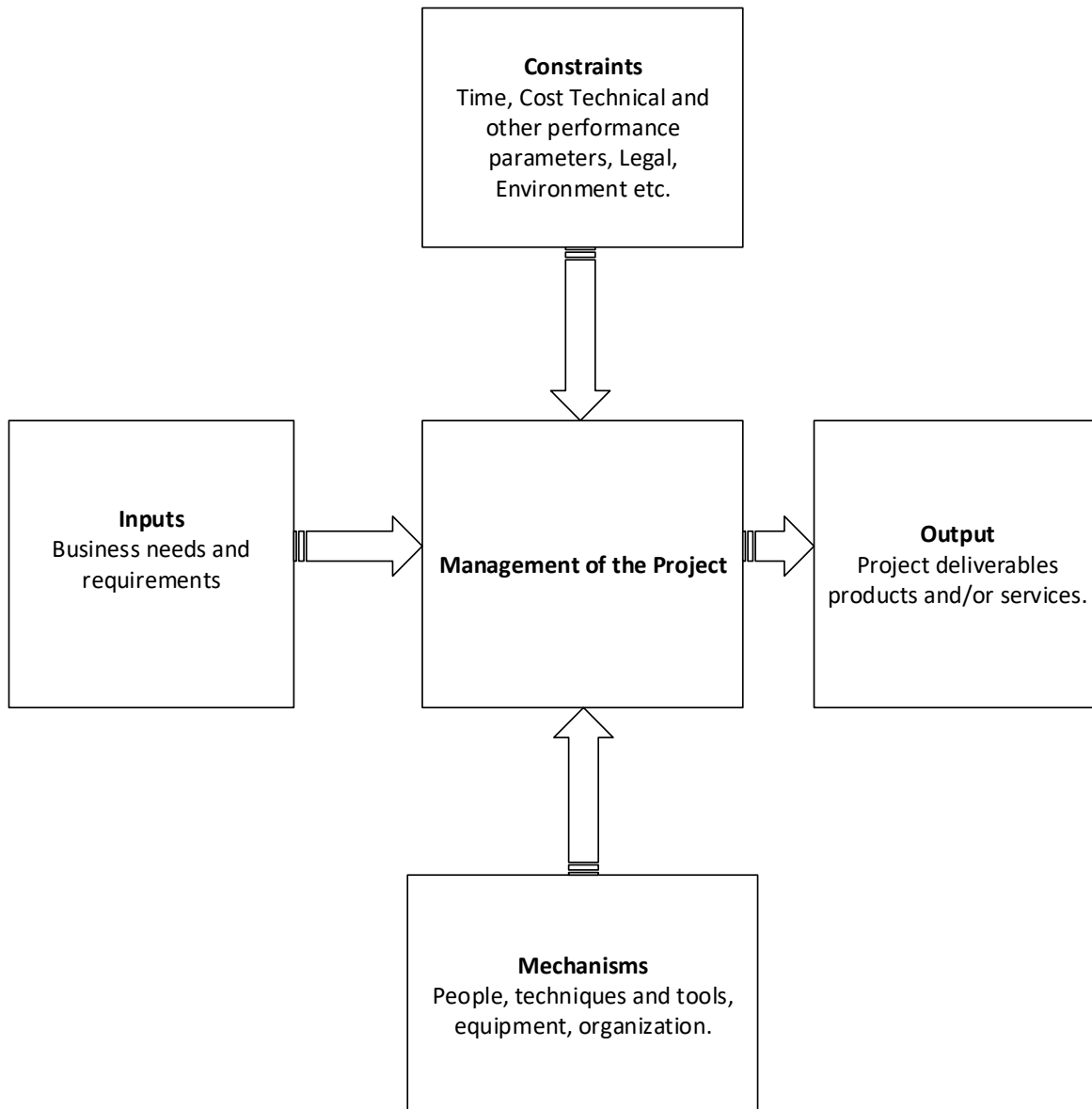


Figure 2.1 Project Management Process per PMBOK (PMI 2000)

### 2.2.3 Project Management Culture

All organizations are composed of a human resource that delivers on the organization's objectives, and the way these objectives are delivered conform to a set of beliefs that has been in employees as to how organization objectives are delivered and these beliefs are what form a culture. By definition Culture is a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration,

that has worked well enough to be considered valid and, therefore to be taught to new members as the correct way to perceive, think, and feel in relation to those problems (Schein, 1992). An organization culture forms its personality; It is comprised of assumptions, beliefs, values, norms, and tangible signs (artifacts) or organization members and their behaviors (Suda, 2007). Culture provides stability to an organization as it provides an assured means of delivering an output but culture could also be a stumbling block to providing results needed for staying competitive as an organization, this is because people would have made up assumption and become intransigent to new ideas (Suda, 2007).

Organizational Culture formation is influenced by both external and internal forces. Some of the internal forces which influence culture are the organization vision, mission and values. These permeate the organization breadth as they elucidate how an organization looks at itself and how it wants to deliver on its strategy. The Organization structure affects culture in that certain structures are command and control driven whereas others are collaborative and Innovative in nature. Figure 2.2 illustrates the formation on culture type to understand the four different types of organization culture. The diagram depicts a two-axis diagram with the vertical axis representing the inputs (contents) which are actuality and possibility. The Horizontal axis depicts the process of decision making which either depends on being personal or impersonal. A combination of these two axes form up four quadrants of cultural patterns. Noteworthy in the four quadrants of figure 2.2 is that these cultural tendencies are figured out as core (central) tendencies and that having one tendencies does not mean that the organization cannot also have tendencies of another quadrant (Schneider, 1994), furthermore subcultures will exist in organizations an example of which is how marketing or research and development (R&D) will interpret the organization vision, mission and values; their interpretation will be different in that marketing will interpret wholesome application whereas R&D will have embellishment to the espoused beliefs (Schneider, 1994).

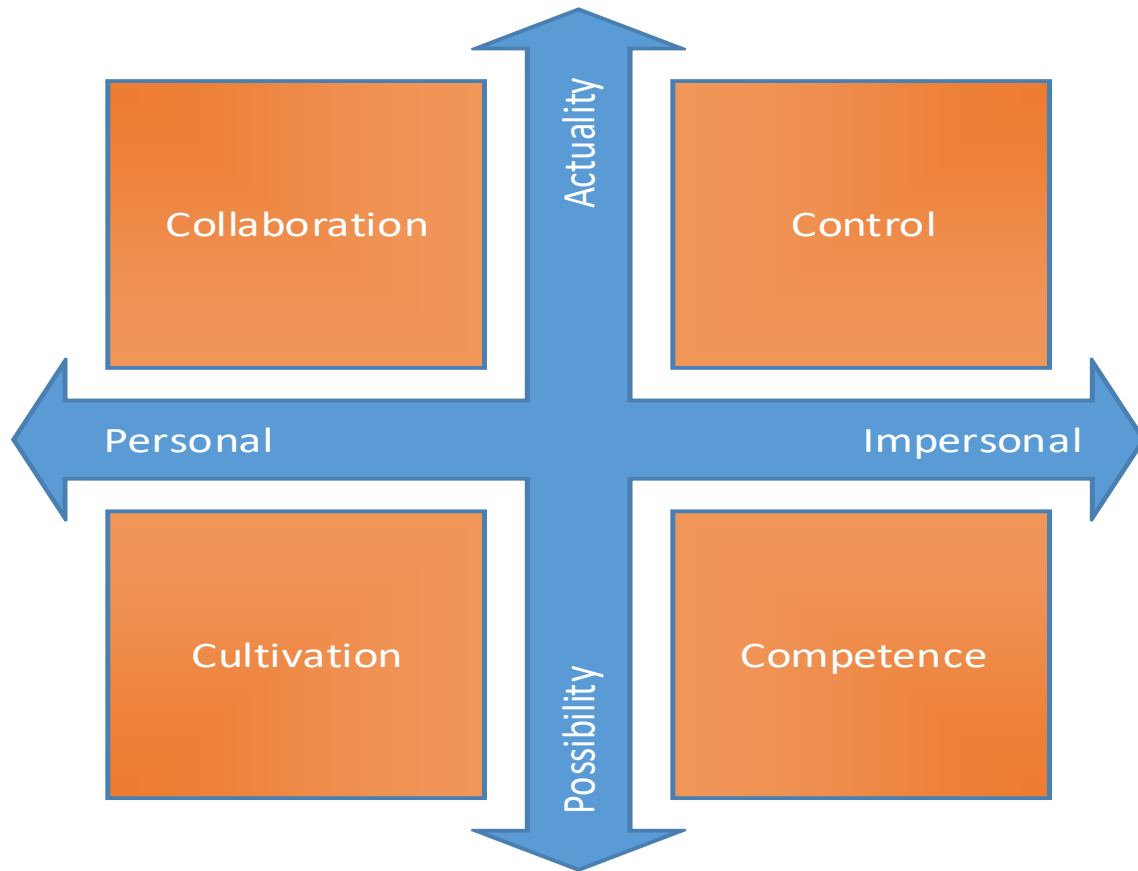


Figure 2.2 Organizational Culture Formation (Suda, 2007)

### 2.2.3.1 Control Core Culture

Under this cultural type the primary reason for its adaptation is the need for certainty predictability (Schein, 2004), safety and accuracy. Figure 2.2 shows that this culture relies on the inputs that are actually happening, its process does not take into consideration who could be affected rather it thrives on what has to be done and thus finds prominence in places like the military (Suda, 2007).

### 2.2.3.2 Competence Core Culture

This culture has a similar process of decision making to control culture (Human feelings are secondary to decision making) except that it looks at what could possibly earn the

organization a top spot, it does not necessary look at what is obtaining but sets higher standards of what would make it be the champion (Schein, 2004; Suda, 2007).

### **2.2.3.3 Collaboration Core Culture**

Under this cultural type practicality and what is actually happening is of great importance, its decision making is dependent on the people rather than the object at hand. It would find great use in system methodology where an object of concern is solicited from the people and a decision on what to do comes from the same group that had a suggestion of the challenge (Suda, 2007).

### **2.2.3.4 Cultivation Core Culture**

This cultural type focusses on possibilities other than what is obtaining on the ground, it also has a decision-making process that is people focused. The decisions made in such culture are wishful in nature and thus would find wide application in religion (Schein, 2004).

The elaboration of all the above core cultures is so that the manager understands the environment in which they are operating so that they could avoid misunderstandings and avoid confrontation in the working environment. With a full understanding of the organization culture one could easily deliver their projects when it comes to project management as they would understand how to approach the organization personnel. Furthermore, by understanding the cultural orientation of an organization a project manager would have a better understanding of what could have led to the failure of their projects which would help in putting up suggestions on how the next projects could best be handled (Suda, 2007).

## **2.3 Project Management Processes**

Project management processes are a set of interrelated actions and activities performed to create a pre-specified product, service or result (Project Management Institute, 2013).

The processes are action points and have to be done by the project team. In order for one to get a clearer perspective, there is need to understand knowledge areas. Knowledge areas are professional skills that one needs to have in order to deliver on a project. Currently there are about ten knowledge areas (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) and for these to be applied to a project they need to be broken down into constituent steps (processes) leading to the specific knowledge area (Ibbs & Kwak, 2000). The constituent steps in each knowledge area are what is called processes (Kwak & Ibbs, 2002). These processes are grouped in what are known as processes groups as they are a combination of more than a single step. PMBoK (2013) recognizes five process groups and these are: Initiating, Planning, Executing, Monitoring and control, and Closing Group. These process groups are not to be mistaken for the project life cycle whose phases bear a resemblance to the process groups except that the process group names are verbs (ending in 'ing' a doing action) whereas the project lifecycle names are nouns (do not end in 'ing') (Cooke-Davies, 2004).

For every project that the project team is undertaking, they need to have a list of the knowledge areas that they will need in order for them to deliver the project as not every knowledge area will be relevant, for example in a project that is being delivered internally procurement management knowledge area might not be needed (Crawford, 2006a; Kwak & Ibbs, 2002). Each relevant knowledge area and its constituent processes are then grouped in each process group (Crawford, 2006b). Of note is that some process groups will not have processes for some knowledge areas (Cooke-Davies, 2004). For easy clarification a table has been adapted from PMI PMBoK. Table 2.1 clarifies how the knowledge areas align with the process groups and where which process sits.

Table 2. 1 Project Management Process Group and Knowledge Area Mapping Adaptation from PMBoK

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
1.0 Project Integration Management.	1.1 Develop Project Charter.	1.2 Develop project management plan	1.3 Direct and Manage Project work. 1.4 Manage project knowledge	1.5 Monitor and control project work. 1.6 Perform integrated change control	1.7 Close project or phase
2.0 Project Scope Management		2.1 Plan Scope Management. 2.2 collect requirements. 2.3 define Scope. 2.4 Create WBS		2.5 Validate Scope. 2.6 Control Scope.	
3.0 Project Schedule Management		3.1 Plan Schedule Management. 3.2 Define activities. 3.3 Sequence activities 3.4 Estimate activity durations. 3.5 Develop Schedule.		3.6 Control schedule.	
4.0 Project Management Cost.		4.1 Plan cost management. 4.2 Estimate costs. 4.3 Determine budget.		4.4 Control costs.	
5.0 Project Quality Management		5.1 Plan quality management.	5.2 Manage Quality	5.3 Control Quality.	
6.0 Project Resource Management.		6.1 Plan Resource management. 6.2 Estimate Activity resources	6.3 Acquire Resources. 6.4 Develop Team. 6.5 Manage Team	6.6 Control Resources	
7.0 Project Communication Management.		7.1 Plan Communication Management.	7.2 Manage Communications.	7.3 Monitor Communications.	
8.0 Project Risk Management.		8.1 Plan Risk Management. 8.2 Identify Risks.	8.6 Implement Risk Responses.	8.7 Monitor Risks.	

		8.3 Perform Qualitative Risk Analysis. 8.4 Perform Quantitative Risk Analysis. 8.5 Plan Risk response			
9.0 Project Procurement Management.		9.1 Plan Procurement Management.	9.2 Conduct Procurements.	9.3 Control Procurements.	
10.0 Project Stakeholder Management	10.1 Identify Stakeholders	10.2 Plan Stakeholder Engagement.	10.3 Manage Stakeholder Engagement.	10.4 Monitor Stakeholder Engagement.	

Source: (Project Management Institute, 2013)

**2.4 Project Management Maturity**

In common parlance maturity as a noun defined by Collins dictionary (Cooke-Davies, 2004) take different forms of meaning such as: i) Fully considered or perfected when referring to plans or theories ii) Fully-Developed or Grown Up, these two meanings give a more relevant meaning in relation to project management. A perfected system refers to a system designed by an external entity who has the ability to look at the system they so designed and be able to measure the extent to which the system is 'fit for purpose' (Cooke-Davies, 2004). The other meaning is more organic in its connotation though it points to the same end state of perfection whether from within.

Taking the meaning of maturity as seen by a designer one would say Project management maturity refers to the progressive development of an enterprise-wide project management approach, methodology, strategy, and decision-making process. The appropriate level of maturity will vary for each organization based on its specific goals, strategies, resource capabilities, scope, and needs (Crawford, 2015). The practice of enterprise-wide project management gained grounds during the 1990s, this created a departure from the practice of applying project management to stand alone projects (Crawford, 2006b). Though this might be the case, this research evaluates the benefit accrual when project management is applied to stand alone projects and thus will avoid the misunderstanding of defining multidimensional project success, thus the researcher's view of project management maturity will be one where maturity is seen as a progressive development of project management usage as it relates to stand alone projects.

