



PROJECT MANAGEMENT APPLICATION IN ACADEMIC AND RESEARCH INSTITUTIONS IN TANZANIA

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Abstract: The management of research and development is very important for organizations as it is the vehicle for creating new products and services and securing a steady stream of future revenue. Unfortunately, many of the challenges that research projects face can lead to poor performance. According to studies, project management techniques can be used to improve the efficiency and productivity of research projects. In Tanzania, it is not clear if there are any project management techniques being utilized by the country's research institutions. The objective of this study was to find out if the project management techniques were being used by the country's research and academic institutions. Through a combination of quantitative and qualitative methods, the study was able to analyze the extent to which project management techniques were being utilized by the various institutions in the country. The results of the study revealed that most of the respondents identified the weaknesses in the project management frameworks used by the various research institutions in the country. The study suggested that the country's research institutions should develop a comprehensive research agenda and implement project management policies and guidelines to improve the efficiency and productivity of their projects. It also suggested that the government should provide adequate funding for research.

Index Terms - Research project, research organization, innovation, project management, monitoring and evaluation

I. INTRODUCTION

INTRODUCTION

The goal of research and development is to create new opportunities and improve the efficiency of organizations. This process requires proper management and is often carried out in a way that is beneficial to both the economy and the people who are involved in it. According to the Endogenous growth theory, an economy can benefit from the discoveries made by its members by investing in new knowledge. According to Basu, in 2015, research projects are unpredictable and require proper management. This is because they can go wrong and experience scope changes. In addition, many of these projects may not have clear goals.

In order to effectively implement research projects, management techniques should be adapted to them. Doing so will ensure that the quality of the work is maintained. This also means that the project's cost and scope should be balanced. Implementing a project can be significantly constrained by various factors. This can prevent it from achieving its objectives. It is therefore important that proper management and identification of these constraints are carried out. A lookahead schedule is also established to ensure that the project is on track.

In order to ensure that the project is successfully implemented, it is also important that the various activities are monitored and controlled. The activities of a project can help the team members and the institution evaluate the project's performance. According to the PMI, project management is a process that involves the use of knowledge, techniques, and tools to carry out activities related to a project. It is usually focused on achieving a set of goals and delivering a finished product. For many organizations, project management is a vital part of their operations as it can help them deliver a product or service that is of high quality. Unfortunately, according to a study conducted by Gray & Larson, many organizations do not use project management effectively. This is because they do not follow the

best practices and only replicate them. Project management ultimately has three functions; planning, executing and controlling (Gray & Larson, 2018).

STATEMENT OF THE PROBLEM

A report released by the Tanzania Manufacturers Association in 2017 indicated that the country's exports have outpaced its imports. This indicates that the country does not have the necessary capacity to effectively utilize its natural resources. This can be improved by having a strong academic performance, which can lead to industry-academia collaboration. In addition, the country's various sector interventions were being carried out without a coordinated and standardized policy framework.

Aim of the Study

The objective of the study was to find out how many research and academic institutions in Tanzania use project management techniques to carry out their studies. It was revealed that there was a lack of information on the extent to how these techniques were used. The main aim of the study was to determine whether research organizations in Tanzania were using project management techniques in managing research projects in order to improve performance of these research projects.

Objectives

The study aim was achieved by satisfying the following objectives:

- i. Establishing the level of project management knowledge among researchers and academicians;
- ii. Determining the extent of application of project management techniques in research and academic institutions;
- iii. Ascertaining how the research management frameworks in research and academic Institutions were performing; and
- iv. Identifying the potential impediments to the successful performance of research projects in Tanzania.

Literature Review

Overview of Project Management

According to literature, project management has a long history. It can be traced back to the earliest humans. It enables people to plan and manage large projects, as well as handle various materials and labour requirements within a specific time frame. The Institute for Project Management defines a project as a temporary undertaking that aims to produce an exceptional result or service. Projects should ideally have characteristics that set them apart from other endeavours. The goal of project management is to ensure that the quality of the project is maintained while also balancing the various demands placed on it. One of the most critical factors that project management considers when it comes to managing a project is the quality of the work that it produces.

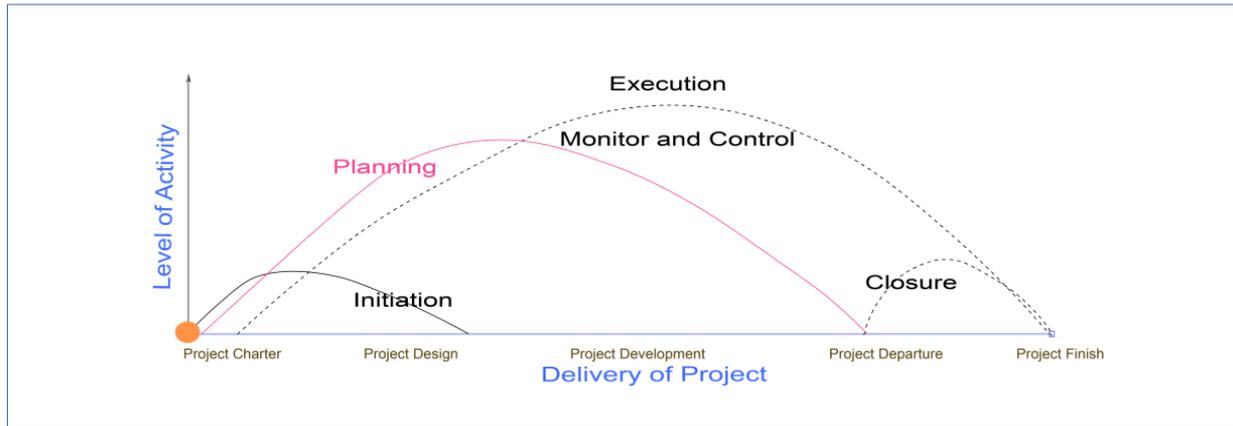


Figure 1: Project Management Triple Constraints

Although time is usually the main factor that prevents companies from achieving success, the funding environment for research and academic institutions can also limit the scope and quality of projects. In many cases, the lack of proper balance between the cost, scope, and time constraints has compromised the quality of these projects. In 2011, Barron and Barron explained that every project has four phases. The first one is the planning phase, followed by the execution phase, and then the closure phase. The middle period of the project is when activities move the project closer to its end. These are referred to as the project life cycle and represent the path that a project takes from its inception to its completion.

