

Assessment of the Delays During Implementation of Selected Agriculture Donor Funded Projects in the Zambian Public Sector

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Abstract

Zambia's Agricultural sector is crucial to realizing the country's Vision 2030 — an efficient, competitive, and export-driven agricultural sector that ensures food security and higher incomes. This study aimed to assess the delays during the implementation of agriculture donor-funded projects in Zambian public sector. The study was guided by three objectives: (i) to ascertain the effect of stakeholder engagement; (ii) to assess the impact of supplier/contractor capacity; and (iii) to analyze the effect of contract management during the implementation of agriculture donor-funded projects. A descriptive research design and a quantitative approach were adopted, focusing on staff from Project Implementation Units, Ministry of Agriculture, Ministry of Fisheries and Livestock, and the Ministry of Finance and National Planning. A sample size of 109 was derived from a population of 120 using stratified random sampling technique. Data was collected using a self-administered structured questionnaire set in a 1 to 5 point Likert Scale format. The Statistical Package for Social Sciences (SPSS) version 30 was used to analysis data. Findings revealed that poor stakeholder engagement was a significant cause of delays, with insufficient understanding of stakeholder expectations and inconsistent involvement often led to unmet project objectives. The study further found that supplier/contractor capacity was critical to minimizing delays, while many contract managers faced challenges due to work overload, inadequate capacity, and lack of skills. Drawing on international best practices, especially from other African contexts, the study highlighted effective engagement strategies to improve project outcomes in Zambia. These include prioritizing tailored stakeholder engagement strategies supported with strong policy framework, providing continuous training for PIU staff, appointing independent technical evaluation committees to rigorously assess the technical and financial capabilities of suppliers, and recruiting full-time contract managers for effective contract management oversight.

Keywords: Agricultural Sector, Donor-Funded Projects, Stakeholder Engagement, Contract Management, Contractor Capacity, Project Implementation.

Introduction

Agriculture stands as a foundational sector underpinning the economic development of many nations, and Zambia is no exception. The Zambian government, with support from international donors, has increasingly sought to leverage agriculture as a means to reduce poverty, improve food security, and diversify its economy away from dependence on

copper production. With a series of donor-funded projects implemented across various sectors — including agriculture, industry, water, sanitation, and energy — Zambia has benefited from over USD 1 billion in investments from the African Development Bank since 1971 (African Development Bank Group, 2022).

The agricultural sector has long been recognized as a cornerstone of Zambia's economic development. According to the (Institute of Economic and Social Research, 2018), the growth of this sector has been consistently prioritized as a key driver for achieving Zambia's long-term development vision. Notably, the country's Vision 2030 aims to establish an efficient, competitive, sustainable, and export-led agricultural sector that ensures food security and increases income by the year 2030. This vision has been maintained throughout the successive national development plans, with the Seventh National Development Plan (7NDP) highlighting agriculture, along with tourism, manufacturing, and mining, as vital sectors that will contribute to the creation of a diversified and resilient economy. However, the agriculture sector has experienced significant fluctuations in growth due to factors such as high dependence on rain-fed production, low investment, and a failure to strategically position agriculture in line with its comparative advantage.

In response to these challenges, the Government of Zambia, with substantial support from international donors, has directed funding towards agricultural projects aimed at enhancing smallholder livestock production, boosting productivity, and promoting commercialization. These projects have been designed to improve institutional capacities, foster economic growth, and reduce poverty, ultimately contributing to better household food and nutrition security. Despite these significant financial inflows from donor aid, the effective implementation of the projects has often been hindered by delays, undermining their potential impact on Zambia's developmental agenda. Assessing and addressing these delays is crucial to ensure that funds are utilized effectively to achieve intended developmental outcomes.

As defined by the, Project Management Institute (Project Management Institute, 2013), a project is a temporary endeavor to create a unique product, service, or result, typically with a definitive beginning and end. This temporality implies that a project concludes once objectives are either met or deemed unattainable. Yet, many donor-funded projects face persistent challenges, particularly during implementation, where delays often result in missed objectives and reduced impact. Within Zambia's agriculture sector, the consequences of such delays are acutely felt, given the sector's potential to improve food security, create employment, and enhance rural livelihoods.

The Government of Zambia recognizes agriculture as a cornerstone of economic development, with initiatives such as the Farm Block Development Program, Livestock Breeding Centres, and Aquaculture Development Projects spearheaded to drive sectoral growth, Zambia Development Agency (Zambia Development Agency, 2024). Despite this, persistent challenges like poverty and project delays impede progress toward sustainable development. (Tembo et al., 2022), highlights that between 2006 and 2021, public projects

in Zambia experienced recurring issues relating to delays during implementation. As such this pattern prompted both past and current Zambian Presidents to appoint special project monitoring units to address the gaps on these recurring issues (Lusaka Times, 2015; Nkomesha, 2023). It was, therefore, essential to conduct an assessment on the causes of delays in the implementation of agricultural donor-funded projects within the public sector, to understand the underlying issues and propose solutions for more efficient and effective project management in this critical public sector in Zambia.

While previous studies have highlighted recurring challenges, such as the negative impact of procurement issues, donor-imposed conditions, and managerial shortcomings, which significantly affect project outcomes. Several other factors are recognized as contributing to the success or failure of donor-funded projects, critical aspects such as stakeholder engagement, supplier capacity, and contract management remain largely underexplored. Notably, there have been little or no prior studies specifically conducted in Zambia targeting delays during the implementation of agriculture-related donor-funded projects within the public sector. This gap in research underscores the need for future studies to delve deeper into these areas, which will offer a more holistic understanding of the dynamics that influence project outcomes in the context of international development, particularly within Zambia's agricultural sector. However, overlooking or inadequately addressing essential elements such as the engagement of stakeholders, the selection and management of suppliers, and the effective administration of contracts would lead to disastrous and failure to meet project objectives, and contribution towards sustainable development outcomes.