The idea of 'Maturity' was seldom used to describe how effective organizations were, but recently there has been a change of fortune as the term has frequently been used to map out how service delivery could be improved in organizations; a testament to the complexities that underlie a project's successful completion (Crawford, 2015); It could also be said that the popularity of 'Maturity' came as a result of the very successful Capability Maturity Model that was designed for software. In order to take away the complexities that underlie successful project execution and a possibility of having exceptional personal heroism, organizations have to introduce a defined systematic and predictive way of doing their projects and this is only achieved by the introduction of project management which has to be practiced through a consistent way of applying practices (Cooke-Davies, 2004; Kwak & Ibbs, 2002). This consistent way of applying practices evolves from a stage of being unsophisticated to a sophisticated stage thus moving from one maturity level to the next and this movement can be measured using instruments called maturity models (Kwak & Ibbs, 2002).

## **2.5 Project Management Maturity Models**

In life an individual requires purpose in order for them to make sense of life a similar analogy could be used for organizations; in order for an organization to make it in these turbulent business times a strategic intent is of essence (Farrokh & Mansor, 2013). Though this strategic intent may vary from organization to organization, it still embodies two kinds of Goals which are Improvement of current products or services, and processes and technology meant for delivering the product and services (Crawford, 2015). Secondly innovation and introduction of new products or services (Crawford, 2015). All this is regardless of the market of organization operation. Whatever the output a strategic intent might produce one can clearly discern that it requires a project to deliver that output onto the market (Farrokh & Mansor, 2013). In an environment where competitive advantage is every organization's desire there is no room to fail in the implementation of the organization's strategic intent through projects, it is thus imperative that a sure way of project delivery is ascertained; therein lies the popularity of the maturity models to provide a high probabilistic chance of success on projects that are undertaken in a mature environment (Cooke-Davies, 2004; Ibbs & Kwak, 2000). Though a quick caution of taking

the project management maturity models as a panacea to all project management difficulties in successful project delivery should be sounded, though research has shown a positive correlation between maturity level and project successful delivery (Farrokh & Mansor, 2013).

A project management maturity model is an instrument that is used to assess and benchmark an organization current level of practice of project management and it is also used to map out the organization direction in terms of project progress as regards the deficiency that could be observed during assessment of a project organization; furthermore they help identify the weakness and strength of an organization (Khoshgoftar & Osman, 2008).

Despite the famed use of Project Management Maturity Models, there is no agreed standard for carrying out maturity assessment (Khoshgoftar & Osman, 2008). Determination of the organization maturity level involve several factors such as evaluation of organization artefacts, processes, standards, Knowledge and conducting individual interviews; the exercise is less of science and more than art, making it a more subjective topic though not expected to move away from reality; the subjective nature of project management maturity models has led to the proliferation of so many models in circulation though their aim is the same that of assessing and improving the product or service delivery (Farrokh & Mansor, 2013). Leading up to the year 2018, there were about 43 project maturity models dumped on project management (Kostalova & Tetreva, 2018).

### **2.5.1 Origin of Maturity Models**

Most of the project Management maturity models follow after the Capability Maturity Models (CMM) which were developed under Software Engineering institute of Carnegie-Mellon between 1986 to 1993 (Cooke-Davies, 2004). The CMM is a culmination of inquiry into why software projects failed to meet the customer expectations and were usually delivered late and over budget (Crawford, 2015). In the development of the Capability Maturity Models Total quality management (TQM) played a pivotal role of referencing the processes. Based on Dr. Deming statistical process control, TQM tried to reduce the manufacturing process variations and increase the process performance (Montero, 2013) through careful standardization and improvement of processes so as to achieve a desired

quality product. The improving and standardization of the process was suggested to have five levels by Crosby (Cooke-Davies, 2004) with key processes to define it, the five levels detailed what it took to introduce a new practice these included: The organization being aware of the new practice, the organization gets to learn more about the new practice, the organization tries out the practice on a pilot testing, The organization implements the practice throughout the corporation and the organization masters the use of the practice. Emulating the similar rigor of process control as that exhibited in TQM, Watts Humphrey (hailing from IBM the major contributors of the development of TQM) and a team of experts tried to migrate the ideas of manufacturing process control to software Industry's daunting task of improving processes so as to have software product which was acceptable to customers and could be counted on to come on time, within budget and without big variations (Cooke-Davies, 2004); this was with the realization that the software product quality was dependent on the processes used to produce them. This thinking process culminated into the production of the Capability Maturity Model.

### **2.5.2 Capability Maturity Model (CMM)**

The technological development of the 1970s led to the increase in the computer usage as it became cheaper and was more flexible, this led to an increased use of computerized information systems leading to the rapid growth of software development, this development was unstructured and did not have a defined framework for improvement. In 1984 the United States (US) Department of Defense (DoD) sponsored the establishment of the Software Engineering Institute (SEI) at Carnegie Mellon University in response to DoD need for improved software as it had become evident that the software contractors did not have a standardized process for software development (Crawford, 2015), the standardization was not only going to be used for software development but also for the acquisition and maintenance of the heavily software-reliant systems. A lack of standardized processes leads to ad-hoc ways of creating a product and is much more dependent on the heroics of individuals, becoming more unreliable as the processes involved in the development of a product become more complicated or indeed if the most dependable developer leaves at the most critical time (Cooke-Davies, 2004). In other words, capability maturity model was a way to develop and refine an organization's

processes of software development through assessing the developmental process against an established set of defined standards. CMM allocates the organization maturity to one of its five maturity levels based on the capabilities that the organization would have acquired in the process of software development. Each maturity level of CMM have competence areas that have to be attained, each level has different competences thus level one will have different competencies compared to level two and so on.

It was not until the development of Capability Maturity Model that capability assessment was used in the software development and with further improvement and government funding developed for usage in the generic maturity assessment (Deffor, 2013).

### **2.5.3 Organization Project Management Maturity Model (OPM3)**

With the wide acceptance of CMM by organizations and researchers came the proliferation of Maturity Models (MM), these were introduced with the sole purpose of improving the effectiveness of the various disciplines (Farrokh & Mansor, 2013). The variety of Project Management Maturity Models bears testimony to the fact that these models embrace different concepts that make up maturity as well as suggesting different paths to attaining maturity (Deffor, 2013). The adaptation of CMM to Project Management was done through Project Management Process Maturity (PM)<sup>2</sup> (Kwak & Ibbs, 2002). Having a background of manufacturing processes quality improvement, CMM was more tailored to manufacturing processes improvement and was seen not to be multidimensional additionally it was deemed to not have a sound theoretical background (Farrokh & Mansor, 2013). Considering the multidisciplinary (e.g. Software Development, Research and Development effectiveness, Product Reliability) nature of project management, a multidimensional and non-disciplinary restrictive approach has been the quest for project managers and this culminated into the production of OPM3.

OPM3 is a multidimensional maturity model with the capability to assess the organization project, program and portfolio management; the model could be used for assessing one of the project management domains or a combination of the domain making it versatile and adaptable to any organization a feature never tried before (Farrokh & Mansor, 2013). The model was first published in 2003 under PMI (Project Management Institute, 2003a). This model has three key elements making up its framework these being Knowledge,

assessment and Improvement. In industry there are certain success factors that have been identified as precursors to having a successfully completed project and these form up best practices for the industry (Deffor, 2013). Under these best practices, their execution require that one is well versed with the competencies required to execute them, thus personnel need to first be familiarized or trained on the competencies; this form up the knowledge aspect that is the key element of OPM3. In assessment, the organization of interest has its processes and activities compared to the standard practice or industry best practice to come up with how the organization is performing on a quantitative basis. A best practice is an optimal way which is recognized by industry as a means to achieving a stated goal or objective (Project Management Institute, 2003a). Using the shortcomings observed in the assessment an organization of interest can formulate a strategy to try and cover up the observed shortcomings by acquiring the necessary knowledge that formulate skills and thus improve their project management. OPM3 make a great depart from the traditional project management maturity model by employing a four-level scale of maturity other than what had been previously used in the other maturity models which is a five levels maturity scale. The four maturity levels in OPM3 are: Standardize which require the documentation of processes for the purposes of consistent usage and communication to the rest of the organization, Measure which is the quantification of the outcome so as to assess the performance, Control which is the measure of the process performance and later comparing it with the expected performance so as to deduce the variance and implement the corrective measure to realign the variance, and Improve which is continuous assessment of the processes and improving upon them (Farrokh & Mansor, 2013).

In OPM3 a relationship exists linking Best practices, Capability, outcome and KPIs. The relationship amplifies the fact that for a project to be completed successfully best practices have to be employed, but before the best practice can be employed the team need to have a capability which is a competence needed to execute that best practice. Further the execution of the project brings about the desired outcome which can only be measure using the established KPIs (Project Management Institute, 2003a). The Figure 2.3 below illustrates this relationship.

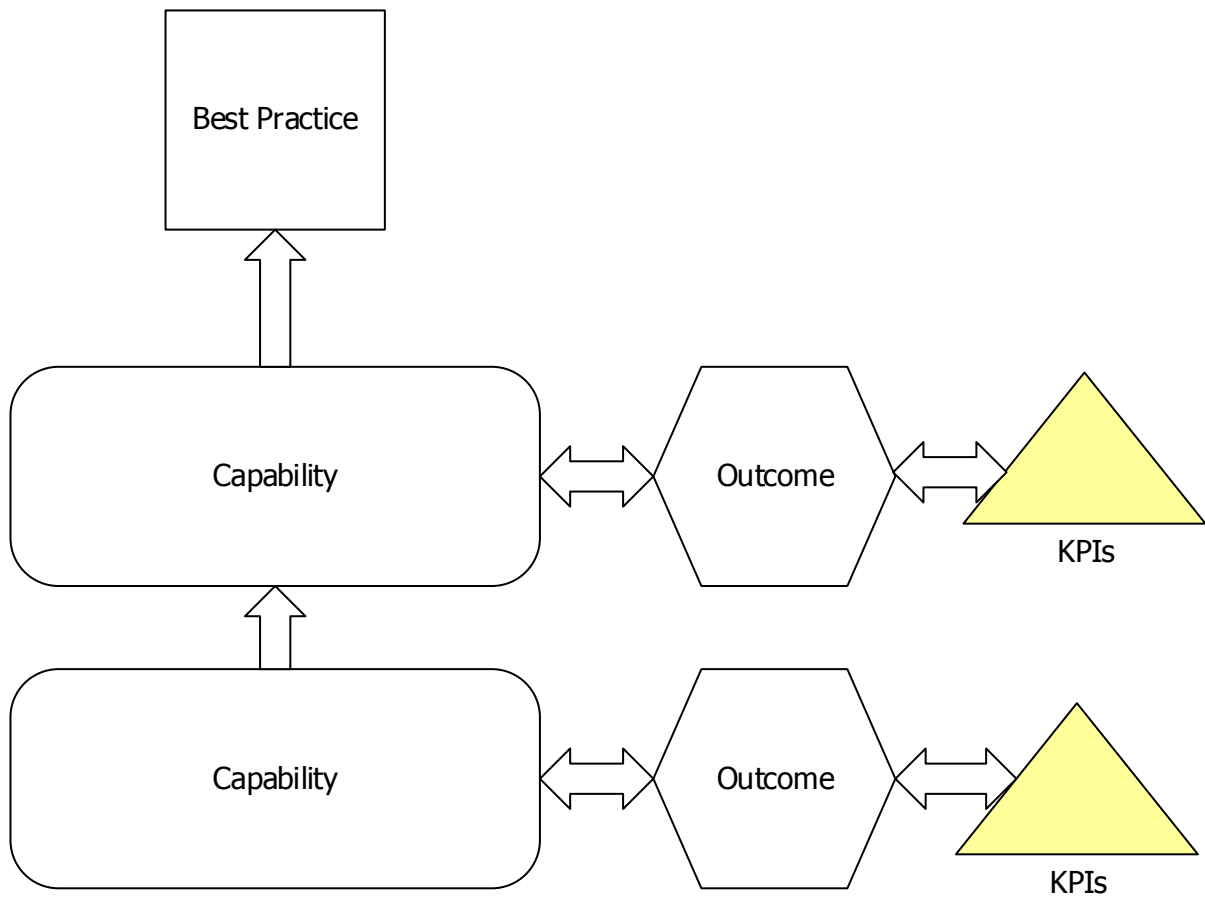


Figure 2.3 Illustration of Best Practice, Capability, Outcome and KPIs Relationship (Project Management Institute, 2003a)

Whereas OPM3 is scalable and flexible (Farrokh & Mansor, 2013), its inability to offer a definite number of Key Performance Indicators (KPIs) leave the interpretation of what other capabilities were needed to execute a project open to speculation and renders it difficult to the practitioners. Currently the industry has over 600 best practices available (Project Management Institute, 2003a), combined with the fact that the tool is scalable makes it difficult for the practitioner to choose which best practices are to be employed on their project.

#### 2.5.4 Project Management Maturity Model (ProMMM)

Like most other project management maturity models ProMMM was developed based on Capability Maturity model with a combination of Excellence Model from European Foundation for Quality Management and was published in the year 2003 (Hillson, 2001),

that as it may be this model has a slight depart from its predecessors as it embraces a four level maturity scale like OPM3, these being; Naïve, Novice, Normalized and Natural. Under Naïve or Level 1 the organization is mostly unaware of the need to manage projects and thus have an unstructured and reactive response managing project risks with little regard for the past.

Under Novice or Level 2 of the maturity model the organization begins to experiment with project management though they do not have structured or general processes in place.

Under Normalized or Level 3 the organization implements project management in all sections of the business and general project management processes are formalized. This is the most preferred level for most organizations.

Under Natural or Level 4 the organization has a project culture and continuously strives to improve on its projects processes based on the inputs of other projects.

The concepts of maturity models look at what attributes lead to better performance in project management much the same way as identifying the critical success factors (CSFs) to project management, this subject of CSFs like Maturity Models still has no consensus as to what makes up the ultimate attributes thus the diversity in the models. ProMMM is one such model which tries to embrace attributes not espoused by other maturity models; for instance, CMM looks at Project Processes as attributes that lead successful project completion. ProMMM tries to broaden the attribute so as encompass project environment and the experience of the people undertaking the project thus this maturity model brings to the project management maturity table four attributes to be assessed for successful project completion and these are; Processes, Culture, Experience and Application (Hillson, 2001).

ProMMM attributes resemble the concepts espoused in OPM3 though it is not multidimensional (Farrokh & Mansor, 2013), it presents a comprehensive easy to assess model for project management; further its use and achievement in industry outweigh its lack of theoretical background (Hillson, 2003). It is thus a favored model to be used in trying to assess Project management on individual project level.

## 2.6 Project Success

For any meaningful correlation to be drawn between organization project maturity and project success, a clear definition of project success has to be achieved. Whereas there could be lack of consensus of project success definition (deWit, 1988; Shenhar et al, 1997) it should suffice for this research to simplify the definition in such a way that it encompasses grey areas around project success definition whilst maintaining project and project management definition; Project Management Institute (PMI) project management book of knowledge (PMBok) define a project as a temporary undertaking with a start and end time (Project Management Institute, 2013) furthermore it defines project management as the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder requirements.