According to Larson and Gray (2018), the project life cycle can help illustrate the unique characteristics of work. Some project managers utilize it as their starting point when it comes to planning and managing projects. The goal of this process is to predict the changes in

the project's level of effort and to track its progress throughout its life. The start point of a project is usually marked when the necessary approval has been obtained. The various models used for project lifecycles vary depending on the industry. For instance, the model used for construction projects is different from that used for other industries



The first stage of a project is called "Defining." This stage involves drawing up a project's goals and procedures. The Defining stage also involves establishing the project's objectives and establishing teams. The next step in the project's development is called "Executing." This stage involves coming up with a plan and a budget. During the planning phase, the team members develop a strategy and a schedule to ensure that the project will be carried out successfully. Some of the major tasks that are performed during this phase include the production of physical products, such as bridges and reports, as well as the development of software programs and other related materials. Various factors such as the budget allocation and meeting the specifications are also taken into account to ensure that the project is on track.

Forecasting the various parameters and the necessary changes and revisions is essential during this phase. The "closing" phase, which is typically the process of transferring the finished product to the customer, is also carried out. Other tasks include reviewing the project and redeploying the resources. The project life cycle is a process that project teams use to time their activities throughout the entire project's development. In 2011, Barron and Company explained that the planning for resources and the quality aspects of a project can be carried out during the defining stage. However, the latter is usually planned for later stages of the project life cycle. In 2018, Larson and Gray noted that due to the varying tasks and activities that an organization has to perform, it is important that the planning and management of these projects are carried out properly. The various technical subjects that are related to project management, such as knowledge areas and process groups, are crucial. These include the inputs, tools, and outputs that bring a project to life. The Institute for Project Management has created a standard that provides practitioners with the necessary resources and knowledge to effectively manage projects.

The PMBOK Guide has been approved by both the American National Standards Institute and the IEEE. The institute claims that a significant portion of the knowledge related to project management is unique to this field. Although the above-mentioned best practices can be applied to effectively manage projects, it is still not enough to just understand them. Johnson claims that project managers need to possess varying levels of management skills to be successful. According to Taylor, research is a personal activity that is heavily dependent on the imagination and ideas of individuals. It does not lend itself to the management or control of projects. In today's competitive environment, where universities are constantly looking for ways to improve their student outcomes, there are still constraints that need to be addressed through the development of a management framework. Barron and Barron (2011) summarise the foregoing in Table 1.

Table 1: Project Management Areas of Expertise

Areas of Expertise
Application knowledge, standard and regulations
Understanding the project environment
Management knowledge and skills
Interpersonal skills

A project's success can be ensured by having a variety of models that it can adopt. Several essential processes should be present in every model, according to an Oxford Academy study. These include planning, monitoring, controlling, and closing. There are about 47 distinct project management processes that are categorized into five groups. These processes can produce one or more outputs depending on the inputs they use. The project processes can be categorized into ten knowledge areas, which are collections of concepts and procedures with a common goal.

1. Integration – Coordinates activities across all project management areas and process groups;
2. Scope – Ensures that the project work includes all elements required to complete the work;
3. Schedule – Ensures that the project work is completed in a timely way;
4. Cost – Plans, estimates, manages and controls project finances;
5. Quality – Ensures that the project delivers a quality output that is fit for purpose;
6. Human Resource – Secures, manages and monitors use of human resources throughout the project;
7. Communications – Ensures that communications on the project are planned and carried out appropriately;
8. Risk – Identifies, assesses and manages risk;
9. Procurement - Carries out purchasing and contracting as required; and
10. Stakeholder – Identifies and engages stakeholders throughout the project.

The concept of process groups refers to the chronological progression of a project, while knowledge areas are the areas that are continuously added to the project throughout its various phases. According to Hartney, in 2016, the knowledge areas and process groups are collections of procedures and techniques that can be utilized to ensure success. Project management systems can be designed to meet the needs of different types of organizations. These include systems that are designed to manage complex projects and workflows.