The main objective of the study was to assess the delays during the implementation of agriculture donor funded projects within the public sector in Zambia.

Specific Objectives

1. To ascertain the effect of stakeholder engagement during the implementation of selected agriculture donor funded projects in the public sector in Zambia.
2. To assess the impact of supplier/contractor capacity during the implementation of selected agriculture donor funded projects in the public sector in Zambia.
3. To analyse the influence of contract management on the implementation of selected agriculture donor-funded projects in the public sector in Zambia.

Research Questions

1. What effect does stakeholder engagement have on the implementation of selected agriculture donor-funded projects in the public sector in Zambia?
2. What impact does supplier/contractor capacity have on the implementation of selected agriculture donor-funded projects in the public sector in Zambia?
3. How does contract management influence the implementation of selected agriculture donor-funded projects in the public sector in Zambia?

Literature Review

The role of the Government is to translate aspirations of the public by finding solutions to social and economic problems faced by the public of the State. While some of these solutions will deliver tangible and physical assets, many will deliver intangible results which can only be perceived by individuals who benefit from them (Lokhande & Harsha, 2018). Cost overruns and schedule delays are one of the most common reasons for project failure. Although schedule delays not only result in significant financial implications to project sponsors but also lead to substantial social costs to the public, scant attention has been dedicated to schedule delays (Park, 2021). While some projects fail due to poor execution or changes in scope, a frequent culprit is an unrealistic time frame that dooms the project before it even starts. Nonetheless, planners often set project schedules that are too short – partly because of uncertainty and ambiguity around the full scope of work required but also due to the expectations and enthusiasm of project sponsors (Lorko, et al., 2025).

(Ogbeifun & Pretorius, 2022) identified six factors causing the delays, divided into internal and external factors. The internal factors are faulty contractor selection processes resulting in delays by contractors and the failure to complete appropriate phases of a project. While the external factors include the delays in the project management system of the funding agency in terms of inspection, monitoring, evaluation and progress certification. This aligns with (Ansah & Sorooshian, 2018) 4P framework, which encompasses four critical components aimed at systematically addressing the gaps by identifying, categorizing and analyzing sources of delays namely; project-related, practices, participants, and procurement factors.

Agriculture projects plays a pivotal role in Zambia's national development, therefore a critical analysis of the six identified causes of delays by (Ogbeifun & Pretorius, 2022); and the application of the 4P framework could provide valuable insights into managing delays specific to donor-funded agricultural projects. As noted by (Mang'atu, et al., 2025) employing the 4P framework could strengthen community participation in donor-funded projects, right from their inception to project closure and handover to enhance the level of acceptance and awareness. Table 1 below shows a comprehensive literature review summary for analysis for challenges in the implementation of donor-funded projects in Africa.

Table 1: Summary of Research Studies on Challenges in International Development Projects (IDPs)

No.	Author/Year	Subject	Purpose	Objectives	Methods	Findings
1	(Lawani & Moore, 2016)	Project Management Practices in Government Organisations of Developing Countries: A Systematic Review	To establish characteristics of previous studies that investigated project management practices in a developing country by presenting a view of those research.	• Assess characteristics of previous studies on Project Management Practices in Developing Countries Government Organizations (DCGOs). • Assess factors that impact on Project Management Practices in DCGOs	Systematic review of past studies	The findings suggest that factors having an impact on project management practices in public organizations of developing countries were identified and categorized into; structural factors, government control procedures, contractor issues and lack of project management knowledge and project manager's expertise.
2	(Nanèma et al., 2021)	Determinants of the performance of Projects in Developing Countries	To identify and analyze the determinants influencing the performance of development projects and programs in Burkina Faso.	• To identify and analyze the internal factors explaining the performance of a development project financed by the World Bank in Burkina Faso. • To identify and analyze external factors explaining the performance of a development project financed by the World Bank in Burkina Faso.	Mixed approach	The results of the study show that two explanatory variables positively and significantly influenced the performance of development projects in Burkina Faso. This concerns in particular the technical organization of projects and the environment or the project intervention area.
3	(Ika et al., 2012)	Critical Success factors for World Bank projects: An empirical investigation	• To explore World Bank project success factors and specifically the relationship between critical success factors (CSFs) and project success as perceived by World Bank Task Team Leaders (project supervisors)		Survey research design	The exploratory factor analysis highlights a specific set of five CSFs: monitoring, coordination, design, training, and institutional environment. The regression analysis shows that there is a statistically significant and positive relationship between each of the five CSFs and project success
4	(Mwanaumo et al., 2020)		To investigate factors causing schedule overrun in mobile telecommunication projects in Zambia	• Establish factors that lead to schedule slippage in Mobile telecommunication projects. • Categorize delay factors in mobile telecommunication projects	Mixed Methods	Findings showed that eight highest ranked factors were identified with the highest frequency of occurrence and impact on the schedule. Further poor planning was pointed out as the main cause of project schedule overrun,