The answer to correlation partially comes from the definition of project success being equated to product success and project management success (Baccarini, 1999). This definition encompasses most arguments as product success covers a high-level stakeholder concern and it also covers the concerns of the customer; it also has a time frame concern covered as regards the shift of stakeholder needs with the project advancing from one phase to another. Project management success covers the concerns of the project team and the iron triangle, as the project team is more concerned with cost, schedule and the quality (or the iron triangle) of the project (Baccarini, 1999).

The subject of project success has not had much attention given to it in the past (Baccarini, 1999). So many measures have been used for quantifying project success by various groups or individuals whom the project affects; it does not matter whether people are on the same project team they still could have different views on what constitutes a successful project (Shenhar et al, 1997). This lack of consensus on what constitutes project success prompted the Project Management Institute (PMI) to dedicate the 1986 annual symposium to the topic of project success (deWit, 1988).

The decade between 1986 and 1997 has seen a marked improvement in project success research (Shenhar et al, 1997). This research has resulted in people grouping the various measures of project success into one common group of association, which is referred to as a dimension. A multidimensional outlook on project success identifies four dimensions of success; this is an improvement compared to earlier research conducted, which had

yielded three dimensions (Shenhar et al, 1997). The identified dimensions of success included; Project efficiency, Impact on the Customer, Business and direct organizational success and preparing for the future. In project efficiency, project success is an appreciation of ways in which the project was managed in terms of time and budget. This dimension takes on the short-term assessment approach which includes project execution and immediately after project completion. A better score in project efficiency does not necessarily mean achievement of the project success as some long term perspectives have to be taken into consideration such as the benefit to the organization (Shenhar et al, 1997); Organizations implementing a project do so with an intention to move from one position to another in terms of efficiency or financial gain. The second dimension identified is Impact on Customers; this dimension relates to the customer who ultimately has to utilize the product that has been realized through a project; as it relates to the usage of the product it thus encompasses success measures such as meeting the performance of the product, meeting the functional and technical requirements of the project product (Shenhar et al, 1997).

The second dimension looks at how satisfied the customer is with the project product and is a major determinant as to whether the customer will come back for more of such products, thus for contractors the level of satisfaction is also essential (Shenhar et al, 1997). The third dimension identified is Business and Direct Success: this dimension looks at the immediate benefit that accrues to the project implementing organization. These benefits could be profits or in the case of non-profit making organization, an improvement in the service delivery or it could be an internal reengineering project and the benefits to be targeted would be the cycle time of yield even quality of the process; has it seen an improvement? (Shenhar et al, 1997). Assessment of this dimension takes a relatively long time, in the range of one to two years (Shenhar et al, 1997). The fourth dimension identified is: Preparing for the Future.

Whereas four dimensions are identified by Shenhar et al. (1997) to evaluate project success, Baccarini (1999) identified two components making up project success. The component was broken down as product success and project management success. Product success could be looked at as the influence that the project has on the organization benefit while project management success is seen as the actual delivery of the project. Langston et al. (2018) tried to come up with a universal method of project

success determination, this method was meant to be insulated against the size and context in which the project is carried out (Langston et al, 2018). Three phases of project success were identified these being project initiate, implement and project influence. Common to all these forms of project success definition is the element of trying to relate project success with organization success which in some way is a departure from project definition.

Most literature identify cost, time and project output as the most prevalent measure of project success (Windapo & Odediran, 2014). This research will thus restrict the definition of project success to the iron triangle (cost, time and quality) dimensions and satisfaction of stakeholders.

## **2.7 Effect of Project Management Maturity on Project Success**

With Project Management Success simplified to well managed cost, time, quality and customer satisfaction, it is expected that any project team that has undergone maturity should be able to reduce waste in the identified project management success attributes (Hillson, 2001).

Project Management Maturity has been identified to have four levels (Hillson, 2003), these being Naïve or Level 1, Novice or Level 2, Normalized or Level 3 and Natural or Level 4. For Organizations that have moved up in Maturity level it is expected that their level of managing the four success attributes will be better than the ones that are at a lower level (Hillson, 2003). For the purposes of illustration refer to Figure 2.4

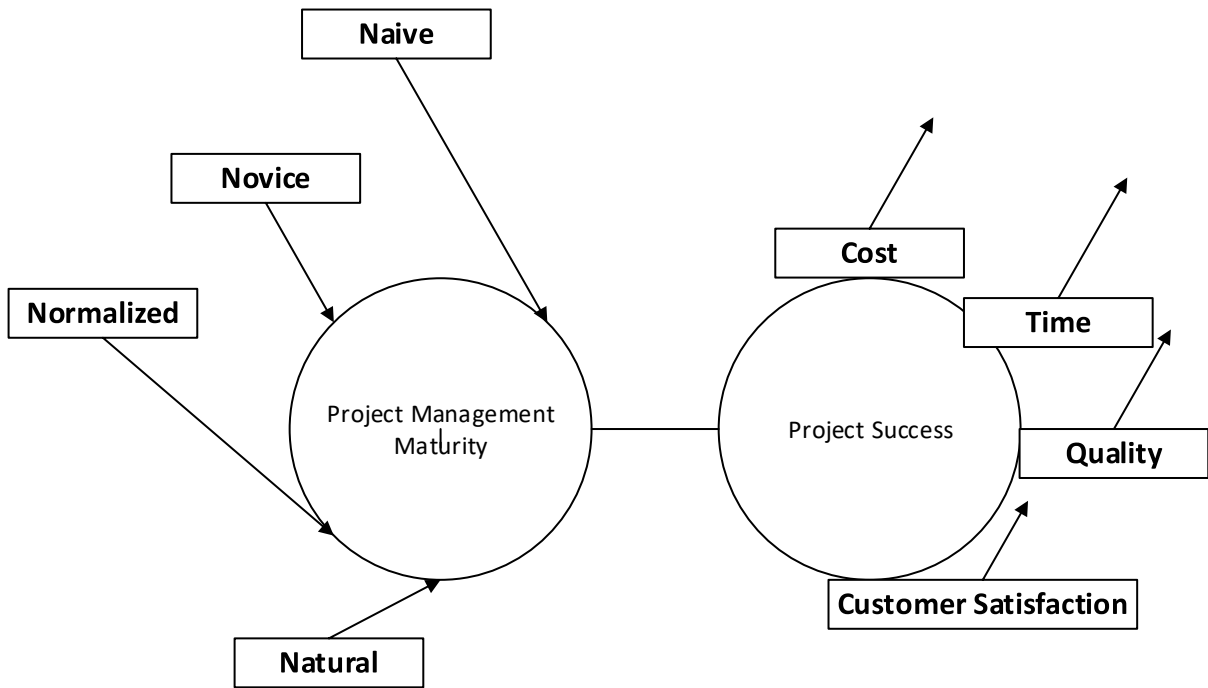


Figure 2.4 Project Management Maturity effects on Project Success

Figure 2.4 illustrates the effects that progress in project management maturity has on project success. It is anticipated that the maturing organization will have positive effects on cost reduction, project schedule, Improved project Quality and a high rate of customer satisfaction (Kwak & Ibbs, 2002).

## **Chapter 3**

### **Research Methodology**

#### **3.1 Introduction**

This chapter outlines the research paradigm, research design, population, sampling techniques, instruments and methods of data collection and methods of data analysis applied to the study. It also presents the validity and reliability of the research, and ethical considerations.

#### **3.2 Nature of Research**

Three different types of research can be carried out these being Exploratory research, Descriptive Research and Explanatory research (Vaus, 2002). Exploratory research is an initial research into a hypothetical or theoretical idea by taking well defined theories and applying them to an area of study or indeed the development of one's own theories from scratch. Descriptive research tries to explore and explain with additional information on a study. Explanatory research tries to explain the relationship between variables (Vaus, 2002).

In this research study Exploratory nature of research was used as the study relies on the theories that existed to test them in the field.

#### **3.3 Research Paradigm**

In order for the researcher to structure their research the Ontology, Epistemology and paradigm had to be understood in a way that they relate. Ontology is the study of the nature of knowledge or reality (Holt & Goulding, 2017). Different school of reason exist as to the nature of reality, other scholars contend that there is a single reality while others opine multiple reality and indeed others contending that reality is constantly negotiated or debated (Bhattacharjee, 2012).

Epistemology on the other had is the study of how to know reality (Holt & Goulding, 2017). Differing views exist for how to know reality, whereas other scholars contend that reality

could be measured using reliable designs and tools others reason that reality needs to be interpreted to discover the underlying meaning and yet others argue that reality can be understood by using whatever tools are best suited to solve the problem (Bhattacharjee, 2012). A combination of ontology and epistemology leads to the creation of the paradigm. A combination of a single reality and a suitably designed tool of measure lead to a Positivism paradigm, a combination of a multiple reality and interpretation for one to gain knowledge leads to a Constructivism paradigm and a combination of a constantly negotiated reality with the best suited tool lead to Pragmatism paradigm.

This research is correlation research 'What is the relationship between project management maturity level and project success' that seek to find the relation between what could not be changed in the field that is the organization maturity level and project success. These variables are out there and cannot be changed as information is within the people and the archives, thus a positivistic and objective approach has been adopted to gather more knowledge on the relationship between Project Management Maturity and Project Success.

### **3.4 Research Approach**

There are three research approaches that exist for the researcher to choose from, these are inductive, deductive and abductive research approach (Bhattacharjee, 2012). An inductive approach to research begins with data collection and ultimately comes up with a theory. A deductive approach begins with a theory, formulation of hypothesis, data collection and ultimately data analysis. An abductive approach is similar to inductive approach but differs in the sense that an inductive approach assumes collection of full data before coming up with a theory whereas as an abductive approach does not have a full data compliment and comes up with a partial theory (Bhattacharjee, 2012).

In this research a deductive research approach is used as the researcher was trying to evaluate the relationship between project management maturity and project success given that an argument of project management maturity affecting project success has been given (Hillson, 2001). Starting from the background of a stated theory an alternative hypothesis that a high organization project maturity level leads to higher rates of project success was made.

### **3.5 Research Design**

A research design is a way to come up with an answer to the research question having adopted a certain research approach (Dainty et al, 2008). Three research designs exist for helping to come up with the answer to research questions these being qualitative, quantitative or mixed method design (Dainty et al, 2008). A qualitative design works very well with an inductive research approach as it tries to analyze or compare entities from data that has been collected from the field, on the other hand a quantitative design works well on a deductive approach as it tries to compare variables that form a relationship and thus could be analyzed using a statistical package. A mixed method design uses both qualitative and quantitative design to give the required answers to the research question (Bhattacharjee, 2012).

In this study a quantitative research design was adopted as the research seeks a deductive approach to the research question.

#### **3.5.1 Case Study Protocol**

This study was aimed at finding out the relationship between project management maturity and project success, theory proposes that high maturity has a positive effect on project success (Mullaly & Thomas, 2010). Starting from a background of theory a hypothesis of high project management maturity having a positive effect on project success was formulated, thus this study undertook a deductive research approach. With a deductive approach being considered a quantitative design was preferred as an appropriate design of study as could be seen from the previous study done in Southern Africa (Pretorius et al, 2012). The choice of this case study strategy was for the study to have a real life experience of how project management maturity affects project success in a Southern African Corporation and targeting a Zambian organization of ZESCO which is an Engineering company specialized in the Generation, Transmission and Distribution of electricity to the country and the Southern African region as a whole (Energy-Regulation-Board, 2018).

### **3.5.2 Case Study Context**

The phenomenon of Project Management maturity and Project success was investigated in ZESCO a Zambian Electricity generating, transmitting and distributing company founded in 1969 wholly owned by the Zambian government (GRZ). The company is headed by a managing director supported by directors each heading a directorate. A directorate refers to a specific functionality such as generation, transmission, distribution and other support functions. The board of directors for the organization are seconded by the Ministry of Energy and is headed by a board chairman who is also external to the organization.

At the time of this study, ZESCO had just recently unveiled their new mission and vision statement which was as follows: Mission Statement 'Making it easy for people to live a better life' and a vision statement of 'to be a hub for electricity trading in the region and beyond by the year 2025'. With this focus, the company embarked on major projects in generation, transmission and distribution networks. Some of the major projects at the time of study included the development of the Kafue Gorge Lower Hydro Power Plant which was being developed at the cost of \$2 billion others included the development of the Batoka Gorge a joint venture between ZESCO and ZESA a Zimbabwean electricity Company which was to be undertaken at the cost of \$5 Billion. The transmission projects included the Zambia-Tanzania interconnector and Zambia-Malawi Interconnector while distribution projects included the Lusaka distribution expansion.

### **3.6 Population of Study**

The population of the study is the targeted group of subjects (projects or entities to which study results will apply) from where the information gathering help to answer the researcher's question (Bhattacharjee, 2012); these could be professionals of a specific field of interest, or it could be persons who have an experience of a phenomenon under investigation, it could be projects or any entity.

The population of this study was drawn from active ZESCO projects. A total of 101 projects composed the population from Generation, Transmission and Distribution projects.

### **3.7 Sampling Technique and Sample Size**

With the population of the study identified it was then incumbent upon the researcher to undertake the solicitation of information from the 101 projects, this presents a practical challenge (Hopkins, 2000). The challenge of engaging the whole population thus limits the researcher to only a certain number of projects which are intended to be representative of research outcome of the population as regards the phenomenon under investigation, this number of subjects is referred to as the sample. In order for the research outcome to be representative, a choice of subjects had to be undertaken with precaution so as not to introduce bias in the research outcome. The choice of subjects could be classified into two categories these being probabilistic and non-probabilistic (Bhattacharjee, 2012). A probabilistic sample is more representative of the population response compared to the non-probabilistic sample (Bhattacharjee, 2012), though it becomes necessary to carry out a non-probabilistic sampling based on the situation (Hopkins, 2000).

In this study, a non-probabilistic purposeful sampling technique was employed whose choice was motivated by the population size that the study had 101, considering the slight administrative challenges that the researcher experienced, this could not be sufficient to offer a probabilistic approach whose minimum response should not be below 30 (Bhattacharjee, 2012). The technique was envisaged to gather more information on the project undertaking as the sample of choice were active projects or were projects that were active in within the last five years (Bricki & Green, 2007).

In carrying out a research, sample size is important as it forms a solid base to adduce the average population response. The researcher distributed 52 questionnaires to projects that had been completed in the last five years and to some which were supposed to have been completed in within the last five years from the year 2021. Out of the distributed 52 questionnaires distributed only 27 were received as responses.

### **3.8 Methods of Data Collection**

Three major data collection methods are in use in research these being Interview, Questioning and Observation, other methods exist though not in use as often as these mentioned three (Bhattacharjee, 2012). Each data collection method comes with its own tool; Interviews use an interview schedule as a tool and this might be structured or unstructured interview, Observations use a rating scale, checklist or closed-circuit television (CCTV) as their tools and the observation might be structured unstructured participant observation or non-participant observation whereas Questioning use a questionnaire as a tool and this questionnaire might take an open or closed format.

In this study a closed format questionnaire or structured questionnaire was used as a tool of data collection. A questionnaire is a general term to include all methods of data collection in which each person is asked to respond to the same set of questions in a predetermined order.

In order to improve case studies data, triangulation is recommended (Bhattacharjee, 2012). Triangulation refers to multiple sources of data collection.

In this research, in line with the quantitative research design, a structured questionnaire was used to solicit primary data, and further data (secondary data) was collected through the researcher's interaction with the Corporate Projects Office.