1. Waterfall Project Management - This is similar to traditional project management but includes the caveat that each task needs to be completed before the next one starts. The steps in this type are linear and progress flows in one direction (LaBarre, 2019).
2. Agile Project Management - This is best suited for incremental and iterative projects and usually involves processes with demands and solutions evolving through the collaborative effort of self-organizing and cross-functional teams and their customers (Muslihat, 2018).
3. Lean Project Management - This methodology aims to avoid waste and borrows heavily from the Japanese manufacturing practices. The main thrust of this method is creating more value for customers with fewer resources (LaBarre, 2019).
4. Scrum Project Management - The main goal for scrum project management is developing, delivering, and sustaining complex outputs through collaborative, accountable, and iterative progress and is best suited for projects teams of less than seven members who require a flexible approach to delivering a product or service (Muslihat, 2018).
5. Kanban Project Management - This is a visual method that uses the agile framework and aims to deliver high quality results by depicting the workflow process so that bottlenecks could be identified early on in the development process. It is ideal for lean project teams that require a flexible approach to delivering the output and is best suited for personal productivity purposes (Muslihat, 2018).
6. Six Sigma Project Management - This method aims to improve quality by reducing the number of errors in a process by identifying what may not be working and then removing it from the process. The method employs empirical and statistical quality management methods, and expertise of people who are specialists in these methods. The method is best suited for larger companies and organizations that aim to improve quality and efficiency through a data-driven methodology (Muslihat, 2018).
7. Project Management Body of Knowledge (PMBOK) – This is a set of standards terminology and guidelines for project management and not a methodology per se. PMBOK gives five process groups (initiating, planning, executing, monitoring & control, and closing) that are prevalent in almost every project (PMI, 2018). Besides the ones listed above, there are many other types of project managements systems and methodologies.

Application of Project Management Techniques to Research Projects

The emergence of new knowledge generation methods has led to the need for academic research to develop effective project management strategies. These techniques can help improve the efficiency of their projects by combining with the knowledge areas and project management processes. According to Johnson, project management emerged from engineering practice. It has since been applied to various fields. In 2015, Thuiller and Riol conducted a study to find out if academic research projects could be managed using the PM

principles. The findings indicated that these projects are generally compatible with the cultural and structural aspects of project management.

Despite the various advantages of project management, it does not address the uncertainties and human factors that are involved in conducting research. Through their study, Riol and Thuiller were able to create a framework that enables academic research organizations to implement project management in their projects.

The findings of the study were significant as they demonstrated that project management can be used effectively by academic research organizations to improve the efficiency of their projects. This is because research plays a vital role in the country's innovation and economic development. Research results have a significant impact on an institution's prestige and, in turn, attract more funding for their studies from external and internal sources. As a result, today's leading organizations are more committed to investing in R&D to maintain their market share. In 2016, a dialogue organized by the Academy of Science in South Africa revealed that the country has various scientific research facilities. However, the private sectors and the public sectors are not always able to work together seamlessly.

In a report released in 2017, the chief executive officer of the country's Manufacturers Association noted that the country's reliance on copper exports has once again highlighted the need for value addition in local raw materials. This call for the country to rely on manufacturing to achieve sustainable growth also highlighted the need for efficient and effective R&D. In Tanzania, there is immense potential for academic research to be utilized by industry to boost the country's economic development. Unfortunately, the relationship between the research community and the industry may not be able to flourish due to various factors. One of these is the lack of confidence in the capacity of the institutions to deliver effective and efficient research.

Through the collaboration between academia and industry, the country can potentially benefit from the knowledge gained through the joint development of new products and technologies. This new knowledge could help improve the efficiency of the country's manufacturing industry and increase its export revenue. One of the most important factors that academic research institutions should consider when it comes to conducting their studies is the proper management of the process. This can be done through the use of project management techniques.

Methodology

Research Design

The goal of this study was to find out if researchers and institutions in Tanzania are using project management methods to implement their work. Descriptive research is a type of research that involves describing and observing the behavior of a sample without trying to influence it. The study, however, did not focus on the specific methods or techniques that academic institutions use to implement their projects. Instead, it was focused on the behavior of the sample.

Target Population and Sample Size

Out of the 50 individuals who were targeted for the study, 42 of them were from universities and other research institutions. The individuals who were selected for the study were chosen based on their relevance to the issue and the time frame of the study. Before the participants were allowed to answer the questionnaires, consent was obtained from all of them. According to Mosco, a minimum of 30 individuals should be considered sufficient. The study also conducted interviews with ten researchers to gather their opinions on the findings.

Sampling Methods

The procedure utilized for sampling was the purposive sampling method. This type of sampling is commonly used because it is very convenient and easy to carry out. According to Schindler & Cooper, this method was preferred due to its fast and inexpensive nature. Repertory samples were selected to obtain more scientific data that can be used to study the entire population. The list of participating institutions was drawn based on their specializations. Through purposive sampling, the researchers were able to identify the individuals who would be the ideal sources for their study.

Data Collection

The two main methods used for collecting the data were the structured interviews and the questionnaire surveys. These two methods were chosen because they are both easy to administer and can be distributed at the same time. In addition, the self-administered surveys provided the participants with an opportunity to explain the study's objectives. In addition, the consent forms for the surveys were made available to the individuals who signed them to ensure that they were not coerced into participating. This method helped minimize the pressure on the participants. The surveys were divided into four sections. The first one sought to gather information about the participants. The data collected from this section was then used to profile the individuals who were involved in the study. The information collected from this section helped the researchers confirm the quality of the data they gathered. Section B also asked the participants about the academic and research organizations they worked for. The questions in this section were focused on the policies and procedures that were used by the participating institutions.

The section C of the survey focused on the project management procedures and techniques that the researchers used. The questions in this area were also related to the knowledge areas of integration within this discipline. In Section D, the researchers focused on the evaluation and monitoring of research projects. Through the 10 interviews that were conducted in this section, the researchers confirmed the results of the questionnaires. The interviews were conducted with individuals from various organizations such as government ministries and academic institutions. The guide included four sections.