				Evaluate the impact of the delay factors and rank them according to their importance as perceived by the stakeholders		which affects subsequent project phases. Based on the fishbone framework, it was also found that process-related factors were the major contributors to project delays
5	(Tulu, 2017)	Determinants of project implementation delay: the case of selected projects financed by development bank of Ethiopia	Poor project initiation, poor project planning/design system, improper implementation, poor project monitoring, evaluation and controlling system, poor communication, improper project closure	to identify the major determinants of project implementation delay and methods of minimizing project implementation delays	Mixed Methods	According to the findings, a strong, positive and significant relationship existed between all delay factors considered as independent variables (i.e. poor project initiation, poor project planning/design system, improper implementation, poor project monitoring, evaluation and controlling system, poor communication and improper project closure.
6	(Nundwe & Mulenga, 2017)	Delays in Construction of Electrical Power Transmission Lines in Zambia	To establish the causes of delays in the construction of electricity transmission lines in Zambia		Mixed Methods	Findings indicted three major causes of delays during the project execution stage, being late advance payments, poor financial management by the contractor, and irregular payments to sub-contractors

Theoretical Framework

Stakeholder Theory

Public donor-funded projects do not operate in isolation, rather, various players are involved in their implementation. These players are referred to as stakeholders. (Hill & Jones, 2001) explain that a company's stakeholders can be categorized into internal and external groups. Internal stakeholders include stockholders, employees, executive officers, managers, and board members, while external stakeholders encompass all individuals and groups that have a vested interest in the company, such as customers, suppliers, governments, unions, local communities, and the general public.

The Stakeholder Theory, first introduced by Edward Freeman in his 1984 book Strategic Management, focuses on the moral and ethical considerations in organizational management. The theory identifies and models the various groups of stakeholders for a corporation and recommends methods for management to give appropriate attention to the interests of these groups (Freeman, 1984).

The relevance of Stakeholder Theory in this study lies in its potential to help project implementers and executing agencies better understand the needs and expectations of various stakeholders. This understanding is crucial for the effective execution of projects, as it enables project managers to address stakeholder concerns throughout the implementation process.

Communication Theory

Communication is a crucial aspect of project implementation and the achievement of objectives, irrespective of the specific goals to be accomplished. (West & Turner, 2018) define communication as a social process in which individuals use symbols to create and interpret meaning within their environment. In their definition, (West & Turner, 2018) highlight five key elements of communication: social, process, symbols, meaning, and environment, which are explained as follows:

1. **Social:** The social aspect of communication emphasizes that people and their interactions are integral to the communication process.
2. **Process:** Communication is viewed as an ongoing, dynamic, and continuous occurrence that evolves over time.
3. **Symbols:** Symbols are arbitrary labels assigned to particular phenomena, facilitating the expression and understanding of ideas.
4. **Meaning:** The meaning aspect of communication focuses on what individuals derive from the messages they receive.
5. **Environment:** The environmental aspect refers to the situation or context in which communication occurs, influencing how messages are interpreted.

(West & Turner, 2018), indicated that (Craig, 1999) and (Craig & Muller, 2007) provided an intellectual framework for understanding communication theory, assisting individuals in comprehending their society and culture in a communicative manner. This theory is a foundational element of this study, as effective project implementation relies heavily on the constant interaction and communication between individuals, throughout the project lifecycle. Thus, communication plays a central role in ensuring project success, facilitating collaboration, and addressing challenges that may arise during the implementation process.

Principal Agent Theory

(Muller & Turner, 2005) states that the responsibility for the success of projects in organizations typically rests with project owners, who are accountable for the business case, ensuring alignment with the organization's strategy, and overseeing the investment in the project. Owners provide financial resources, monitor progress, and approve forecasts, plans, milestones, and project completion dates. Conversely, the day-to-day management of the project is delegated from the project owner to the project manager, who is responsible for steering the project toward the agreed-upon objectives. This delegation of authority establishes a principal-agent relationship between the owner

(principal) and the project manager (agent), wherein the principal depends on the agent to perform tasks on the principal's behalf. As described by Jensen cited in (Muller & Turner, 2005), an agency relationship is a contract under which one party, the principal, engages another party, the agent, to perform a service on the principal's behalf, thereby delegating some decision-making authority to the agent.

In the context of this study, the principal-agent theory is examined from multiple perspectives. For example, the Government, through the Ministry of Finance and National Planning, is considered the principal, as it sources funds from donors to finance the projects. The line Ministries, represented by the Controlling Officers, would then be the agent responsible for implementing the project's deliverables. Similarly, the Controlling Officers within the line Ministries is considered the principal, with the Directorate overseeing the project serving as the agent. Additionally, the Directorate could be regarded as the principal, while the Project Coordinator fulfilling the role of the agent. (Chauvet et al., 2017) further notes that donors supervise projects during implementation, and the level of effort put into supervision is an important decision for donor agencies. Hence, the relationship between donors and governments must not be overlooked. This theory is crucial to this study as it helps to clarify the roles of principals and agents during the implementation of projects. It also provides insights into how information asymmetry, which can lead to mistrust between the principal and agent, can be addressed, as suggested by (Muller & Turner, 2005). Additionally, it emphasizes the importance of aligning interests to improve project performance, especially when there are divergent interests, as noted by (Chauvet et al., 2017).

A comprehensive understanding and application of the above three theories in this study can lead to discovering long lasting solution to challenges faced during the implementation of agriculture donor-funded projects in Zambia.

Conceptual Framework

(Kothari, 2004), cited in (Nzamu, 2016), postulates that a conceptual framework facilitates the portrayal of the interaction between dependent and independent variables. (Cooper & Schindler, 2011) argue that it is commonly hypothesized that the independent variable (IV) causes the dependent variable (DV) to occur. In this study, the dependent variable was the implementation of selected agriculture donor-funded projects, while the independent variables revolved around factors that were believed to influence the dependent variable. Moderating variables were also incorporated, as illustrated in Figure 1.