#### **3.8.1 Structured Questionnaire**

A structured questionnaire was circulated to participants for solicitation of responses. Further, an email address for the researcher and the supervisor were added to the questionnaire for easy communication in case clarification was needed. Further, the mobile contact details for the researcher were added as a supplement detail.

In a structured questionnaire, closed-answer questions were asked to the respondent to give their responses and this questionnaire (refer to appendix C) was structured in such a way that it carried questions which required respondents rating on a Likert scale of 1-5. Usage of a 1-5 Likert scale increases the number of points on the response scale, thus improving the reliability of data collection compared to binary answer questions (Boateng

et al, 2018). A Likert scale is a single dimension psychometric scale used in measuring the extent to which research participants agree with the questions that are posed to them (Dainty et al, 2008). Structured questionnaires are a favored tool for soliciting information in a deductive approach with a quantitative design (Clarkson & Hodgkinson, 2007) and thus an instrument of choice in this research, this is consistent with other similar researches (Pretorius et al, 2012).

### **3.8.2 Documentation**

To enhance data triangulation, the researcher retrieved secondary data from documents related to the projects. This exercise was enhanced and enriched by the ZESCO corporate project office. The documents reviewed include financial reports, project status reports and project completion certificates.

### **3.8.3 Participant-Observation**

In Constructivism paradigm there are multiple realities and the way of finding out about this reality is through negotiation. In a Positivism paradigm, only a single reality exists and this reality can be found out using an appropriate instrument of measure. To have an in-depth knowledge in a constructivism paradigm a researcher might need to be part of the research that they are conducting, on the other hand in a positivism paradigm a researcher does not need to be part of the research in order for them to interpret the data that they get.

In this study a positivism approach was adopted and thus the researcher was not required to be part of the research.

## **3.9 Role of the Researcher**

As an employee of ZESCO, the researcher easily identified the directorates within the organization that were involved in several projects. The researcher works in the generation directorate and has prior knowledge of the project implementation being done in the directorate however this did not affect the research in any way as all participants

were given equal opportunity to respond to the research at their own time without duress. This could be witnessed by how long it took for the researcher to get clearance to research within the organization. All protocol was observed, and the due process of undertaking research followed.

The research outcome was little or not influenced; this was helped by the fact that the research data was quantitative and no any means known or unknown to the researcher could be used to influence the research subjects to respond in a biased manner. Furthermore, the research was conducted ethically and professionally bearing in mind that the researcher had signed the University of Cape Town ethics declaration (EiR) (refer to appendix B) with a promise to uphold ethical standards in the course of the research.

### **3.10 Types of Data**

A fundamental distinction can be made between two data types, these being quantitative (Numeric) and qualitative (categorical) data (Ali & Bhaskar, 2016). Quantitative data refers to data that takes a numerical form, whereas any data that take the form of words, texts, video, the photo is referred to as qualitative data.

In this research, quantitative data type was used. It was obtained through a structured questionnaire administered to respondents who had to rank their responses on both a Likert scale and a binary scale, thus producing categorical data which was ranked, ordinal. The study data came into different variable headings and had to be computed into single variables to come up with variables for analysis. The distributed questionnaire had four questions for project quality, these where computed into a single question which was a scaled variable. Customer/Stakeholder satisfaction had five question, organization culture had five questions, project processes had sixteen questions, project management principles had ten questions, project skills had six questions and project tools had six question which were all ordinal using a Likert scale of 1-5. The project application had a dichotomous response of yes or no. These questions were computed to make up a single variable. The study questionnaire had six sections which sought to find out the project management maturity level. The six sections sought to find out the organization project culture, project experience, project application and project processes in line with competence areas for project maturity in ProMMM (Hillson, 2003). Project culture was

solicited using its own questions whereas project experience was solicited using tools and skills questions, project processes was solicited using principles and processes questions and project application had its own independent questions.

With the set of questions computed into a single question the ultimate result was a mean question score which was scaled. In ProMMM, a scale of 1-4 is used other than a Likert scale thus the computed questions mean score had to be normalized to a range of 1-4 so as to have uniform analysis with ProMMM.

### **3.11 Methods of Data Analysis**

Quantitative data types can be analyzed using descriptive or inferential statistical methods (Ali & Bhaskar, 2016).

In this research using SPSS, Inferential statistics was used to come up with the relationship between project success and project maturity level whereas descriptive statistic was used to come up with the variable frequency. The data was gathered through the collection of the structured questionnaires responses, which were then reviewed and inputted in the Statistical Package for Social Scientists (SPSS) analytical software. The data was then presented in the form of charts and tables to convey the relationship between the variables. Establishing a relationship between variables which numeric require the usage of either Pearson or Spearman correlation coefficient, the choice of which is dependent on whether the data is parametric or non-parametric. The Pearson correlation is used for parametric data whereas the Spearman Correlation is used for non-parametric data.

The Spearman measure of correlation rho. varies between -1 to +1. A value of -1 shows a perfect negative correlation between the variables under study whereas a value of +1 shows a perfect positive correlation between the variables. A value of Zero entail no relation between the variables. Any value between 0.00 and 0.19 show a very weak correlation (Patrick Schober, 2018).

Likert scale of 1-5 was used to obtain data in this study, while the other data was binary. This whole data had to be normalized to a range of 1-4 in line with the scale used in ProMMM. The computed set of questions gave a mean score for the different ranges thus the following normalization formula was used  $y = \frac{(x - \min(d)) * (\max(n) - \min(n))}{(\max(d) - \min(d)) + \min(n)}$  (Sadawi, 2014).

### 3.12 Validity and Reliability

According to Voss et al. (2002) in a case study research, it is particularly important to pay attention to validity and reliability. Validity refers to how well a construct has been dissected to include the variables that amount to that construct (Voss et al, 2002). Reliability refers to how well the results of the research can be reproduced if the research instrument is to be administered to other participants.

The researcher utilized an established questionnaire and variables. The questionnaire was well utilized in an international organization with satisfying results (Hillson, 2001). The construct of project success utilized the project management 'iron triangle' alongside customer satisfaction. Furthermore, data validity was enhanced by data triangulation through structured questionnaire distribution and review of responses, review of financial records and project status reports.

In this research the reliability of the instrument was enhanced by subjecting the questions with a Likert scale to the Cronbach alpha test as shown in (See Appendix D). The threshold acceptable is 0.4 (Taber, 2016). No attempt was made to manipulate the data that was obtained from the respondents.

Table 3.12.1 Reliability Test Scores

Item	Cronbach Alpha Score
Customer Satisfaction	0.799
Project Quality	0.712
Project Culture	0.443
Project Management Processes	0.884
Project Management Principles	0.637
Practical Skills and Techniques	0.806
Project Management Tools	0.722

### 3.13 Ethical Consideration

In research that involves human subjects, it is always important to ensure that the ethical implications are handled beforehand (Merriam, 2008). The researcher must ensure that respondents and the organization studied if any are duly informed of the content and the

extent of the research; furthermore, it is the duty of the researcher to ensure that no harm is done to the subjects of the research and their organization. Unless agreed to, the identity of the subjects is to be kept strictly confidential.

In this study, though quantitative and with very little concern for divulging respondents' identity, the researcher ensured that a consent form was sent to would-be respondents to explain the extent of the research and the extent of their participation. Guarantees were made to the effect that the final report of this research would be availed to the participants should they request for it. The research was carried out with the approval of the organization under study (see appendix H); a request to carry out the research was sent to the human resource department alongside the research instrument and consent form for the department to have a second opinion on the content of the research (See appendix G). Ethics clearance to undertake the research was also obtained from the University of Cape Town and is appended to this report (see appendix B).

### **3.14 Limitations of the Study**

The number of research designs in use today attests to the fact that all research designs have inherent limitations unique to them (Yazan, 2015). In a case study research, the research population is narrowed to the case in question. The narrowing of the research population entails an inherent challenge of generalizability for this research design as it is carried out in a specific context. This being a single case study a danger of exaggerating the available data exists (Voss et al, 2002).

### **3.15 Summary of the Chapter**

This chapter looks at the philosophy that motivated the research. This paradigm and approach further motivated the research design adopted to concisely undertake the research as an answer to the research question. The chapter also looks at the research protocol adopted, research reliability was enhanced by carrying out a Cronbach alpha test on Likert scale questions of the study.

## **Chapter 4**

### **Data Presentation Analysis and Discussion**

#### **4.0 Introduction**

This chapter presents and analyses the data collected in response to the research question on the relationship between Project management maturity level and Project Success. Statistical package for social sciences (SPSS28) was used in analyzing the data collected. The major focus of the data analysis was to establish the success criteria and determine performance of organization projects, establish the failure areas of organization projects and map the failure areas to competence areas, index and benchmark the level of organization project management and determine the organization project success and correlate organization project management maturity level to project success.

#### **4.1 Demographic Characteristics of Respondents**

This part of the research gives various demographic characteristics that were included in the research data and might in a way have an influence on the study outcome. Among the characteristics that were studied are Experience in Project Management (In Years of service), Certification in Project Management and Level of academic qualification. Gender was not included as part of Demographic characteristic as all the respondents and the current project managers in ZESCO are male.

##### **4.1.1 Project Experience (In Years)**

Experience one has in handling the project was part of the demographic characteristic of the respondents in the study. It refers to how long the respondent had been working on projects that are of importance to ZESCO specifically to generation, transmission and distribution related projects. The Importance of this characteristic was to establish the mean number of years of experience and ascertain whether experience plays a role in management of a project later on providing objective response to this study. The results of the experience distribution are as shown in Table. 4.1

Table 4.1 Experience of the Respondents

Valid	27
Missing	0
Mean	9.48
Median	8.0
Mode	7
Minimum	4
Maximum	24

The results from Table 4.1 show that the mean number of years' experience was (9) nine with the minimum years of experience being (4) four and the maximum being (24) twenty-four.

From the mean experience score it is apparent that we have sufficient project management experience which could have been attained from major hydropower construction projects which normally take five (05) years to complete, whereas transmission and distribution projects take a relatively short period to be completed as compared to hydropower construction projects (Energy-Regulation-Board, 2018). This experience is sufficient to provide objective data to enable analysis of the relationship between project management maturity level and project success.

#### **4.1.2 Project Management Qualification**

Project management Qualification was another demographic characteristic of the respondents that took part in this study. The Characteristic was important to help assess the project management background of the respondent. This characteristic is in addition to the first Education Qualification that the respondents had. This characteristic could influence the respondent's response as it spells out an extra understanding of project management. The result of the study is as shown in Figure 4.1.

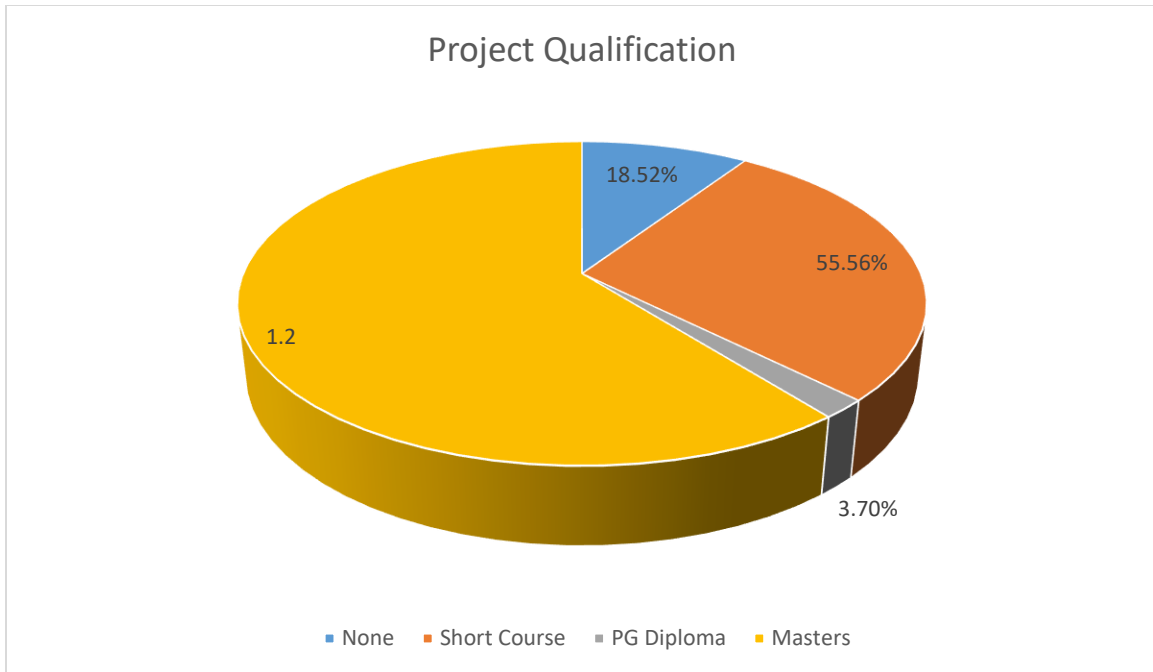


Figure 4.1 Respondents Project Qualification

The results as obtained in Figure 4.1 show that 55.56% of the respondent had a short course qualification in project management, followed by 22.22% of respondent who had a Master’s degree in addition to their first degree, they were followed by 3.70% of respondents who had a Postgraduate Diploma. 18.52% of the respondents had no project management qualification thus presenting the research with a fair chance of 81.48% unbiased response.

A combination of Experience and project management qualification enables the comparison of what the respondents have religiously been doing with some theoretical background to enable them to assess how effective project management is managed with and without a theoretical background.

### 4.1.3 Project Management Certification

Further to Project management Qualification, Project Management Certification was identified as a demographic characteristic of the respondent that took part in the study. This characteristic enhanced the group understanding of project management thus a

provision of a well understood response. The results of the study are as shown in Figure 4.2

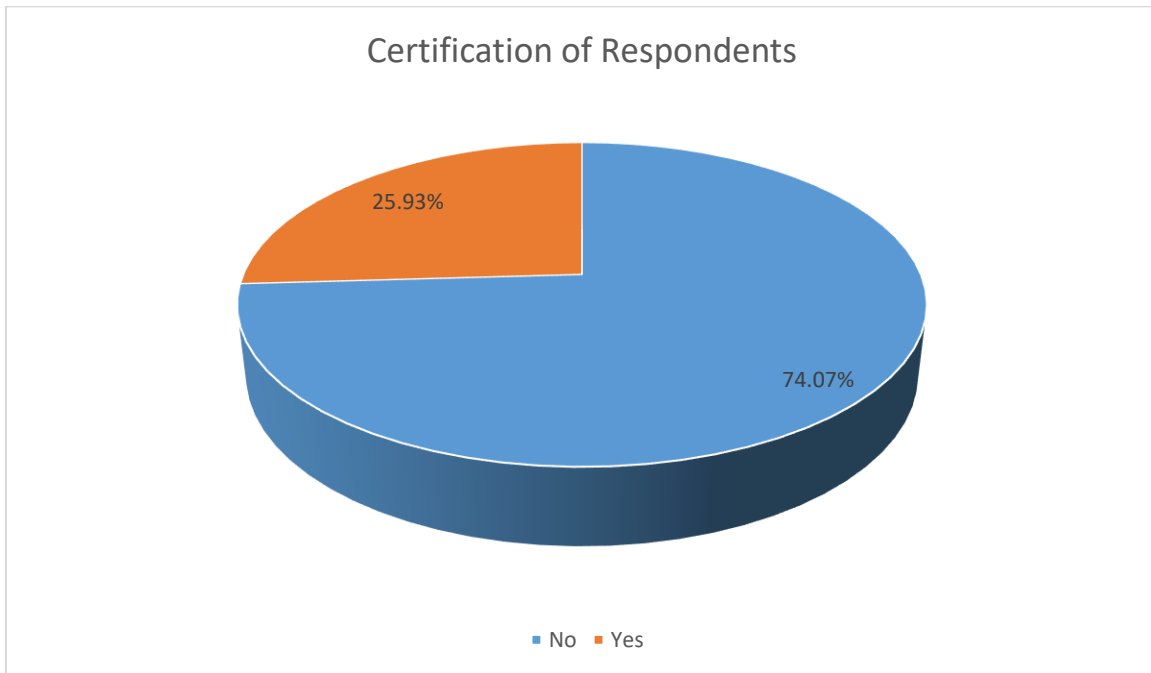


Figure 4.2 Project Management Certification of Respondents

From the results obtained in figure 4.2, 74.07% of the respondents had no form of Project management certification whereas 25.93% of the respondents had some form of certification. This characteristic was important to assess the degree of project management understanding among the respondents. The characteristic would be used to enhance the project management maturity in an organization giving them a better edge if any among their competitors.