Section A - personal information about the interviewee;

Section B - managing research projects in research and academic institutions;

Section C - implementation of project management techniques in research management;

and

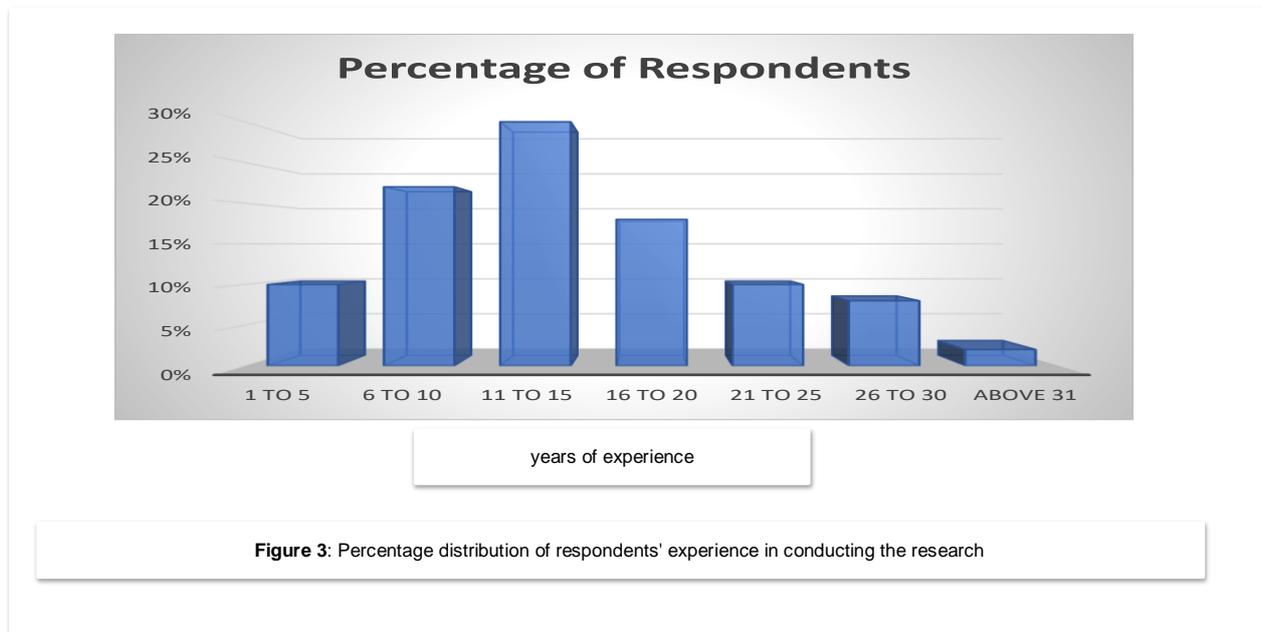
Section D - monitoring and evaluation of research projects

Methods of Data Analysis

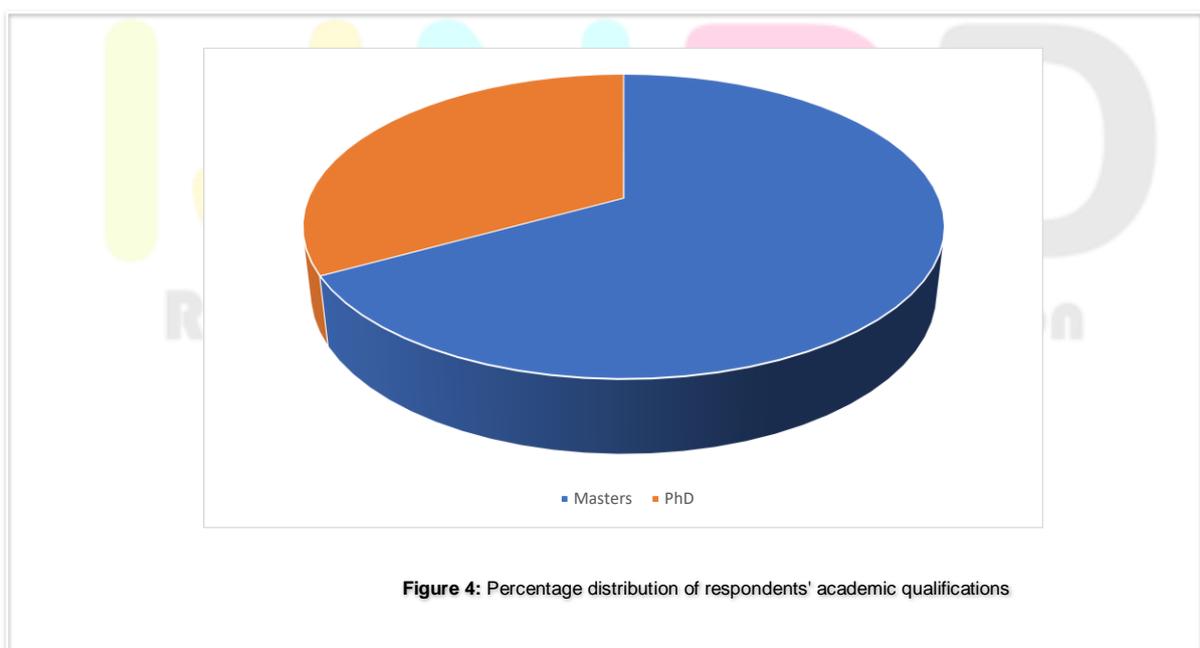
The research utilized a combination of quantitative and qualitative methods to analyze the results. It was very difficult to interpret the data due to the raw nature of the information collected. The qualitative data collected from the interviews and questionnaires were analyzed descriptively. They were then categorized into meaningful themes and patterns. The quantitative information gathered from the closed-ended questions was then analyzed using statistical methods such as tabulation, pie charts, and frequency counts.

Results and Discussion

The data collected from the questionnaires and interviews were then displayed on bar charts. The SPSS and Excel software were used to enter and interpret the quantitative data.