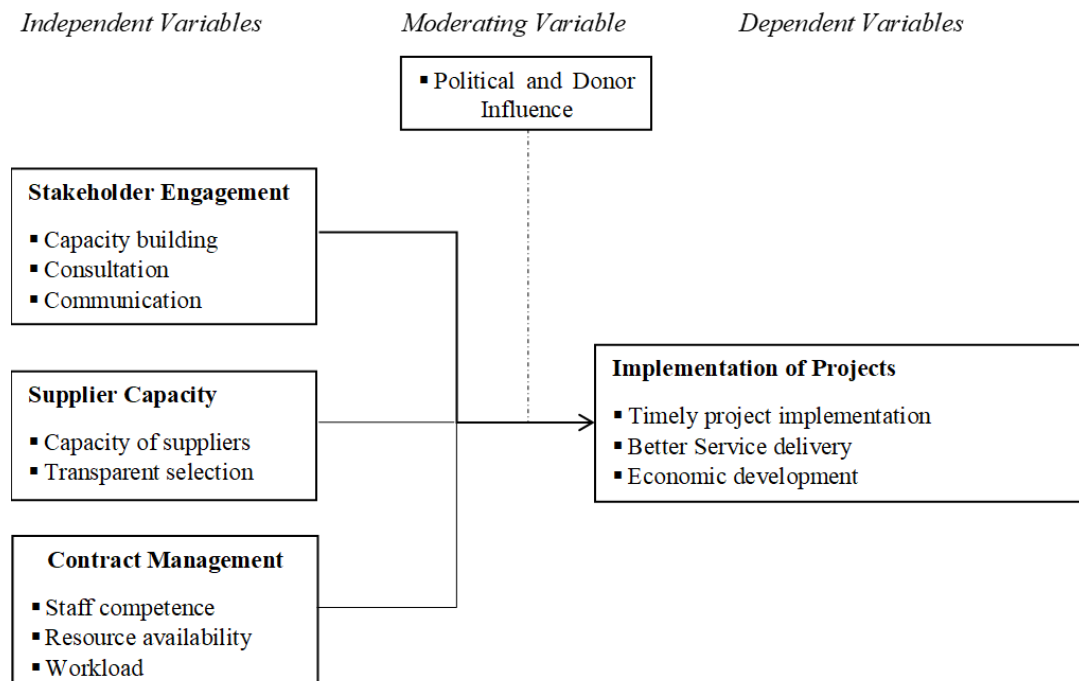


Figure 1: Conceptual Framework; Source: (Author, 2024)

The conceptual framework for this study on delays during the implementation of selected agriculture donor-funded projects in the Zambian public sector focuses on understanding how the identified independent variables interact to influence the dependent variable, which is the successful implementation of these projects. The independent variables identified include stakeholder engagement, supplier capacity, and contract management, which are moderated by political and donor influences. Thus, the implementation of agriculture donor-funded projects is hypothesized to be influenced by stakeholder engagement (including capacity building, consultation, and communication), supplier capacity (emphasizing supplier capacity and transparent selection processes), and contract management (focusing on staff competence, resource availability, and workload management).

Stakeholder Engagement

This variable refers to the continuous engagement of both internal and external project stakeholders throughout all phases of the project to mitigate current and potential future resistance. Key elements identified for consideration include:

- i. **Capacity Building:** This involves educating and familiarizing stakeholders with the project's objectives from the outset, ensuring they understand the project's goals and their role in its success.
- ii. **Consultation:** This emphasizes ongoing discussions with project stakeholders to gather their input before making decisions or implementing changes in the project.
- iii. **Communication:** This concerns the extent to which stakeholders are kept informed about the progress at each stage of the project to secure their buy-in and support.

A study by (Bruce & Shelley, 2010) highlights that organizations recognizing the importance of engaging their stakeholders aim to replace monologue with dialogue, enhancing shared understanding. Effective stakeholder engagement, therefore, holds significant potential as a pragmatic tool to improve communication with both internal and external stakeholders. Such engagement is expected to positively influence the successful implementation of projects.

Supplier Capacity

Supplier capacity encompasses all the necessary capabilities, including technical skills and financial resources, possessed by the supplier or contractor to execute the project requirements. This process is influenced by the following key considerations:

- i. **Capacity of the Suppliers:** This refers to the technical and financial capabilities of the suppliers to meet procurement requirements within the specified timeframe, location, quantity, and quality.
- ii. **Transparent Selection:** This entails the contracting authority's ability to competitively select the best suppliers or bidders based on predetermined criteria and their capacity, free from external influence.

Studies by (Zakeri et al., 2023) and (Beil, 2009) underscore that the success of an organization is closely linked to its interactions with suppliers. It is, therefore, anticipated that effective supplier selection will have a positive impact on the efficiency and success of project implementation.

Contract Management

This variable pertains to the management of all activities following the award of a contract until its full execution, considering the following key aspects:

- i. **Staff Competence:** This refers to the ability of appointed contract managers to understand the project assignment, key contract requirements, deliverables, and the ability to interpret legal clauses (contract terms and conditions).
- ii. **Resource Availability:** This entails the availability of essential resources, including time, financial, and logistical support, to enable contract managers to effectively execute both desk and field assignments.
- iii. **Workload:** This refers to the amount of work allocated to officers responsible for managing the contract(s), in addition to their routine responsibilities.

A study by (Rogers et al., 2024) highlighted that effective contract relationship management is a crucial factor influencing procurement performance. Additionally, contract management should span from the drafting and signing of contracts through to their execution (Ngesa, 2021). Therefore, it is anticipated that efficient contract management will positively affect the overall success of project implementation.