#### 4.1.4 Sectoral Distribution of Projects

Another demographic characteristic identified was that of project mix, which identified projects on their role to the corporation. They were identified as Educational, Residential, Institutional and all other projects not under any of the categories mentioned would fall under the category 'Other'. The results of the study are as shown in Figure 4.3.

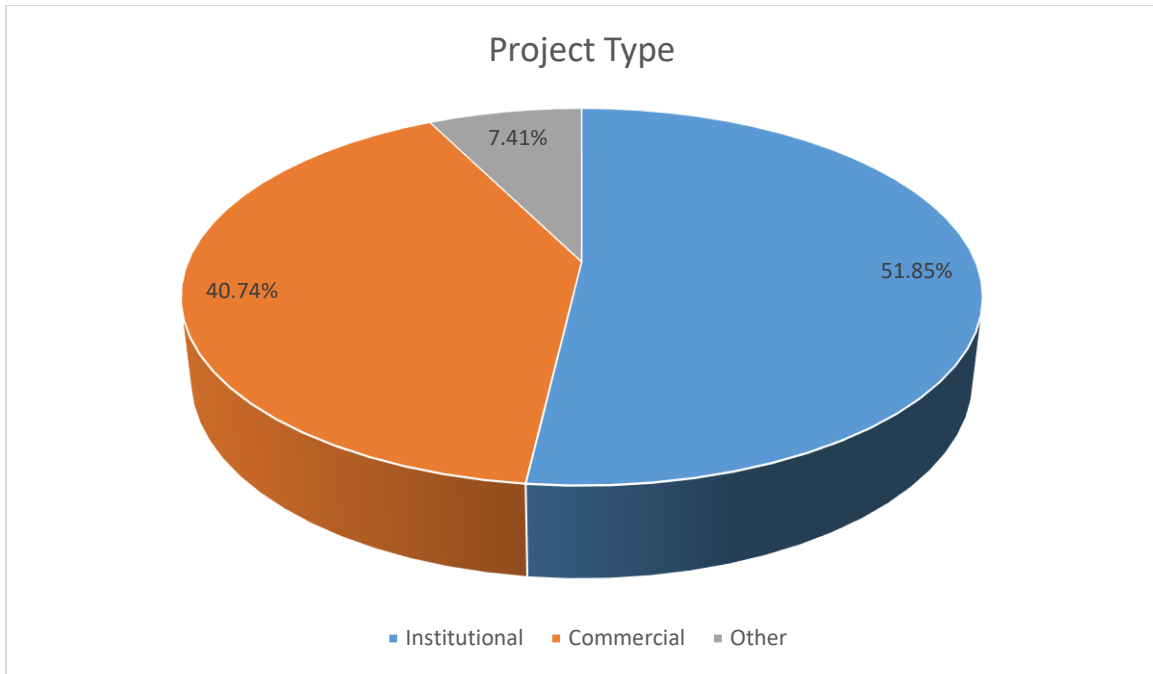


Figure 4.3 Project Sectoral Distribution

From Figure 4.3, 51.85% of the projects conducted by the respondent under this study were Institutional whereas 40.74% of the projects conducted were Commercial, a paltry 7.41% fall under other Projects. The results provide the study with the distribution of respondents who undertook various projects under varying contexts. In our study 40.74% of projects were conducted for giving the corporation an edge to profit making whereas 51.85% of the projects were conducted for the purposes of asset growth which in essence translate in sustenance of profits.

#### 4.2 Establishing Organization Success Criteria

This section discusses the Project Success Criteria that were used on ZESCO projects and were used in this study to come up with responses from the research participants. The success criteria that this study established were Cost, Schedule, Quality and Customer Satisfaction.

### 4.2.1 Project Cost Performance

The Project cost was given in terms of the budgeted cost and the final project cost. This cost was converted into the Cost Performance Index (CPI). A CPI of 1 indicated that the project budgeted project cost was equivalent to the final cost of the project, a CPI of less than 1 indicated that the project performance was less than the budgeted cost a good sign for the project team. A CPI of greater than 1 indicated the project failure to complete the project within the budgeted cost. This study conducted this research, and the results are as shown in Table 4.2.

Table 4.2 Project CPI (Cost Performance Index) Statistics

N Valid	21
Missing	6
Mean	1.1257
Median	1.1100
Mode	1.00
Std. Deviation	0.13407
Variance	0.018
Range	0.41
Minimum	1.00
Maximum	1.41

The results from Table 4.2, indicate a mean project CPI of 1.13 a value above 1, indicating project failure to meet the budget projections.

### 4.2.2 Project Schedule Performance

Similar to Cost Performance, the Schedule performance was given in terms of the budgeted time and final completion period. This Schedule was converted into a schedule performance index (SPI). A value SPI equal to 1 meant perfect execution of the project, a value less than 1 meant that the project was completed before time and a value of SPI

above 1 meant the project being completed after its allotted time. Table 4.3 gives the study results on project schedule.

Table 4.3 Project SPI (Schedule Performance Index) Statistics

N Valid	25
Missing	2
Mean	1.7248
Median	1.4400
Mode	1.50
Std. Deviation	0.94989
Variance	0.902
Range	4.00
Minimum	1.00
Maximum	5.00

From the results of the Table 4.3, we have a mean of 1.72 and a median of 1.44. These results indicate a central tendency that is above 1, thus from the study the results indicate the respondents' inability to meet the schedule.

### 4.2.3 Project Quality

Another Variable that was used to measure project success was Project Quality. This variable was assessed through a categorical measure. The variable was assessed using the Likert scale of measure from 1-5, 1 being very unsatisfactory and 5 being very satisfactory. Four questions in a tabular form were used to solicit for responses in this study the result of which are as shown in Figures below. The Ordinal responses were computed into a scalar form on combining the questions into a single variable.

Table 4.4 Project Quality Statistics

Options	Very Unsatisfactory	Unsatisfactory	Neither	satisfactory	Very satisfactory	Frequency	MIS Score
Fit of Purpose				5	21	26	4.81
Product aesthetics			2	14	11	27	4.33
Number of reworks		1	5	11	9	26	4.08
Product durability				16	11	27	4.41
<b>Total</b>							<b>4.41</b>

From the above Table 4.4 the study establishes quality to have a mean value of 4.41, the minimum score was 3.5. This assures a better performance of quality by the project teams that took part in this case study.

#### 4.2.4 Customer Satisfaction

Another variable of concern to the study of project success was identified as customer satisfaction. This variable was assessed using the Likert scale of 1-5 with 1 being very unsatisfied and 5 being very satisfied. Five questions were administered to the respondents and the final variable computed which gave a scaled final value whose results are as shown below.

Table 4. 5 Customer Satisfaction Statistics

Options	Very Unsatisfactory	Unsatisfactory	Neither	satisfactory	Very satisfactory	Frequency	MIS Score
Project Product Breakdown		1	1	11	14	27	4.41
Rate			3	14	9	26	4.23
Ease of Maintenance			3	13	11	27	4.30
Service Support	1	1	5	10	9	26	3.96
Product Output		4	2	9	12	27	4.07
<b>Total</b>							<b>4.19</b>

From the above Table 4.5, the study results give a mean of 4.19. These results show a satisfactory 'customer satisfaction' delivery on the projects.

### **4.3 Activities Performed While Managing Projects**

This section discusses the areas of Project Management which are used to measure project management maturity. ProMMM Questionnaire, as a tool used to measure project management maturity in this study identifies four competence areas that make up project management maturity (Hillson, 2001). The four (4) competence areas identified are Process, Experience, Culture and Application. The questionnaire solicits cultural values using cultural questions only, experience is solicited using project management practical tools and techniques questions along with project management tools questions; Process competence is solicited using project management process and project management principles question whereas Application competence is solicited using application questions only.

The ProMMM maturity model has four (4) levels of project maturity these being Naïve (Level 1), Novice (Level 2), Normalized (Level 3) and Natural (Level 4) (Hillson, 2001). At Naïve stage the organization is unaware of the need for project management and has no structure for doing work. At Novice stage the organization starts to experiment with project management. At Normalized stage the organization has formal project processes and benefits of project management is understood at all levels of management. At Natural stage the organization has a proactive project mentality and project management is used to improve business processes.

#### **4.3.1 Project Culture**

In soliciting the attribute of culture from the respondents five questions were asked. The response from the respondents in the project culture research component is as shown in Table 4.6

Table 4. 6 Project Culture Statistics

Options	Highly Disagree	Disagree	Neither	Agree	Highly Agree	Frequency	MIS Score
Project Management Critical to business				3	24	27	4.89
Project Team sent for Training		3	5	14	5	27	3.78
Organization rewards personnel for good results		5	13	7	2	27	3.22
Organization Repository for Information		4	9	10	4	27	3.52
Project Team Socialization		6	11	8	2	27	3.22
<b>Total</b>							<b>3.73</b>

From Table 4.6 the mean score culture is 3.73 for a range of 1-5 however, when normalized to a range of 1-4 the result was 3.0. Thus on a ProMMM scale ZESCO Project Culture was 3.0 as the score could only be taken to one decimal place (Hillson, 2003), a reflection of a Normalized organization. This reflects an organization which recognizes the benefits of project management and is ready to invest to enhance this cause.

### 4.3.2 Project Management Processes

Project management processes form one of the four competence areas of ProMMM project management maturity. In soliciting for answers as to whether the organization practices Project management processes, a set of two Likert scale questions in array form were posed these being based on project processes and principles of project management. Sixteen questions on a Likert scale were posed to ascertain the levels of project management processes practice, the results were as shown in Table 4.7.

Table 4.7 Project management Processes Mean Score

Options	Never	Rarely	Occasionally	Frequently	Always	Frequency	MIS Score
Created project charter		6	8	7	6	27	3.48
Consulted stakeholders		2	2	13	10	27	4.15
Detailed project plan		3	4	12	8	27	3.93
List of activities			4	11	12	27	4.30
Estimation of activity duration			1	15	11	27	4.37
Sequencing of project activities			3	12	12	27	4.33
Resource identification			4	12	11	27	4.26
Activity cost estimation			6	15	6	27	4.00
Change request adherence		1	5	9	12	27	4.19
Followed project management plan		1	4	15	7	27	4.04
Monitoring of expenses		2	5	9	11	27	4.07
Monitored time schedule			3	16	8	27	4.19
Quality standards set			4	10	13	27	4.33
Evaluate deliverables against standards		1	4	10	10	27	3.92
Project status communicated		1	2	10	13	26	4.35
Project close meeting		6	6	6	8	26	3.62
<b>Total</b>							<b>4.10</b>

From Table 4.7 the mean score for Project management Process was 4.10 which when Normalized to a ProMMM scale is 3.3, a reflection of an Improving Normalized Organization a more mature level desired by organization (Hillson, 2003).

### 4.3.3 Project Management Principles

In similar manner to section 4.3.2, Project management principles were solicited from respondents and presented as in Table 4.8.

Table 4. 8 Project Management Principles Mean Score

Options	Never	Rarely	Occasionally	Frequently	Always	Frequency	MIS Score
Team Created Vision and Mission Reason for Project	5	3	6	7	6	27	3.22
Outlining Project Team	1		3	9	14	27	4.30
Outlining Meeting Frequency	1		3	7	16	27	4.37
Project had a Scribe	1	2	6	6	11	26	3.92
Project activity failure cause	2	3	7	10	3	25	3.36
Project Team Intervention on failures			10	12	5	27	3.81
Team Organized Trainings for end-users	2	1	4	9	11	27	3.96
Outlined frequency of stakeholder engagement	1	2	4	10	10	27	3.96
Scoreboard for the project	4	7	5	7	4	27	3.00
<b>Total</b>							<b>3.84</b>

From Table 4.8 the mean score for Project Management Score was 3.98 which when normalized is 3.1 on ProMMM scale a desired state with an indication of improvement. The project teams had embraced the principles of Project Management.

#### 4.3.4 Overall Project Management Process

In order for the study to obtain the overall Project Management Process, the Project Management Processes score from section 4.3.2 and Principles of Project management scores from section 4.3.3 had to be computed by combining these two section scores. Table 4.9 shows the resultant descriptive scores.

Table 4.9 Project Management Process Statistics

N Valid	27
Missing	0
Mean	3.97
Median	4.06

From Table 4.9 the mean score is established to be 3.97 which when Normalized translated into 3.2 a Normalized third Level in ProMMM capability development stage. This means that ZESCO had General processes incorporated in their quality system and used these on most of their projects.

### 4.3.5 Practical Skills and Techniques of Project Management

Another competence area in ProMMM Maturity Model is Experience. Project Management Experience is verified through assessing how project teams utilize project management skills, techniques and tools (Hillson, 2003). Under this section the practical usage of project management skills and techniques is evaluated on a Likert scale and the results are presented as shown in Table 4.10.

Table 4.10 Project Management Skills and Techniques

Options	Never	Rarely	Occasionally	Frequently	Always	Frequency	MIS Score
Traditional method used for undertaking Projects	1	1	8	12	4	26	3.65
Agile Method used for undertaking projects	6	8	6	5	2	27	2.59
Waterfalls Method for undertaking projects	4	4	6	11	2	27	3.11
RUP used for undertaking projects	8	8	6	5		27	2.30
Critical Chain Method used for undertaking projects	5	3	8	8	3	27	3.04
Extreme Method Used for	7	10	5	5		27	2.30

undertaking Projects <b>Total</b>	<b>2.83</b>
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From Table 4.10 the mean score for project management skills and techniques is 2.83 which when Normalized to the ProMMM range is 2.4 a reflection of Novice improving.

### 4.3.6 Project Management Tools

Whilst still soliciting the attribute of Experience, usage of project management tools is key to determining the level of interaction between respondents and project management. A Likert array of questions was used to assess the level of usage of project management tools and the results are as presented in Table 4.11.

Table 4.11 Project Management Tools Statistics

Options	Never	Rarely	Occasionally	Frequently	Always	Frequency	MIS Score
MS Project used to evaluate Project progress	2	1	3	7	14	27	4.11
Alternative Package to MS used for Progress.	9	6	6	5	1	27	2.37
MS Project used to evaluate project cost.	9	1	6	5	5	26	2.85
Alternative to MS used to evaluate project cost	8	5	8	4	2	27	2.52
Corporate Messenger used for communication.	11	4	4	3	5	27	2.52
Alternative used for Communication	5	2	9	8	3	27	3.07
<b>Total</b>							<b>2.90</b>

From Table 4.11 the mean score for usage of project management tools is 2.90 translating into 2.4 on a ProMMM Level.