In Figure 4 it is seen that majority of the respondents were PhD holders with 33% of the respondents being master's degree holders. The distribution by gender: 83% of the respondents were males and 17% females.



The results of the structured interviews were in agreement with the survey responses. Even though the two guides were different in structure, they still addressed the research questions adequately. The goal of the survey was to collect information about the various methods that researchers and institutions use when it comes to managing their research projects. In addition to these, the survey also asked about the challenges that they face when trying to implement these techniques in their operations.

- Availability of policies and guidelines for managing research projects;
- Application of project management techniques in research institutions;
- Application of project management techniques by researchers;
- Monitoring and evaluation of research projects;
- Challenges in managing research projects; and
- Identified weaknesses in the research project management frameworks.

Availability of Policies and Guidelines for Managing Research Projects

The findings of this study indicate that there are policies and guidelines in place for managing research programs in Tanzania. The results of the structured interviews and the questionnaire survey confirmed the findings of the study. The survey revealed that 62% of the respondents had policies and guidelines related to managing research programs, while 19% said they didn't have these documents. Six out of the nine participants who participated in the structured interviews confirmed that there are policies and guidelines in place for managing research programs. Three others said they didn't know if these guidelines and policies exist in academic institutions.

Examples of the various private and public sector institutions that have policies and guidelines related to the management of research programs were also supported by the study. These include University of Dar Es Salaam (UDSM) and Mzumbe University. The study also confirmed that the various academic institutions in Tanzania, such as UDSM and MZUMBE, have structures that are responsible for guiding the development of their research programs. These structures also include the distribution of these functions to the various departments and faculties of the institution. It was also confirmed that both UDSM and SUA have policies that provide guidelines on how intellectual property should be handled.

Although it's important for academic institutions to have policies and guidelines related to managing their research programs, it's also important that they implement these guidelines and policies. Most of the time, however, it's important that these policies and guidelines are implemented properly. For instance, when it comes to keeping records of past research projects, only 40% of the survey participants said that their institutions have databases that contain information about these activities.

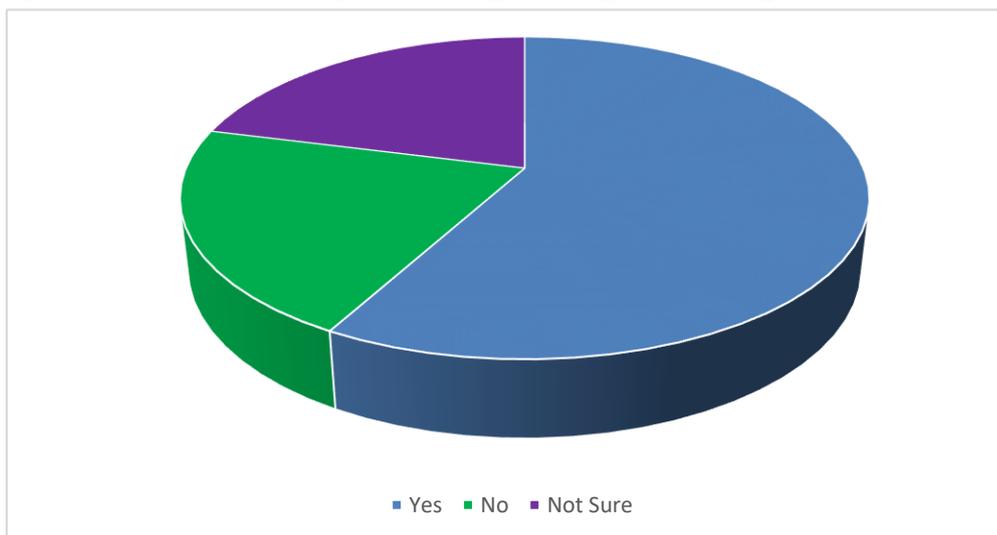
Only 37% of the survey respondents said that their academic institutions have databases regarding past research projects, while 29% said they didn't know if these institutions keep records of these activities. The data collected through the survey and the interviews were then analyzed using the SPSS statistical package. The results of the study revealed that the majority of the academic institutions in Tanzania have policies and guidelines regarding the management of their research programs. However, these guidelines and policies weren't being utilized by most of the institutions. This suggests that the implementation of these policies and procedures is needed in order to improve the efficiency of the institution's research management system.

The low number of private institutions participating in the study revealed that they tend to carry out research activities at a lower level than public-funded institutions. This suggests that many private institutions don't have policies and guidelines regarding managing their research programs. It's believed that private institutions might not have the necessary resources to develop their own policies and guidelines related to research management. In addition, private institutions weren't supported by the government's programs that encourage collaboration between donor agencies and academic institutions.

Application of Project Management Techniques in Research Institutions

The results of the study clearly show that research and academic institutions in Tanzania use project management techniques to manage their projects. Of the respondents, 58% confirmed that they use the techniques, 21% said they do not, and the rest said they are unsure if they do. The data collected from the questionnaires were then analyzed and compared with the qualitative information gathered through structured interviews.

Figure 5: Percentage distribution of Organizations usage of project management techniques



The results of the analysis indicated that the frequency of the survey questions was related to the topic. The results of the survey revealed that most of the respondents have already established guidelines or policies regarding the management of their research projects. This indicates that the procedures can be easily implemented in an environment that has already been established. The results of the structured interviews also indicated that about half of the respondents are familiar with the procedures used in research management. However, they noted that the level of implementation of these techniques was not high. This was because the integrated approach was not fully utilized.