Research Methodology

Research Philosophy

A research philosophy is a set of fundamental beliefs that guide the design and execution of a research study, with different philosophies offering distinct ways of understanding scientific research (Tamminen & Poucher, 2020). It encompasses the assumptions, principles, and beliefs that shape the researcher's approach to a study (Jasen & Rautenbach, 2023). This study applied the epistemology of a pragmatic approach, which emphasizes flexibility, usefulness, and the applicability of research findings. The pragmatic approach allows for the integration of both quantitative and qualitative data, ensuring that research outcomes are practical and relevant to real-world contexts.

Research approach

The study adopted a quantitative research approach, this study allowed for the systematic collection and analysis of numerical data to identify, quantify, and analyze the factors contributing to delays in the implementation of agriculture donor-funded projects within Zambia's public sector. According to (Kothari, 2004), quantitative research is based on the measurement of quantity or amount and is applicable to phenomena that can be expressed in terms of quantity. (Taherdoost, 2022) further clarified that quantitative research employs numerical values derived from observations to explain and describe phenomena that those observations reflect. It includes empirical statements that describe the real-world meaning of cases and evaluates how well a standard or norm is met in a particular policy or program.

Research Design

For this study, a descriptive research design was adopted to assess the delays during the implementation of selected agriculture donor-funded projects in Zambia's public sector. (Ghanad, 2023) explained that descriptive research can be either quantitative or qualitative in nature. This type of research involves collecting quantitative data, which can be presented numerically (such as test scores or usage frequency of a specific feature in a multimedia program), or it may categorize data, such as gender or patterns of communication within a group setting.

The research design was aligned with the study's objectives, as follows:

1. **Objective 1:** To ascertain the effect of stakeholder engagement on the implementation of agriculture donor-funded projects in the public sector in Zambia. The descriptive design allowed the researcher to document and scientifically explain the frequency of stakeholder capacity building, consultation, and communication activities.
2. **Objective 2:** To assess the impact of supplier/contractor selection on the implementation of selected agriculture donor-funded projects in the public sector in Zambia. The descriptive design assisted the researcher in collecting quantitative data to assess the capacity of suppliers and the transparency of their selection process.

3. **Objective 3:** To analyze the influence of contract management on the implementation of agriculture donor-funded projects in the public sector in Zambia. The descriptive design facilitated the collection of statistical data to evaluate staff competency, resource availability, and workload.

This descriptive research design effectively supported the collection and analysis of data to answer the research questions and meet the study's objectives.

Table 2: Research design matrix of the study

RESEARCH QUESTION	RESEARCH OBJECTIVE	SAMPLING TECHNIQUE	DATA COLLECTION	DATA ANALYSIS
What effect does stakeholder engagement have on the implementation of agriculture donor-funded projects in the public sector in Zambia?	To ascertain the effect of stakeholder engagement on the implementation of agriculture donor-funded projects in the public sector in Zambia.	Stratified random sampling targeting Projects Staff, those involved in projects in the Ministry of Agriculture, Ministry of Fisheries and Livestock, and Ministry of Finance and National Planning.	Structured Questionnaire.	Descriptive statistics: mean, median, standard deviation using SPSS.
What impact does supplier/contractor selection have on the implementation of agriculture donor-funded projects in the public sector in Zambia?	To assess the impact of supplier/contractor selection on the implementation of selected agriculture donor-funded projects in the public sector in Zambia.	Stratified random sampling targeting Projects Staff, those involved in projects in the Ministry of Agriculture, Ministry of Fisheries and Livestock, and Ministry of Finance and National Planning.	Structured Questionnaire.	Descriptive statistics: mean, median, standard deviation using SPSS.
How does contract management affect the implementation of agriculture donor-funded projects in the public sector in Zambia?	To analyze the influence of contract management on the implementation of agriculture donor-funded projects in the public sector in Zambia.	Stratified random sampling targeting Projects Staff, those involved in projects in the Ministry of Agriculture, Ministry of Fisheries and Livestock, and Ministry of Finance and National Planning.	Structured Questionnaire.	Descriptive statistics: mean, median, standard deviation using SPSS.

Source: Author (2024)

Study Population

The targeted population for this study consisted of 120 individuals, which included those involved in the planning, implementation, and oversight of donor-funded agricultural projects in Zambia. This group consisted of government officials, project managers under the Ministry of Agriculture, the Ministry of Fisheries and Livestock, and the Principal oversight institution (Ministry of Finance and National Planning) Headquarters. These stakeholders were selected based on their direct involvement in or oversight of agriculture donor-funded projects in the public sector in Zambia, ensuring that the information gathered would be relevant and representative of the key sectors impacting project implementation.

Sample Size and Sampling Technique

A sample is a subset of the population selected for investigation, intended to reflect the characteristics of the larger group. The purpose of sampling is to study a manageable portion of the population when it is impractical to investigate the entire population. A sample should be representative of the general population to ensure valid conclusions. (Szilvia, 2013) highlighted that a sample exhibits the traits of the population from which it is drawn, and it is typically selected because the entire population is too large to study.

For this study, the sample size was determined using the Taro Yamane formula, developed by statistician Taro Yamane in 1967, which is commonly used for calculating sample sizes from a finite population (Uniproject Materials blog, 2016). The formula is as follows:

$$n = \frac{N}{(1 + N(e)^2)}$$

Where:

n = the sample size

N = the population under study

e = the margin error (0.05)

Using this formula, a sample size of 109 was derived from a population of 120, as shown in Table 3. According to (Sekaran & Bougie, 2010), the rule of thumb for determining sample size suggests that a sample larger than 30 and less than 500 is appropriate for most research. Based on this guideline, a sample size of 120 was chosen for this study. Out of this, 109 respondents were conveniently selected from seven purposively chosen stakeholder groups in Lusaka, Zambia.