### 4.3.7 Project Management Experience

As per the instrument used in this research Project management Experience is a combination of Project management Tools and Practical Skills and Techniques. Using SPSS

28 Project Management Experience was computed using a combination of the mean scores of project tools and practical skills and techniques. The overall results obtained are summed up in the Table 4.12.

Table 4. 12 Project Management Experience Statistics

N Valid	27
Missing	0
Median	3.0
Mean	2.87

From Table 4.12 with a valid sample of 27 (N=27) the mean score for project Experience is found to be 2.87 translating into 2.4 on a ProMMM level indicating an Organization whose project experience is of an Improving Novice. This means that ZESCO had started transitioning from having project team members who never had or indeed had very little training in Project Management.

#### **4.3.8 Project Management Application**

Another attribute for the measurement of project management maturity according to ProMMM is Project Management Application. This attribute was solicited from the respondents by asking them whether they carried out Project management best practices. The responses were either in the affirmative or the negative. Table 4.13 shows the results of this study.

Table 4.13 Project Management Application

<b>Options</b>	Yes	No	<b>Frequency</b>	<b>Percentage Use (%)</b>
Conducted closeout Meetings	23	4	27	85.2
Developed Lessons Learnt	18	9	27	66.7
Archived Project Documents	23	4	27	85.2
Developed closeout reports	21	6	27	77.8
Conducted risk assessment	21	6	27	77.8
Performed qualitative risk analysis	15	11	26	55.6
Performed quantitative risk analysis	13	13	26	48.1
Developed a risk log	14	12	26	51.9
Developed risk response plan	12	14	26	44.4
Assigned schedule risk to a member	11	15	26	40.7
Assigned quality risk to a member	13	12	25	48.1
Measured active performance against standard	23	4	27	85.2

From Table 4.13 the test practices that are widely practiced are conducting close out meetings, archiving project data and measuring performance against standards. The least performed activity is assigning of risks to project members.

#### **4.4 Input Variable Creation**

This research study was designed with a purpose to assess the effect of Project management Maturity on Project Success. This entail that the two variables of interest were Project Management maturity and Project Success.

#### **4.4.1 Project Success**

This research study established Project Success to be a composition of project Cost, Project Schedule, Project Quality and Project Customer satisfaction. Using SPSS28, a scaled computation of Project Success was obtained by computing a compound score of the attributes' mean score. The realized score was a continuous variable.

#### **4.4.2 Project Management Maturity**

This research study used a ProMMM research instrument which identifies four competence areas to be a building block for assessing project management maturity and these were: Project Culture, Project Management Process, Project Experience and Project Application. The four competence areas were combined using SPSS 28 to come up with a single continuous variable of Project Management Maturity. The mean score for Project Management Maturity on ProMMM scale was found to be 2.5.

#### **4.5 Establishing a Relationship Between Project Management Maturity and Project Success**

This research study set out to find out the relationship between Project management Maturity and Project Success. The study set to test the null hypothesis of Project Management maturity Level having no relationship with Project Success and the alternative hypothesis that Organization with higher Project Management Maturity Level have higher Project Success. The two variables of interest were established as outlined in Section 4.4.1 and 4.4.2. The two variables were both continuous variables and Spearman correlation analysis was used to establish the relationship between the two (Nayak & Avijit, 2011). Considering that the data distribution was not perfectly normal, a Spearman correlation test was used to establish whether there is a the relationship between the variables of Project Management Maturity and Project Success (Nayak & Avijit, 2011), the results obtained are as shown in Table 4.14

Table 4.14 Project Management Maturity and Project Success Correlation

<b>Spearman'</b>			<b>PM_Success</b>	<b>PM_Maturity</b>
<b>rho</b>	<b>PM_Success</b>	Correlation	1	0.07
		Coefficient		
		Sig. (2-tailed)		0.973
		N	27	27
	<b>PM_Maturity</b>	Correlation	0.07	1
		Coefficient		
		Sig. (2-tailed)	0.973	
		N	27	27

From Table 4.14 a very low positive correlation result ( $r_s = 0.07$ ) and non-significant relation was obtained (sig. 0.973, N 27). The results showed a lack of relationship between the ZESCO implemented project success and project management maturity.

Table 4.14 shows that Project Management Success and Project management maturity have a correlation coefficient ( $r_s = 0.07$ ) a value which is closer to a zero value, thus validating lack of a relationship.

The P value allowable for this analysis is 0.05 meaning that, if the significance value is less than 0.05 then an alternative hypothesis to the null hypothesis is accepted whereas if the p value is greater than 0.05 a null hypothesis of lack of relation between variables in question is accepted. In this study a spearman correlation of ( $r_s = 0.07$ ) is too small for a relationship to exist and this is further confirmed by a significance value of ( $p = 0.973$ ), which is above the p value of 0.05.

A correlation test of the organization project management maturity against the constituent variables of project success (Cost, Schedule, Customer satisfaction and Quality) revealed a positive correlation between project maturity level and project quality giving a Spearman correlation value of ( $r = +0.386$ ) and a significance value of ( $p = 0.047$ ), the study also showed a positive correlation between project customer satisfaction and project quality

with a Spearman correlation standing at ( $r=+0.753$ ) and the significance value being  $<0.001$ . Table 4.14 shows the findings of the study.

The results obtained in Table 4.15 indicate that project management maturity has a positive correlation with Project Quality, meaning an increase in Project Maturity level will impact positively on project quality. Furthermore, the results show that Project Quality has a positive correlation with customer satisfaction. Thus, it can be said that Project Management Maturity level has a positive correlation to Project Quality and a hidden correlation to Customer Satisfaction.

Table 4. 15 Correlation between Project Management Maturity and Project success attributes

Spearman Rho		PM_Maturity	Project Quality	Customer Satisfaction	Project Schedule	Project Cost
	PM_Maturity	1.000	0.386	0.118	-0.042	0.196
	Correlation coefficient		0.386	0.118	-0.042	0.196
	Sig. (2 Tailed)		0.047	0.557	0.842	0.393
	N	27	27	27	25	21
	Project Quality	0.386	1.000	0.753	-0.381	-0.239
	Correlation coefficient	0.386	1.000	0.753	-0.381	-0.239
	Sig. (2 Tailed)	0.047	<0.001	0.60	0.297	0.297
	N	27	27	27	25	21
	Customer Satisfaction	0.118	0.753	1.000	-0.245	-0.043
	Correlation coefficient	0.118	0.753	1.000	-0.245	-0.043
	Sig. (2 Tailed)	0.557	<0.001	0.238	0.855	0.855
	N	27	27	27	25	21
	Project Schedule	-0.042	-0.381	-0.245	1.000	0.374
	Correlation coefficient	-0.042	-0.381	-0.245	1.000	0.374
	Sig. (2 Tailed)	0.842	0.060	0.238	0.105	0.105
	N	25	25	25	25	20
	Project Cost	0.196	-0.239	-0.043	0.374	1.000
	Correlation coefficient	0.196	-0.239	-0.043	0.374	1.000
	Sig. (2 Tailed)	0.393	0.297	0.855	0.105	0.105
	N	21	21	21	20	21

## **4.6 Discussion of Findings**

### **4.6.1 Establish the Organization Project Success Criteria and Determine the Performance of The Organization.**

This section discusses the Project Success Criteria that were used on ZESCO projects and were used in this study to come up with responses from the research participants. The success criteria that this study established were Cost, Schedule, Quality and Customer Satisfaction.

The research findings of this study show that ZESCO projects had failures in Cost performance Index (CPI) as well as Schedule performance Index (SPI), the Project teams scored well on Quality and Customer Satisfaction Project Success attributes.

### **4.6.2 Establish the Failure Areas of the Organization Projects and Map the Failure Areas to ProMMM Competence Areas**

In terms of Project Management Maturity scores the ZESCO Project teams had a Low score in Project Management Experience. Experience in ProMMM Maturity Model looks at how the project team utilizes Project Management tools to evaluate both the Project Schedule and Cost implications (Hillson, 2001). A low score in experience is thus consistent with the Project teams' poor scores in CPI and SPI, a low score in Project Management Application helps to verify that the Organization might have a good theory about Project Management but poor practice. The lowest score was a Novice level in Project Application which entail an inconsistent application of Project Management tools. The Organization score an improving Novice score in Culture meaning the Company was beginning to recognize project management not as an overhead. The highest score came from Project Management Processes entailing that formal processes are incorporated in ZESCO quality system.

### **4.6.3 Index and Benchmark the Maturity Level of Organization Project Management**

The Overall Maturity mean score which when translated onto the ProMMM scale was 2.6 shows that the Organization was still experimenting with project management through a small number of individuals who could have Project management knowledge. The Low scores in Experience and Application attributes while having a high score in Culture and Processes is consistent with what has been identified as common combination (Hillson, 2003) which reflects an Organization belief in Project Management and having implemented Project Processes but has a workforce which do not have skills and experience to implement Project Management.

### **4.6.4 Determine the Organization Project Success and Correlate Organization Project Management to Project success**

The study also establishes that there is no relationship between the Project Management Maturity level of ZESCO and Project Success, these findings seem consistent with the findings of a research on Engineering and Construction Industries in Southern Africa (Pretorius et al, 2012). Furthermore, other studies on Project management Maturity's effects on Project performance seem to yield no relationship (Judgev & Thomas, 2002; Mullaly & Thomas, 2010). However, it could be said that this lack of relationship is as a result of inconsistent application of Project Management.

## **4.7 Summary of the Chapter**

This chapter presents the analysis of data that was collected. The objective requirements were successfully completed using descriptive statistics (frequencies) and inferential statistics (Spearman Correlation test). A Spearman correlation value was obtained whose strength suggested the lack of relationship between the variables of Project Management Maturity and Project Success. A significance value obtained in the correlation study helped to judge whether the correlation index was significant enough for the study to accept an alternative hypothesis to the null hypothesis.

## **Chapter 5**

### **Summary, Conclusion and Recommendations**

#### **5.1 Introduction**

This chapter is a representation of the summary of the major findings in the study of the relationship between project management success and project management maturity level. It also addresses the conclusion and recommendations that were arrived at as a result of the study undertaken.

#### **5.2 Summary of Major Findings**

This section presents a summary of the major findings of the study. The study found that ZESCO was still experimenting with Project Management though they had realized the benefits that this discipline can offer, the Organization had put in place documentation for carrying out their project tasks though they were inconsistently using the documents. Further, ZESCO needed to concentrate on the application of project management which would improve their risk, quality, lessons learnt behavior thus project execution and that Project staff lacked experience and skill to apply project management tools which would explain poor performance on the Project Schedule and Cost performance Indices.

The study findings were further organized as below:

##### **5.2.1 Project Schedule Performance Index (SPI)**

ZESCO performed poorly on Schedule Performance Index translating into long Project duration for completion. This is attributed to lack of experience that staff have in using project management tools, thus inability to foresee schedule overshoot.

##### **5.2.2 Project Cost Performance Index (CPI)**

ZESCO performed poorly on Cost Performance Index (CPI) translating into cost overruns on projects under execution. Similar to Schedule, the cost overruns are also an indication

that the project teams had very little experience in using project management tools which play a major role in identifying cost overruns.

### **5.2.3 Project Quality**

The organization performed very well in terms of quality delivery of projects. This performance is consistent with the study findings that an improvement in project management maturity level has a positive effect on project quality.

### **5.2.4 Project Customer Satisfaction**

The Organization performed very well in terms of customer satisfaction as most of the stakeholders were happy with the product. This good performance in customer satisfaction is consistent with the findings that project quality has a positive correlation with customer satisfaction. In the study ZESCO projects performed well on quality and it was expected that customer satisfaction would also have a better score.

### **5.2.5 Project Culture**

The Organization had a Novice score in project culture, this entail that the organization viewed Project Management Processes as additional overheads and that the benefits were not consistent.

### **5.2.6 Project Management Process**

The Organization had an Improving Normalized score, this entail that there were established instructions for doing tasks in the organization. This explains why the organization scored better in product quality.

### **5.2.7 Project Management Experience**

The Organization scored an Improving Novice score in project experience, meaning the organization proved to have project execution to a few individuals who either had or did not have formal project management training. This explains the failure witnessed in the success attributes of cost and schedule.

### **5.2.8 Project Management Application**

The Organization scored a Novice score for Project application, meaning that project team members were inconsistent in the way they used project management tools. This inconsistency would mean a variable project outcome result. The results also indicate inability to assign scheduled risks, a pointer to failure on the cost and schedule attributes of project success.

### **5.2.9 Project Management Maturity**

The overall project management maturity score for ZESCO using the ProMMM scale was an Improved Novice or Level 2, entailing that the organization was trying to move from experimenting with Project Management to being proactive and that a realization of the benefits of this core administration functional area are being seen.

### **5.2.10 Hypothesis Test**

The study hypothesized that an organization with high project management maturity level have a higher level of project success; conversely those with lower project management maturity levels have lower levels of project success. It was deduced from the correlation analysis of the project management maturity level of the organization and project success that there is no relationship between Project Management Maturity Level and Project Success

### **5.3 Conclusion**

Based on the Findings, the study concludes that:

There is no relationship between Project Management Success and the Level of Project management Maturity. Whereas some areas like quality and customer satisfaction might seem to benefit from the higher levels of project management maturity, the overall project success as measured using the attributes of Cost, Time, Quality and Customer Satisfaction do not show a correlation with Project Management Maturity.

### **5.4 Recommendations**

Based on the data gathered and the analysis undertaken, and inferences made, the study recommends that:

- i. ZESCO as an organization is implored to enlighten the workforce on the need for usage of project tools, skills and techniques.
- ii. ZESCO encourages its project team members to consistently use documentation during project execution.
- iii. ZESCO is implored to create a central repository for Projects so as to pass on lessons learnt to other projects.
- iv. ZESCO is implored to assign scheduled risks to Project Team Members

### **5.5 Suggestions for Future Research**

This study brought out issues which were incomprehensible and might require some further insights for the academic world to understand. The study outlines the following suggestion as future research areas:

- i. Further research is needed to determine whether there is an extra competence area that could contribute to the project management maturity of organization.
- ii. A detailed study of the factors affecting personnel not to appreciate the need for project management skills, tools and techniques.

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## **Appendix A: Consent Form**

### **INFORMATION SHEET AND CONSENT FORM-PROJECT MEMBERS OF ZESCO GENERATION, TRANSMISSION AND DISTRIBUTION PROJECTS**

Investigating the effects of project management maturity on project success

Dear Prospective Participant,

Good day, my name is Paul MWANZA and I am conducting a research in partial fulfilment of the award of a Master of Science degree in project management at the University of Cape Town. I am researching the effects that organization Project Management maturity has on project success and would like to invite you to participate in the project.

The purpose of this study is to investigate the effects of project management maturity on Project success in the energy sector in Zambia. Project management maturity arise when an organization moves from one level of project management practice application to another. Project success is the degree to which a project organization achieves the project objectives set at the beginning of the project. The widely publicized objectives of a project are cost to complete the project, time it takes to complete the project, quality of the work done and how satisfied a customer (end user) is. An empirical study involving data collection and analysis will be conducted using a structured questionnaire to which your responses are required.