Some of the respondents noted that project management techniques are commonly used by academic institutions and research organizations to manage large projects instead of small ones. This is due to the belief that doing small research projects would require a lot of time and resources. For large research projects, the management of the project is usually carried out in order to ensure that the operations are carried out efficiently. This method ensures that the necessary steps are followed and that the research is completed on time.

Application of Project Management Techniques by Researchers

The figure 6 shows the average level of knowledge about project management techniques that researchers have when it comes to managing their research. The number of individuals who use these techniques when conducting studies is equal to that of those who do not. The most common knowledge areas that project managers use are quality management and time management. Most of the time, these subjects are used to manage multiple tasks and projects.

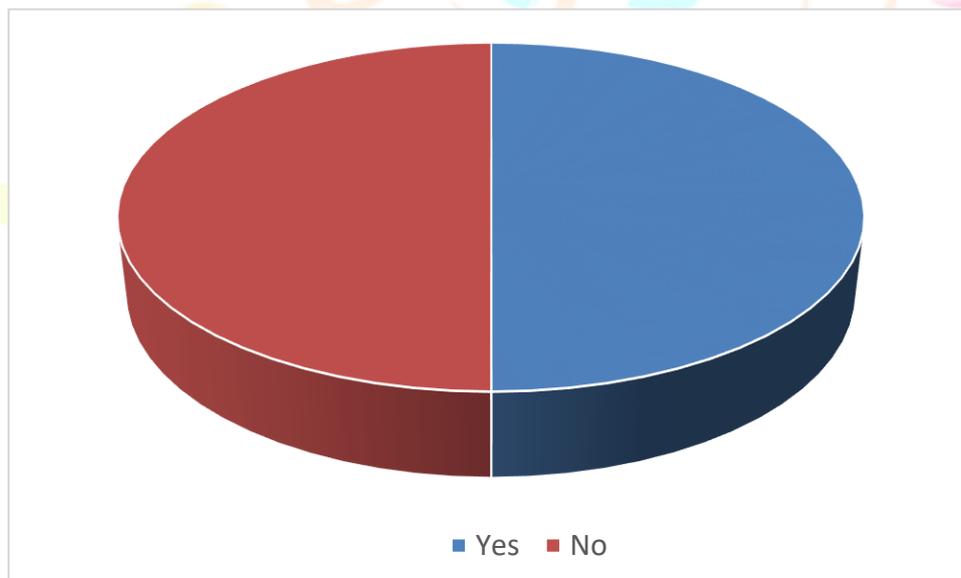


Figure 6: Percentage distribution of researchers' usage of project management techniques

Most of the time, project managers are able to identify the importance of managing their time. They often provide examples of how they do it. This is because, in most cases, observing time is an innate part of any project, and it requires only a certain amount of skills. Most of the time, project managers are not focused on coordinating the various tasks involved in a research project. They said they would be too stretched to do so, and they did not find it beneficial to manage the risks associated with such projects.

The survey revealed that 51% of the respondents identify the risks associated with a project as a matter of practice, but they do not perform the other four activities, such as risk management planning, risk analysis, risk monitoring and control, and risk response planning. In most cases, basic research projects are not considered to be very risky. However, when it comes to demanding research, the researchers are more likely to worry about the potential failure of the project and its financial implications. This is why it is important for them to establish an active risk management framework. Although most of the respondents said they would implement two out of the three cost management activities, only 40% of them actually implemented cost control. This suggests that the low financial status of the project is the reason why the implementation of cost control is low. The other factors that contribute to the low implementation of cost control are the lack of management skills and the researchers' expectations of the accounts units.

Most of the respondents said that they would implement three of the five scope management activities. However, only a third of them actually performed these activities. This indicates that the researchers are not able to control the scope of their studies. This is a clear indication that the research field is unpredictable. The lack of project management skills and knowledge is the main reason why many researchers fail to implement effective management techniques when carrying out research.

The results of the survey were gathered through a questionnaire that was administered to the researchers. The structured interviews were then conducted to confirm the results of the survey. The questionnaire method was chosen because it covered the most critical aspects of the project management process and its knowledge areas, as well as reaching out to many potential collaborators at low cost. The results of the survey were then analyzed using a statistical package, which was provided by Microsoft Excel and Social Sciences.

The results of the survey data were then analyzed using a variety of statistical techniques, such as bar charts, frequency counts, and pie charts. According to a study conducted by Thuillier and Riol in 2015, projects are generally considered to be project-friendly due to their cultural acceptance and structural similarities. In 2017, Donna noted that implementing effective management techniques can increase the chances of success of a research project. Unfortunately, only half of the respondents in the survey were able to implement project management techniques. This suggests the low success rate of research projects conducted in Tanzania and other countries. This suggests a link between the academic and commercial sectors. The commercial sector is also more likely to avoid collaborating with academic institutions and research facilities due to the low success rate.

The lack of proper research and development opportunities in Tanzania could hinder the country's efforts to diversify its economy and produce finished goods from its plentiful raw materials.

Monitoring and Evaluation of Research Projects

The study revealed that about 82% of the respondents used project monitoring to evaluate the effectiveness of their research work, while 59% utilized an activity-based approach. The findings were confirmed through the structured interviews, where seven out of ten participants stated that evaluation and monitoring were carried out in academic institutions. The study also revealed that researchers often mix the two approaches when it comes to monitoring their research projects. This suggests that they need to identify an appropriate indicator for their project's success. According to the study, 73% of the respondents stated that their institutions consider the outcomes of their research projects when it comes to assessing their success. Another 68% said that they also look at other factors such as the meeting of the objectives of the project. Surprisingly, only 32% of the respondents noted that the financial impact of their research is a factor that influences their evaluation. Although the low level of financial impact is a concern for researchers, it is also clear that most institutions in Tanzania do not collaborate with industry when it comes to conducting demand-driven research. According to Kowalczyk, most research in the country is conducted on a basic level and is mainly focused on curiosity. If the country's research focus is on demand-driven research, then the financial impact of the project might have been a factor that influences the evaluation and monitoring of the work. The study was conducted through a combination of structured interviews and survey questionnaires. Through the survey questionnaires, the researchers were able to collect quantitative data. They were also able to customize the questions by allowing them to specify the answers.