The study employed a probability stratified random sampling method. According to (Singh & Masuku, 2014), stratification is the technique by which the population is divided into subgroup/strata. (Singh & Masuku, 2014) assert that sampling is then be conducted separately in each stratum. Furthermore, Strata or Subgroup are chosen because evidence is available that they are related to outcomes (Singh & Masuku, 2014). Stratified random sampling was chosen for this study because the study aimed to directly engage those involved in the execution of donor-funded agriculture projects. This approach ensured that

the individuals in the stratum had the necessary experience and knowledge to provide insights into the delays during project implementation.

Table 3: Sampling Frame and Sample Size

Strata	Targeted Respondent	Project Sub-Sector	Population (N)	Sample Size (n)
1	Ministry of Agriculture		30	27
2	Ministry of Fisheries and Livestock		30	27
3	Ministry of Finance and National Planning		20	19
4	Enhanced Smallholder Livestock Investment Programme	Livestock	10	9
5	Cashew Infrastructure Development Project	Agriculture and Rural Development	10	9
6	Livestock Development and Animal Health Project	Livestock	10	9
7	Zambia Aquaculture Enterprise Development Project	Aquaculture	10	9
Total			120	109

Data Collection

The study employed a self-administered structured questionnaire as the primary data collection instrument for this study. The questionnaire was designed using a 1 to 5 point Likert scale, where 1 represented the most favorable impression and 5 represented the least favorable impression. According to (Cooper & Schindler, 2011), the Likert scale, developed by Rensis Likert, is a widely utilized variation of the summated rating scale. Summated rating scales consist of statements expressing either a favorable or unfavorable attitude toward the object of interest, with participants asked to indicate their level of agreement or disagreement with each statement.

(Kuphanga, 2024) emphasized that questionnaires are versatile and effective tools for data collection across various research domains. Their structured format facilitates standardized data collection, organization, and analysis, making them particularly valuable in quantitative research. Moreover, questionnaires ensure confidentiality and anonymity, allowing respondents ample time to reflect on their responses before completing the survey, as they are typically distributed in advance.

Data Analysis

Data analysis generally involves reducing accumulated data to a manageable size, developing summaries, identifying patterns, and applying statistical techniques (Cooper & Schindler, 2011). This process is a crucial aspect of the study. To facilitate this, the study employed descriptive statistics to analyze the data collected from the questionnaire.

Measures of central tendency, including the mean, median, and standard deviation, were calculated using the Statistical Package for the Social Sciences (SPSS) version 30. These statistical methods provided a comprehensive understanding of the current state of implementation of agriculture donor-funded projects in the public sector, helping to highlight key trends and insights from the data collected.

Results

General Respondent's information

The study targeted employees from key government ministries and donor-funded projects relevant to Zambia's agricultural and economic development. Specifically, participants were drawn from the Ministry of Agriculture, Ministry of Fisheries and Livestock, and the Ministry of Finance and National Planning, as well as the following selected donor-funded initiatives: Enhanced Smallholder Livestock Investment Programme (ESLIP), Cashew Infrastructure Development Project (CIDP), Livestock Development and Animal Health Project (LDAHP) and Zambia Aquaculture Enterprise Development Project (ZAEDP).

Response Rate

The study's response rate of 96.3% is notably higher than the rates reported in comparable research within the field. For instance, similar studies targeting employees in public-sector organizations or donor-funded projects often report response rates ranging between 70% and 85% (Smith, et al., 2020); (Chanda & Mumba, 2018). Such variability is often attributed to logistical challenges, respondent availability, and survey fatigue. In contrast, the exceptionally high response rate in this study reflects strong engagement among participants, likely due to the relevance of the subject matter and effective communication during the data collection process. The outcome highlights the importance of strategic planning in achieving high participation levels, which is a critical factor in ensuring data quality and study credibility. Table 4 shows the distribution of response rate.

Table 4: Distribution of Response Rate

		Questionnaires Distributed	Responsive Questionnaires	Non-responsive Questionnaires
N	Number	109	105	4
	Percentage	100	96.3	3.7

Source: (Author, 2024)

Gender

The gender distribution in this study, with male participants comprising 66.7% and females 33.3%, reflects a continued trend of male dominance in roles related to national development and donor-funded agricultural projects in Zambia. This finding aligns with previous studies, such as (Chisanga, et al., 2020), which reported male representation at

70% in similar contexts, citing cultural, institutional, and structural barriers as factors contributing to the underrepresentation of women in decision-making roles. However, other studies have reported higher female participation in agricultural projects, particularly in community-level roles. For instance, (Mwansa & Phiri, 2018) documented female participation rates of up to 45% in projects focused on extension services and grassroots mobilization. This contrast underscores the variability of gender representation depending on the project focus and level of engagement, with women more likely to participate in operational or community-facing roles than in strategic or policy-making positions. Table 5 shows the distribution of respondents by gender.

Table 5: Distribution of Respondents by Gender.

		Frequency	Percent	Cumulative Percent
Valid	Male	70	66.7	66.7
	Female	35	33.3	100.0
	Total	105	100.0	

Source: (Author, 2024)

Level of Education

The educational profile of participants in this study, with 49.5% holding undergraduate degrees, 30.5% master's degrees, and 20% diplomas, aligns with the emphasis on engaging highly educated individuals to provide informed and insightful responses. This distribution is consistent with findings from similar studies in the field. For example, (Mwansa, et al., 2020) reported a comparable trend, where 48% of respondents had undergraduate qualifications, and 32% held postgraduate degrees, reflecting the recruitment of participants with advanced knowledge and expertise. The inclusion of participants with varied educational backgrounds in this study enhances the richness of the data by capturing perspectives from different professional levels. However, it also introduces potential variability in responses, as participants with lower educational qualifications may interpret research questions differently than those with advanced degrees. Similar concerns were highlighted by (Kabwe & Munkombwe, 2019), who noted that education levels influenced respondents' ability to articulate nuanced opinions on complex topics, such as donor-funded project implementation and policy integration. Figure 2 illustrates the distribution of respondent's education levels.