The data collected from the questionnaire shall be treated with utmost confidentiality and anonymity. As an emphasis to anonymity, no name shall be requested from the participant on the questionnaire. Participation in this study is voluntary and you are at liberty to decline the offer to participate if you so wish. Should you elect to participate and decide to withdraw during the course of study, you are welcome to do so. Should you participate fully in the study, the following benefits and outcomes will be realized: Benchmarking of the organization project maturity level, Identification of the major inadequacy areas of the organization project management, determination of the organization project success degree and finally establishing the relationship between project management levels of practice and how successful the organization is in project execution.

Should you require further information before answering the questionnaire or during the process of answering the questionnaire, you are encouraged to get in touch with the principal researcher. It is the well-meaning intention of the researcher to conduct the study in a careful and thoughtful manner so that data collection, analysis and the final report publication does not cause any perceived or unperceived harm to the participating organization and its members. It is thus encouraged that parties to the study undertake to sign a confidentiality agreement should this be deemed necessary. The researcher undertakes to furnish the participants with findings of the study should this be deemed necessary.

I, Paul MWANZA, undertake to safeguard the data collected from the study, by treating it as confidential and have no reference to participants.

I..... (Print your name), is fully aware of the aim, motivation and purpose of this study and hereby agree/disagree (tick the most appropriate) to participate in the research.

Signed at.....on this..... Day of.....  
Year.....

Researcher: Paul MWANZA Email: [mwnpau004@myuct.ac.za/paulnmwanza@gmail.com](mailto:mwnpau004@myuct.ac.za/paulnmwanza@gmail.com)

Mobile/WhatsApp: +260 977 430096

## Appendix B: Ethics Clearance Form

Application for Approval of Ethics in Research (EIR) Projects  
Faculty of Engineering and the Built Environment, University of Cape Town

### ETHICS APPLICATION FORM





**Please Note:**

Any person planning to undertake research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town is required to complete this form **before** collecting or analysing data. The objective of submitting this application *prior* to embarking on research is to ensure that the highest ethical standards in research, conducted under the auspices of the EBE Faculty, are met. Please ensure that you have read, and understood the **EBE Ethics in Research Handbook** (available from the UCT EBE, Research Ethics website) prior to completing this application form: <http://www.ebe.uct.ac.za/ebe/research/ethics1>

APPLICANT'S DETAILS		
Name of principal researcher, student or external applicant	PAUL MWANZA	
Department	CEM	
Preferred email address of applicant:	Paulnmwanza@gmail.com	
If Student	Your Degree: e.g., MSc, PhD, etc.	MSc in PROJECT MANAGEMENT
	Credit Value of Research: e.g., 60/120/180/360 etc.	60
	Name of Supervisor (if supervised):	A/PROF. ABIMBOLA WINDAPO
If this is a research contract, indicate the source of funding/sponsorship	N/A	
Project Title	INVESTIGATING THE EFFECT OF PROJECT MANAGEMENT MATURITY ON PROJECT SUCCESS	

**I hereby undertake to carry out my research in such a way that:**

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

APPLICATION BY		Full name	Signature	Date
Principal Researcher/ Student/External applicant		PAUL MWANZA		16/04/20
SUPPORTED BY		Full name	Signature	Date
Supervisor (where applicable)		ABIMBOLA WINDAPO		17 Apr 2020
APPROVED BY		Full name	Signature	Date
<b>HOD (or delegated nominee)</b> Final authority for all applicants who have answered NO to all questions in Section 1; and for all Undergraduate research (Including Honours).		Louie Van Schalkwyk		21 April 2020
<b>Chair: Faculty EIR Committee</b> For applicants other than undergraduate students who have answered YES to any of the questions in Section 1.		Louie Van Schalkwyk		21 April 2020

## Appendix C: Research Questionnaire

### QUESTIONNAIRE

#### INVESTIGATING THE EFFECT OF PROJECT MANAGEMENT MATURITY ON PROJECT SUCCESS

Dear Prospective Respondent,

You are hereby invited to participate in a Masters in Project Management research project that investigates the effect of project management maturity on project success. This research has the potential to provide valuable insight into whether a repetitive way of project execution leads to more project success as compared to non-repetitive alternative. Note that this exercise is being done in partial fulfilment of the requirement for the award of a Master of Science Degree (MSc) in Project Management.

The research does not pose any known risks and does not request any sensitive information. Your identity and any information that you shall provide will be protected with unreserved

confidentiality. The questionnaire can be completed in approximately fifteen (15) minutes. All useful comments that will aid the researcher in carrying out the study are welcome.

Should you have any queries or questions for clarification purposes about the study do not hesitate to contact me via email on [mwnpau004@myuct.ac.za](mailto:mwnpau004@myuct.ac.za)

Thank you for your assistance.

Mr. Paul Mwanza  
Principal Researcher

A/Prof Abimbola Windapo  
Supervisor

EACH QUESTION HAS RESPONSES WHICH REQUIRE An (x) MARK IN THE BOXES PROVIDED AGAINST THE QUESTION or a written response in the space provided.

**section a**

Kindly state how many years of experience you have in managing projects (e.g. five (5) years).....?

Have you had any project management training?

- None
- Short course
- Diploma
- Post graduate diploma
- Master's degree or higher

Have you had any project management certification by project management institute or equivalent organization?

- Yes
- No

How many projects have you been involved with at ZESCO? Also name the project/s using the space below.

## **Section B**

Please identify a project you were involved with for ZESCO, which you are conversant with and which was completed within the last five years. Use that project in answering the following questions.

State the type of project/s you undertook.

- Educational
- Residential
- Institutional
- Commercial
- Other Please specify in the space below

Does the organization outline project objectives (e.g. Complete within cost, time, quality etc.) at project initiation? If so state the objectives for the project you were involved with in the space below.

Indicate in months the project planned completion time and the final completion time?

Initial completion time (in months).....

Final completion time (in months).....

Indicate (either in US \$ or Zambian ZMW) the project/s budgeted cost and the project final cost?

Budgeted Cost (US\$/ZMW).....

Project final cost (US\$/ZMW).....

The project product quality

This table is meant to gather information on the quality of the project you were involved with.

**Kindly tick the appropriate box.**

On a scale of 1-5 where 1 is very unsatisfactory and 5= very satisfactory. How satisfactory were the following project characteristics.

		Very unsatisfactory	Unsatisfactory	Neither unsatisfactory nor satisfactory	Satisfactory	Very Satisfactory
9.1	How did the project product fit its purpose?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.2	How was the project product aesthetics?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.3	In relation to reworks how was the project execution?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.4	What was the durability of the project product?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The project customer satisfaction.

This table is meant to gather information on how satisfied the customer (end user) was with the project product. **Kindly tick the appropriate box.** (On a scale of 1-5 where 1=very unsatisfied,2=Unsatisfied, 3=Neither unsatisfied nor satisfied, 4=Satisfied and 5=very satisfied.) How satisfied was the customer with the following project characteristics.

		Very Unsatisfied	Unsatisfied	Neither unsatisfied nor satisfied	Satisfied	Very satisfied
11.1	How satisfied was the customer with the 'easy to use' of project product?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.2	How satisfied was the customer with the product breakdown rate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.3	How satisfied was the customer with 'easy to maintain' of project product?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.4	How satisfied was the customer with service support?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.5	How satisfied was the customer with meeting his target using the project product?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### SECTION C

This section investigates the activities that are performed whilst managing projects.

#### 1. Organization culture

This table is meant to gather information on the organization culture. **Kindly tick the appropriate box.** (On scale of 1-5 where 1 = highly disagree, 2=Disagree, 3=Nether Disagree nor Agree, 4=Agree and 5=highly agree.) What is your level of agreement with the following statements that interrogate the organization culture?

		Highly disagree	Disagree	Neither agree or disagree	Agree	Highly agree
1.1	Project management is critical to business success.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2	The organization sends its project team for further training in project management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3	The organization reward its personnel for good project results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4	The organization has a central repository for project information.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5	The project team socialize after work.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 2. Project management processes

This table is meant to gather information on project management processes undertaken during projects. **Kindly tick the appropriate box.** (On a level 1-5 where 1=Never, 2=Rarely, 3=Occasionally, 4=Frequently and 5=Always.) What is your level of agreement with the following statements that interrogate the organization processes?

		Never	Rarely	Occasionally	Frequently	Always
2.1	The organization created a Project Charter.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.2	The organization had a consultative meeting/s with stakeholders before creating a scope of work statement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3	The organization created a detailed project management plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4	The project team listed the activities that were to be undertaken.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5	The project team estimated the duration of each activity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.6	The project team sequenced the activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.7	The project team identified the resources needed for each activity.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.8	The project team estimated the cost for each activity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.9	The project team followed a change request process for any change on the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.10	The project team followed the project management plan in their work execution.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.11	The project team monitored expenses against activities budget.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.12	The project team monitored time elapsed against activity schedule.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.13	The project team define the quality standard to be followed on the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.14	The project team evaluated project deliverables against the matching defined standards.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.15	The project team informed stakeholders on the project status.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.16	The project team discussed the project success/failures at the close of the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### 3. Principles of project management

This table is meant to gather information on the principles of project management. **Kindly tick the appropriate box.** (On a scale of 1-5 where 1=Never, 2=Rarely, 3=Occasionally, 4=Frequently and 5=Always. What is your level of agreement with the following statements?

		Never	Rarely	Occasionally	<input type="checkbox"/> Frequently	Always
3.1	The project team created the vision and mission statement of the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2	The project team outlined the reason for the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3	The project team outlined who was to be part of the project team.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4	The project team outlined the frequency of meetings.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.5	The project team had a designated scribe.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.6	The project team had a method of determining cause of activity failure on the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.7	The project team had a method of intervention on the activity failures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.8	The project team organized trainings for end users.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.9	The project team outlined how often communication between stakeholders would be.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.10	The project team maintained a scorecard for the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Practical skills and techniques of project management

This table is meant to gather information on project techniques. **Kindly tick the appropriate box.** (On a scale of 1-5 where 1=Never, 2=Rarely, 3=Occasionally, 4=Frequently and 5=Always.) What is your level of agreement with the following statements?

	Never	Rarely	Occasionally	Frequently	Always
4.1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 5. Project management tools

This table is meant to gather information on project management tools used by the project team. **Kindly tick the appropriate box.** (On a scale of 1-5 where 1=Never, 2=Rarely, 3=Occasionally, 4=Frequently and 5=Always.)

What is your level of satisfaction with the following statements?

	Never	Rarely	Occasionally	Frequently	Always
5.1 The project team used Microsoft project for evaluating project progress.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.2 The project team used an equivalent software to MS Project for evaluating project progress.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.3 The project management team used MS project to evaluate project cost.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.4 The project team used an equivalent software to MS project for evaluating project cost.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.5 The project team used corporate messenger for communication during the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.6 The project team used an alternative communication package during the project.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 6. Application of project management processes.

This table is meant to gather information on project management process application. **Kindly tick the appropriate box.** What is your level of Agreement with the following statements?

		Yes	No
6.1	The project team conducted a closeout meeting.	<input type="checkbox"/>	<input type="checkbox"/>
6.2	The project team developed lessons learnt from the project.	<input type="checkbox"/>	<input type="checkbox"/>
6.3	The project team archived project documents and artifacts.	<input type="checkbox"/>	<input type="checkbox"/>
6.4	The project team developed a closeout report.	<input type="checkbox"/>	<input type="checkbox"/>
6.5	The project team conducted a risk assessment.	<input type="checkbox"/>	<input type="checkbox"/>
6.6	The project team performed a qualitative risk analysis.	<input type="checkbox"/>	<input type="checkbox"/>
6.7	The project team performed a quantitative risk analysis.	<input type="checkbox"/>	<input type="checkbox"/>
6.8	The project team developed a risk log.	<input type="checkbox"/>	<input type="checkbox"/>
6.9	The project team developed a risk response plan.	<input type="checkbox"/>	<input type="checkbox"/>
6.10	The project team assigned schedule (Time) risk to a team member.	<input type="checkbox"/>	<input type="checkbox"/>

6.11 The project team assigned quality risk to a team member.

6.12 The project team measured activity performance against set standards.

## Appendix D: Questionnaire Reliability Testing

### Reliability

#### Scale: Quality\_alpha

#### Case Processing Summary

		N	%
Cases	Valid	25	92.6
	Excluded <sup>a</sup>	2	7.4
	Total	27	100.0

a. Listwise deletion based on all variables in the procedure.

### Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.712	.722	4

### Inter-Item Correlation Matrix

	Project_Quality1	Project_Quality2	Project_Quality3	Project_Quality4
Project_Quality1	1.000	.260	.510	.204
Project_Quality2	.260	1.000	.528	.505
Project_Quality3	.510	.528	1.000	.357
Project_Quality4	.204	.505	.357	1.000

### Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.390	4.040	4.800	.760	1.188	.099	4

### Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Project_Quality1	12.76	2.523	.437	.261	.697
Project_Quality2	13.24	1.857	.589	.394	.592
Project_Quality3	13.52	1.343	.619	.433	.596
Project_Quality4	13.16	2.307	.461	.267	.676

### Scale: Customer Satisfaction\_alpha

#### Case Processing Summary

		N	%
Cases	Valid	25	92.6
	Excluded <sup>a</sup>	2	7.4
	Total	27	100.0

a. Listwise deletion based on all variables in the procedure.

### Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.799	.811	5

### Inter-Item Correlation Matrix

	Satisfaction n1	Satisfaction n2	Satisfaction n3	Satisfaction n4	Satisfaction n5
Satisfaction n1	1.000	.378	.379	.535	.528
Satisfaction n2	.378	1.000	.644	.370	.327
Satisfaction n3	.379	.644	1.000	.588	.360
Satisfaction n4	.535	.370	.588	1.000	.509
Satisfaction n5	.528	.327	.360	.509	1.000

### Summary Item Statistics

Item	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	4.208	3.960	4.400	.440	1.111	.030	5

### Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Satisfactio n1	16.64	7.073	.607	.396	.755
Satisfactio n2	16.80	7.750	.523	.446	.781
Satisfactio n3	16.72	7.293	.631	.557	.753
Satisfactio n4	17.08	5.660	.662	.502	.738
Satisfactio n5	16.92	6.243	.564	.357	.773

### Scale: Skills\_alpha

#### Case Processing Summary

		N	%
Case	Valid	26	96.3
s	Exclude d <sup>a</sup>	1	3.7
	Total	27	100.0

a. Listwise deletion based on all variables in the procedure.

### Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.806	.799	6

### Inter-Item Correlation Matrix

	Skills1	Skills2	Skills3	Skills4	Skills5	Skills6
Skills1	1.000	-.039	.233	.208	.363	.086
Skills2	-.039	1.000	.494	.711	.401	.475
Skills3	.233	.494	1.000	.451	.527	.364
Skills4	.208	.711	.451	1.000	.415	.639
Skills5	.363	.401	.527	.415	1.000	.658
Skills6	.086	.475	.364	.639	.658	1.000

### Summary Item Statistics

Item	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.814	2.231	3.654	1.423	1.638	.294	6

### Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Skills 1	13.23	21.225	.223	.333	.837
Skills 2	14.23	16.665	.582	.615	.772
Skills 3	13.81	16.642	.585	.396	.771
Skills 4	14.62	16.486	.695	.694	.746
Skills 5	13.88	15.546	.665	.629	.750
Skills 6	14.65	17.435	.641	.650	.760

### Scale: Tools\_alpha

#### Case Processing Summary

		N	%
Case s	Valid	26	96.3
	Exclude d <sup>a</sup>	1	3.7
	Total	27	100.0

a. Listwise deletion based on all variables in the procedure.

## Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.722	.730	6

## Item Statistics

	Mean	Std. Deviation	N
Tools1	4.12	1.243	26
Tools2	2.38	1.267	26
Tools3	2.85	1.567	26
Tools4	2.54	1.303	26
Tools5	2.54	1.606	26
Tools6	3.15	1.223	26

## Inter-Item Correlation Matrix

	Tools1	Tools2	Tools3	Tools4	Tools5	Tools6
Tools1	1.000	.199	.564	.429	.248	.409
Tools2	.199	1.000	.253	.402	.346	.373
Tools3	.564	.253	1.000	.375	.448	.117
Tools4	.429	.402	.375	1.000	.162	.548
Tools5	.248	.346	.448	.162	1.000	-.207
Tools6	.409	.373	.117	.548	-.207	1.000

### Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	2.929	2.385	4.115	1.731	1.726	.413
Inter-Item Correlations	.311	-.207	.564	.771	-2.726	.036

### Summary Item Statistics

	N of Items
Item Means	6
Inter-Item Correlations	6

### Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Tools1	13.46	20.578	.572	.465	.653
Tools2	15.19	21.442	.471	.356	.680
Tools3	14.73	18.685	.549	.445	.653
Tools4	15.04	20.198	.570	.432	.651
Tools5	15.04	21.478	.303	.426	.738
Tools6	14.42	23.294	.321	.544	.720

### Scale Statistics

	Variance	Std. Deviation	N of Items
Mean	28.574	5.345	6

### Scale: Principles\_alpha

#### Case Processing Summary

		N	%
Cases	Valid	24	88.9
	Excluded <sup>a</sup>	3	11.1
	Total	27	100.0

a. Listwise deletion based on all variables in the procedure.

### Reliability Statistics

	Cronbach's Alpha	Based on Standardized Items	N of Items
Cronbach's Alpha	.733	.731	9

### Item Statistics

	Mean	Std. Deviation	N
Principles 2	4.58	.654	24
Principles 3	4.21	.977	24
Principles 4	4.38	1.013	24

Principles 5	3.92	1.213	24
Principles 6	3.33	1.129	24
Principles 7	3.75	.737	24
Principles 8	3.92	1.248	24
Principles 9	4.04	1.083	24
Principles 10	2.88	1.361	24

### Inter-Item Correlation Matrix

	Principles 2	Principles 3	Principles 4	Principles 5	Principles 6	Principles 7	Principles 8
Principles 2	1.000	.210	.049	-.046	.314	.225	.062
Principles 3	.210	1.000	.049	-.058	-.184	-.287	-.235
Principles 4	.049	.049	1.000	.734	.456	.422	.507
Principles 5	-.046	-.058	.734	1.000	.497	.365	.397
Principles 6	.314	-.184	.456	.497	1.000	.574	.298
Principles 7	.225	-.287	.422	.365	.574	1.000	.307
Principles 8	.062	-.235	.507	.397	.298	.307	1.000
Principles 9	.210	-.214	.461	.268	.237	.395	.292

Principles 10	.232	-.176	.319	.230	.566	.271	.122
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### Inter-Item Correlation Matrix

	Principles 9	Principles 10
Principles 2	.210	.232
Principles 3	-.214	-.176
Principles 4	.461	.319
Principles 5	.268	.230
Principles 6	.237	.566
Principles 7	.395	.271
Principles 8	.292	.122
Principles 9	1.000	.476
Principles 10	.476	1.000

### Summary Item Statistics

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance
Item Means	3.889	2.875	4.583	1.708	1.594	.275
Inter-Item Correlations	.232	-.287	.734	1.021	-2.560	.063

### Summary Item Statistics

	N	of
	Items	
Item Means	9	
Inter-Item	9	
Correlations		

### Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Principles 2	30.42	27.297	.257	.321	.730
Principles 3	30.79	30.607	-.193	.368	.795
Principles 4	30.63	21.636	.723	.706	.654
Principles 5	31.08	21.732	.555	.606	.679
Principles 6	31.67	21.623	.626	.657	.667
Principles 7	31.25	25.152	.512	.480	.700
Principles 8	31.08	23.297	.384	.353	.715
Principles 9	30.96	23.346	.474	.488	.697
Principles 10	32.13	21.940	.446	.508	.704

### Scale Statistics

	Variance	Std. Deviation	N of Items
Mean	29.478	5.429	9

### Scale: Processes\_alpha

#### Case Processing Summary

Case		N	%
s	Valid	24	88.9
	Excluded <sup>a</sup>	3	11.1
	Total	27	100.0

a. Listwise deletion based on all variables in the procedure.

### Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.884	.905	16

### Inter-Item Correlation Matrix

	Processes 1	Processes 2	Processes 3	Processes 4	Processes 5	Processes 6
Processes1	1.000	.332	.417	.344	.389	.100
Processes2	.332	1.000	.552	.654	.523	.493
Processes3	.417	.552	1.000	.719	.648	.525
Processes4	.344	.654	.719	1.000	.753	.784
Processes5	.389	.523	.648	.753	1.000	.597
Processes6	.100	.493	.525	.784	.597	1.000

Processes7	.183	.564	.459	.733	.643	.792
Processes8	.116	.149	.209	.282	.344	.371
Processes9	-.056	.387	.396	.584	.353	.701
Processes10	.023	.276	.421	.605	.541	.601
Processes11	-.016	.403	.274	.413	.409	.331
Processes12	.070	.322	.396	.648	.533	.624
Processes13	-.112	.429	.482	.550	.440	.682
Processes14	.028	.485	.560	.583	.433	.638
Processes15	.040	.067	.118	.075	.057	.046
Processes16	.035	-.005	.223	.102	.148	.019

### Inter-Item Correlation Matrix

	Processes7	Processes8	Processes9	Processes10	Processes11	Processes12
Processes1	.183	.116	-.056	.023	-.016	.070
Processes2	.564	.149	.387	.276	.403	.322
Processes3	.459	.209	.396	.421	.274	.396
Processes4	.733	.282	.584	.605	.413	.648
Processes5	.643	.344	.353	.541	.409	.533
Processes6	.792	.371	.701	.601	.331	.624
Processes7	1.000	.586	.710	.622	.518	.606
Processes8	.586	1.000	.448	.351	.659	.518
Processes9	.710	.448	1.000	.538	.458	.631
Processes10	.622	.351	.538	1.000	.459	.652

Processes1 1	.518	.659	.458	.459	1.000	.721
Processes1 2	.606	.518	.631	.652	.721	1.000
Processes1 3	.536	.176	.625	.563	.330	.621
Processes1 4	.549	.388	.716	.485	.547	.763
Processes1 5	-.098	-.160	.187	-.114	-.125	.041
Processes1 6	-.093	.109	.239	-.162	-.155	-.028

### Inter-Item Correlation Matrix

	Processes1 3	Processes1 4	Processes1 5	Processes1 6
Processes1	-.112	.028	.040	.035
Processes2	.429	.485	.067	-.005
Processes3	.482	.560	.118	.223
Processes4	.550	.583	.075	.102
Processes5	.440	.433	.057	.148
Processes6	.682	.638	.046	.019
Processes7	.536	.549	-.098	-.093
Processes8	.176	.388	-.160	.109
Processes9	.625	.716	.187	.239
Processes1 0	.563	.485	-.114	-.162
Processes1 1	.330	.547	-.125	-.155
Processes1 2	.621	.763	.041	-.028

Processes1 3	1.000	.826	.167	.174
Processes1 4	.826	1.000	.302	.259
Processes1 5	.167	.302	1.000	.627
Processes1 6	.174	.259	.627	1.000

### Summary Item Statistics

Item	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Means	4.109	3.458	4.375	.917	1.265	.072	16

### Item-Total Statistics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Processes1	62.29	60.650	.185	.532	.897
Processes2	61.54	56.694	.584	.710	.875
Processes3	61.88	54.810	.680	.732	.870
Processes4	61.42	56.080	.824	.905	.867
Processes5	61.38	58.592	.716	.795	.873
Processes6	61.38	56.766	.744	.853	.870
Processes7	61.50	57.217	.740	.903	.870
Processes8	61.75	60.109	.459	.858	.880
Processes9	61.54	55.129	.711	.824	.869
Processes10	61.79	58.172	.568	.669	.876
Processes11	61.63	57.636	.497	.846	.878

Processes1 2	61.58	57.819	.724	.884	.872
Processes1 3	61.46	57.129	.665	.848	.872
Processes1 4	61.63	54.505	.797	.904	.866
Processes1 5	61.38	62.418	.164	.615	.891
Processes1 6	62.13	60.810	.157	.839	.900

**Appendix E: Project Maturity against Project success areas correlation**

**Correlations (Project maturity against Project Success Areas)**

			PM_Matu rity	PM_Qua lity	PM_Satisfac tion	Project_Sch edule	Project_C ost
Spearman's rho	PM_Maturity	Correlation Coefficient	1.000	.386*	.118	-.042	.196
		Sig. (2-tailed)	.	.047	.557	.842	.393
		N	27	27	27	25	21
	PM_Quality	Correlation Coefficient	.386*	1.000	.753**	-.381	-.239
		Sig. (2-tailed)	.047	.	<.001	.060	.297
		N	27	27	27	25	21
	PM_Satisfac tion	Correlation Coefficient	.118	.753**	1.000	-.245	-.043
		Sig. (2-tailed)	.557	<.001	.	.238	.854
		N	27	27	27	25	21
	Project_Sched ule	Correlation Coefficient	-.042	-.381	-.245	1.000	.374
		Sig. (2-tailed)	.842	.060	.238	.	.105
		N	25	25	25	25	20

Project_Cost	Correlation Coefficient	.196	-.239	-.043	.374	1.000
	Sig. (2-tailed)	.393	.297	.854	.105	.
	N	21	21	21	20	21

\*. Correlation is significant at the 0.05 level (2-tailed).

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

## Appendix F: Google Form Link

<https://docs.google.com/forms/d/1M1d-26oR5csHxmWIwunDKzbrAiw6dw4zMx046wtCsQk/edit>

## Appendix G: Introductory letter to ZESCO Management



Department of Construction Economics and Management

A/Professor Abimbola Windapo

University of Cape Town, Private Bag X3, Rondebosch 7701  
Room 5.17, Snape Building, Engineering Mall, Upper Campus  
Tel: +27 (0) 21 650 3443 Fax: +27 (0) 21 689 7564

Internet: <http://www.cons.uct.ac.za>  
Email: [CON-cem@uct.ac.za](mailto:CON-cem@uct.ac.za)

28 April 2020

The Senior Manager,  
Human Resource Development,  
ZESCO Limited.  
P.O Box 33304  
Lusaka-Zambia.

Dear Sir/Madam,

### REQUEST FOR PERMISSION TO CONDUCT RESEARCH-PAUL MWANZA

Mr. Paul MWANZA student number MWNPAU004 is a bonafide student of the University of Cape Town in the department of Construction Economics and Management (CEM). He is currently pursuing his MSc in project management. In partial fulfilment for the award of the MSc Degree, he is required to conduct research on project management maturity and their effects on project success. The main objectives of the study are to establish the organization project success criteria and determine the performance of organization projects, establish the failure areas of the organization projects, index and benchmark the organization project management maturity level and to investigate the relationship between project management maturity and project success. The research does not pose any known risks and does not request any sensitive information.

Permission is being sought from your organization to allow the researcher to conduct this study through a questionnaire to employees in generation, transmission and distribution for primary data output and to obtain secondary information to corroborate the questionnaire data from your corporate project office.

Should you require further information on the research, do not hesitate to get in touch with the researcher via email at [mwnpau004@myuct.ac.za](mailto:mwnpau004@myuct.ac.za). It is the well-meaning intention of UCT that the study is conducted carefully and thoughtfully so that data collection, analysis and the final report publication does not cause any perceived or unperceived harm to the participating organization and its members.

Your support of the researcher will be highly appreciated.

Yours Faithfully,

A handwritten signature in blue ink that reads "Abimbola Windapo". The signature is fluid and cursive, with a long horizontal stroke at the end.

**Abimbola Windapo (PhD)**

*Associate Professor*

Research Supervisor

E-mail address: [Abimbola.Windapo@uct.ac.za](mailto:Abimbola.Windapo@uct.ac.za)

## **Appendix H: Permission Granting (Subject to appendix G)**



Powering the Nation & the Region

**Ref:** A200/HRD/15461/1281/2020

25 September 2020

Mr Paul Mwanza  
C/O ZESCO Limited  
Lusiwasi Small Hydro Power Station  
**SERENJE**

Dear Mr Mwanza

**REQUEST TO CONDUCT RESEARCH – MR PAUL MWANZA**

Reference is made to the letter dated 28<sup>th</sup> April, 2020, wherein you requested ZESCO Management to grant you permission to carry out a research project entitled **"Project Maturity and their Effects on Project Success"**.

This serves to inform you that permission has been granted to you to undertake the above mentioned research under the following terms and conditions:

1. That all information regarding the research project should be handled with all the confidentiality it deserves and shall be used for academic purposes only.
2. The final report should be availed to the office of the undersigned before submission to your school for a go ahead in writing.
3. A copy of the final report shall be retained by ZESCO Limited for future reference.
4. You are only permitted to carry out your research project under the following departments:

NO	DIRECTORATE	DEPARTMENT
1.	Generation	Generation Support Services
2	Transmission	Transmission Projects – North
3.	Distribution	Southern Division



All correspondence to be addressed to the Managing Director  
ZESCO Limited, Stand No. 6949 Great East Road, P.O. Box 33304, Lusaka-Zambia  
Tel: +260 211 261111 E-mail: zesco@zesco.co.zm

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25 September 2020

Mr Paul Mwanza  
C/O ZESCO Limited  
Lusiwasi Small Hydro Power Station  
**SERENJE**

**REQUEST TO CONDUCT RESEARCH – MR PAUL MWANZA**

Please fill in the attached form to indicate whether or not you are agreeable to these Terms and Conditions and return a copy to the office of the undersigned.

Yours sincerely  
**ZESCO LIMITED**



**CHILESHE M LUPUTA (MRS)**  
**SENIOR MANAGER – HUMAN RESOURCE DEVELOPMENT**

**CC:** Director – Human Resource  
Director – Generation  
Senior Manager – Generation Support Services  
Power Station Manager – Small Hydros Power Station  
Senior Manager – Transmission Projects, North  
Divisional Manager – Southern Division  
Human Resource Manager – Generation  
Human Resource Manager – Transmission  
Human Resource Manager – Southern Division  
Personal File  
Training File

CML/fs

25 September 2020

Mr Paul Mwanza  
C/O ZESCO Limited  
Lusiwasi Small Hydro Power Station  
**SERENJE**

**REQUEST TO CONDUCT RESEARCH – MR PAUL MWANZA**

I Paul Mwanza ..... \*agree/do not agree, to the above Terms  
and Conditions. Phone No: 0977 430296 .....

Signature: [Signature] ..... Date: 10/10/2020 .....

**\*Delete that which is not applicable.**

Witness: Milimo MALAMBO ..... Phone No: 0976 076149 .....

Date: 9/10/2020 [Signature] .....