Challenges in Managing Research Projects

In Tanzania, implementing research projects can be very challenging. In a structured interview, ten individuals were interviewed to reveal the various challenges that researchers encounter when carrying out their studies. These include the various academic institutions and the individuals who are involved in the project. The interviewees identified three key issues that need to be resolved in order to improve the performance of the research projects. These include the funding of the project, the quality of the research, and the implementation of the project.

1. National research agenda - The country seemingly does not have a common document to guide research. This has led to a situation where policies or guidelines for academic and research institutions that have the capacity develop their own guidelines have been developed but these do not feed into a national strategy for research. As a result, these institutional policies or guidelines may fail to effectively contribute to the national development plans. The lack of a national research agenda has led to institutions working in 'silos' and because of this it is more likely that research efforts may be uncoordinated with the risk of duplication of efforts. Another result for lack of a national research agenda would be a situation where a certain institution lacking a particular piece of equipment fails to progress because they are not aware that another institution in the country has that equipment. It is expected that within the framework of this national research agenda, platforms for information sharing would exist.

2. Financing - This is an issue that was common to all participants in the study. Evidently, research in Tanzania does not receive the desired funding neither from the national treasury nor from the private sector. Naturally, the few available financial resources from government are spread out to the government-supported academic and research institutions like UDSM, SUA and National Institute for Medical Research (NIMR) among others. The said budget allocations do not suffice to fund any meaningful research. Industry, which should, be collaborating with research institutions and fund demand driven research, does not do that in Tanzania. This may be attributed to the fact that the majority of players in the private sector are foreign-owned corporations who fund research in their countries of origin. Further, the Tanzania n academic and research institutions have not positioned themselves well to give confidence to these multinational corporations.

3. Training/skills and infrastructure - This aspect refers to skills in core disciplines and/or complementary skills. The lack of project management and financial management skills explains this. For infrastructure, there are instances when researchers send samples outside the country for testing and this may be due to either, because of working in 'silos' one institution does not know that another institution in the country has that particular piece of equipment or in the entire country no institution has that particular equipment. Further, research infrastructure in the country is outdated and requires replacing/upgrading. The poor state of research infrastructure in the country does not give confidence to stakeholders.

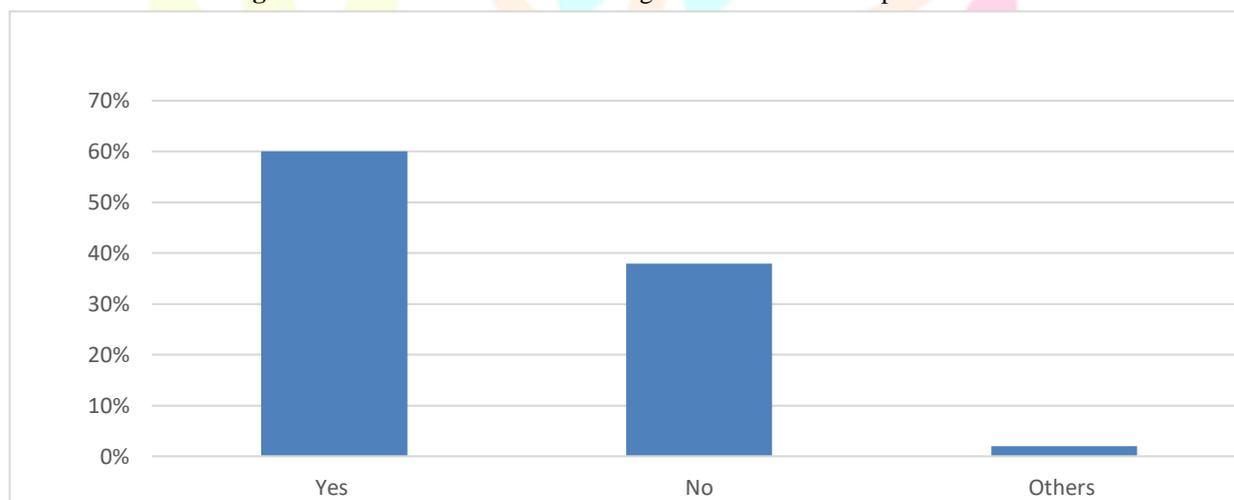
Some of the factors that could contribute to the non-optimal use of project management methods in Tanzania include the lack of proper resources and financing. This issue can also affect the procurement of necessary equipment. In addition, the lack of proper training and software for staff members could also contribute to the non-performance of project management. Since research and academic institutions do not have the necessary budget allocations, they may not prioritize the training and upgrades of their staff. A national research agenda should be created to help these institutions develop effective research management policies. It is also important to note that project management techniques can help improve the performance of research projects. This paper aims to provide a comprehensive analysis of the various challenges that researchers face when it comes to using project management methods. Through a structured interview guide, the researchers were able to share their thoughts on the challenges they encountered when it came to using project management techniques. The data collected during the study were analysed using qualitative methods. Through the findings, the researchers were able to identify various issues that could prevent the quality of research from being conducted. In order to ensure that the research is conducted properly, it is important that the necessary steps are taken.