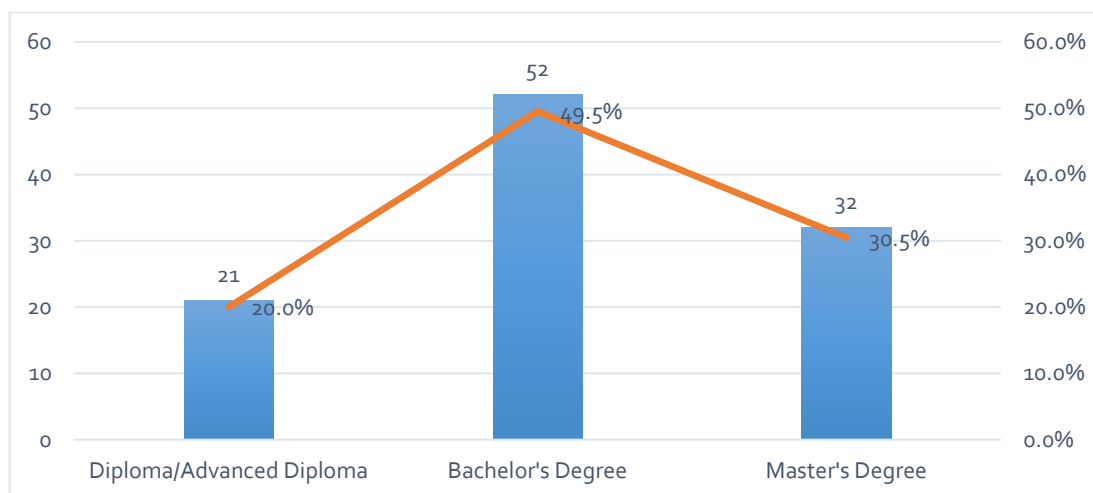


Figure 2: Distribution of Respondent's Education Level. Source: (Field Data, 2024)

Roles in the Ministry

The findings of this study reveal that 38.1% of the participants were members of implementing departments, while 30.5% were part of Project Implementation Units (PIUs). These roles placed the respondents in direct engagement with donor-funded agricultural projects, positioning them to provide informed and contextually relevant insights. This distribution is consistent with findings in similar studies. For example, (Atieno, et al., 2019) reported that 100% of the respondents were from the projects, emphasizing their pivotal role in project execution.

In contrast, studies with a broader focus, such as (Mwansa & Phiri, 2018), found a lower representation of PIU members (20%) and a higher inclusion of support staff (45%) in their respondent pool. Figure 3 illustrates the distribution of respondent's roles in the Ministry.

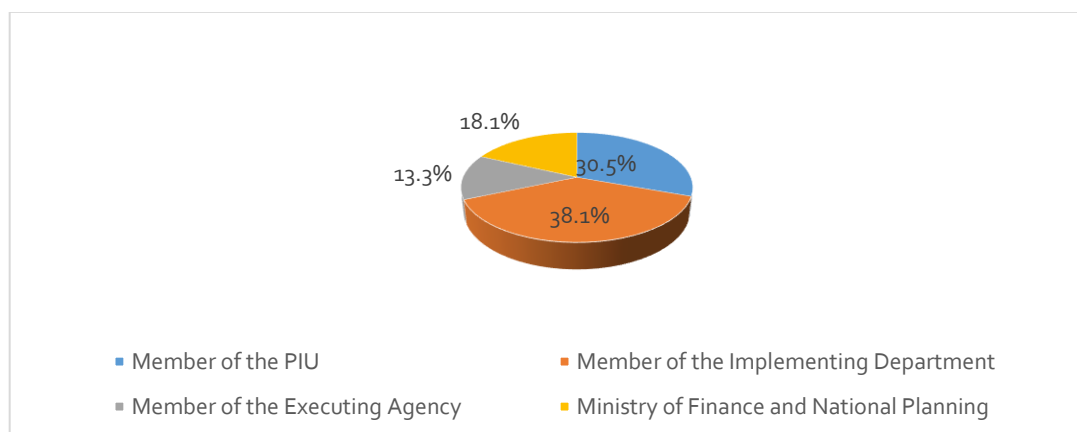


Figure 3: Distribution of Respondents' Roles in the Ministry. Source: (Field Data, 2024)

Funders of the Projects

These results highlight the diverse funding landscape for agricultural donor-funded projects, with the African Development Bank playing a dominant role in funding agricultural

projects in the Zambian Public Sector. Figure 4 illustrates the distribution of responses on project funders.

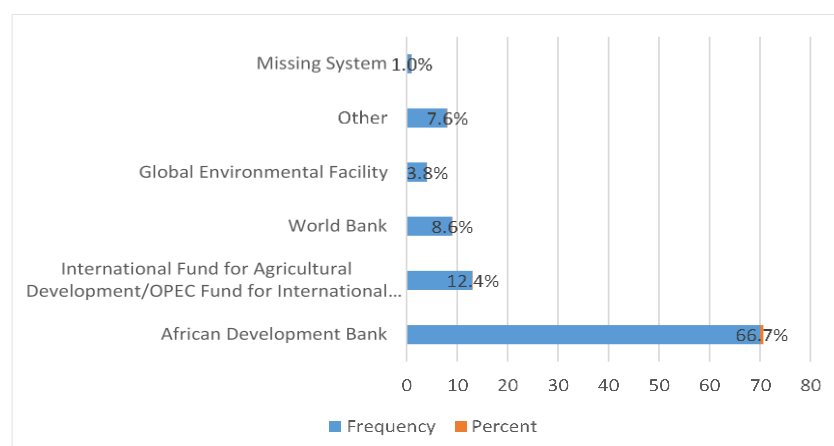


Figure 4: Distribution of Responses on Project Funders. Source: (Field Data, 2024)