The list of issues that the researchers identified during the study clearly shows how difficult it is for research and academic institutions to attract funding for their projects. The results of the study revealed the extent of the problems that the two sectors face. Despite the various factors that can affect the quality of research, it is still important to note that the efforts and commitment of the researchers and academic institutions are needed to overcome these issues. The government and the private sectors must work together to ensure that the country's research and academic institutions continue to flourish. One of the most important steps that the government and the private sectors can take to ensure that the academic and research sectors continue to flourish is by increasing the export of raw materials and finished goods.

Identified Weaknesses in the Research Project Management Frameworks

The table shows the results of the survey, which revealed that 60% of the survey respondents identified weaknesses in the frameworks used for research management. About 37% of the respondents did not find any issues. The structured interviews also confirmed the findings of the survey, with over 70% of the respondents stating that there are weaknesses in these frameworks in Tanzania. Although the earlier results indicated that various institutions in

Figure 7: Weakness in research Management framework response rate



Tanzania have policies and guidelines on how to manage research, the survey results show that most of the respondents still identified weaknesses in these frameworks. In a number of situations, what is apparent is that the developed frameworks are not in use and therefore, serve no purpose. These weaknesses tend to affect the performance and therefore, quality of research in the academic and research institutions. The situation if left unchecked may lead to the growing lack of confidence in these institutions by various stakeholders. Two key issues relating to weak research frameworks can be identified:

1. Monitoring and evaluation systems may not be consistent with the aspirations of various stakeholders. The results show that most respondents indicated that their institutions have monitoring and evaluation systems, but the results also suggest that these current monitoring approaches may not be as desired by the researchers as this has been identified by many respondents as a major weakness. A most likely case is of developed monitoring guidelines that are not being followed. This calls for an implementation plan to make use of these monitoring guidelines.
2. Guidelines and frameworks for managing research appear not to be institutionalized or they might not have been tailored well to suit the particular institutions.

The above two issues are not the only weaknesses identified in the study. It is also important to acknowledge that, since research projects depend on other support units of these academic and research institutions, any inefficiencies in these support units could affect the performance of research projects. From the responses obtained, the following weaknesses associated with the support units were noted:

- bureaucracy in the procurement process;
- poor project governance resulting in poor risk management;
- irregular disbursement of the project funds;
- research management not being prioritized; and
- lack of incentives for conducting research due to low appreciation by the other units.

Both open-ended and closed-ended questions in the structured interviews as well as the questionnaire survey were used to arrive at these findings. The data obtained, therefore, was both quantitative and qualitative. The qualitatively obtained data from the open-ended questions provided explained the identified weaknesses.

Conclusions and Recommendations

In this era where knowledge is the cornerstone for economic development, the search for new knowledge through research and development is vital (Cantner et al., 2008). Various studies have shown that research performance can be improved by adapting project management techniques (Riol & Thuiller, 2015). Therefore, this study aimed to determine whether research institutions in Tanzania were using project management techniques in managing research projects. The aim was achieved by obtaining and analyzing information from key stakeholders that implement research projects in the respective academic and research institutions in Tanzania.

By considering the literature on project management and its application to research, and by employing the descriptive research design, the study found out that the majority of academic and research institutions in Tanzania apply project management techniques in research management. The findings on the specific objectives are presented as follows.

Application of Project Management Techniques in Research Institutions - This study has established that the majority of the academic and research institutions in Tanzania apply project management techniques when managing research projects. Further, the study revealed that these institutions have policies or guidelines for managing research. The findings agree with the findings of the studies conducted by Riol and Thuiller (2015) which showed that in order to successfully implement project management techniques to research projects, there is need for well-defined guidelines or policies.

Application of Project Management Techniques by Researchers - The findings from the study suggest that to some extent researchers in Tanzania apply project management techniques when managing research projects. The study has also shown that the extent to which individual researchers apply project management techniques is relatively lower than the extent to which the respective institutions do this. These findings agree with the presentation by Johnson (2013) that not all scientists have the ability to comply with institutional research guidelines which may include the requirement to adapt traditional project management techniques.

Performance of Research Management Frameworks - The majority of academic and research institutions in Tanzania have weaknesses in the respective research management frameworks. These weaknesses can negatively affect the performance of research projects. The study has also shown that the majority of the academic and research institutions do monitor the research projects implemented and that the results-based approach is used more than the activity-based approach. Further, these institutions tend to use the project outcomes as the measure of success for the projects rather than the research meeting the objectives. The identified weaknesses broadly cover the following areas:

- policies or guidelines not being effectively utilized by researchers for various reasons;
- dilapidated and in some instances lack of research infrastructure;
- financing for research being inadequate;
- complementary skills like project management techniques lacking;
- focus on non-demand driven research;
- collaboration between industry and academia is low; and
- poor work culture

Challenges in Managing Research Projects - The challenges faced by researchers and institutions when managing research projects can be grouped as follows:

- lack of a national research agenda which leads to fragmented efforts;
- lack of financing for research activities;
- poor research infrastructure; and
- lack of complementary skills

Recommendations

Having understood the weaknesses of the respective project management frameworks and the challenges faced by researchers when implementing research projects, the study yielded the following recommendations aimed at enhancing the performance of research projects in academic and research institutions in Tanzania:

3. Develop a national research agenda to guide and harmonise the conduct of research and development. (The document is currently in draft form.)
4. Enhance the project management skills of researchers in research institutions through tailored courses by funders and the research institutions.
5. Strengthen research management frameworks in research institutions.
6. Encourage a mindset change by researchers to embrace techniques aimed at improving research management.
7. Improve monitoring and evaluation frameworks by research institutions.

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