Duration in the Projects

The study found that 44.8% of respondents had been involved in the projects for three to five years, representing the largest group and suggesting a high level of familiarity with project implementation processes. This duration provided these respondents with significant experience to offer nuanced insights into the successes and challenges of the donor-funded agricultural projects. Similar studies, such as (Mwansa & Phiri, 2018), reported comparable trends, with 42% of respondents having three to five years of involvement in donor-funded initiatives. Such findings indicate that this range often reflects a sufficient period for participants to develop a comprehensive understanding of project dynamics, including monitoring, evaluation, and stakeholder engagement. Figure 5 illustrates the distribution of respondent's duration in the Projects.

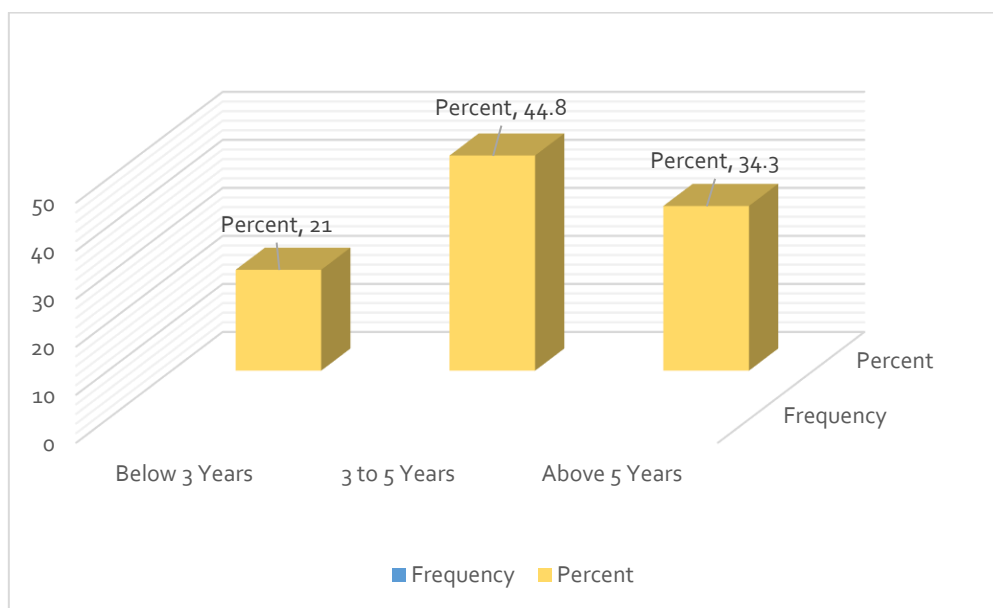


Figure 5: Distribution of Responses on Duration in the Projects. Source: (Field Data, 2024)

Status of the projects

This study found that 64.8% of the donor-funded agricultural projects were completed at the time of the research, indicating that most respondents had experienced the full project lifecycle. This high proportion of completed projects provided a robust basis for evaluating both the successes and challenges encountered during implementation. The findings align with (Mwansa, et al., 2020), who reported 62% of projects as completed in their study on donor-funded agricultural initiatives, emphasizing similar insights into the overall performance, outcomes, and sustainability of completed interventions. Figure 6 illustrates the distribution of responses on projects status.

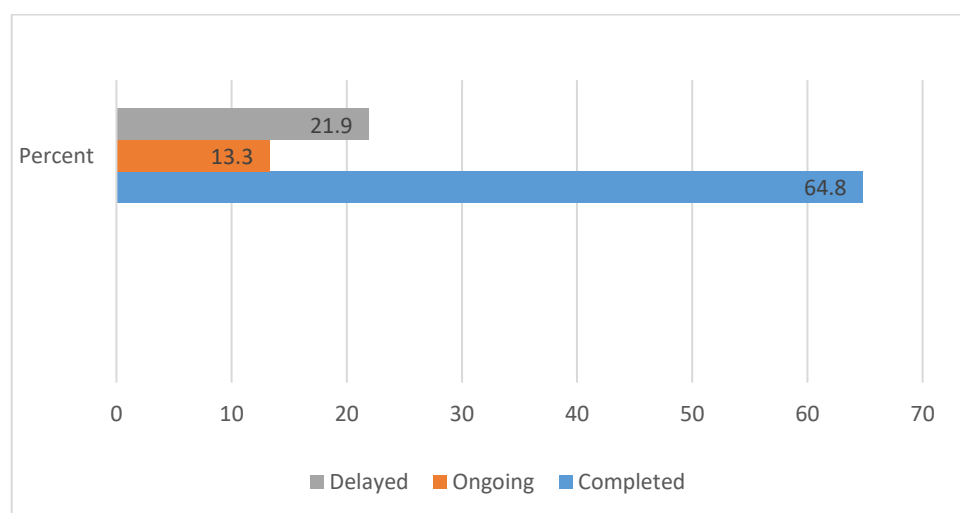


Figure 6: Distribution of Response on Project Status. Source: (Field Data, 2024)

Findings and Discussion**Effect of Stakeholder Engagement on the Implementation of Agriculture Donor-Funded Projects in the Public Sector in Zambia*****Stakeholder Capacity Building in Projects***

The study revealed notable gaps in stakeholder engagement at the inception of project activities, with 49.6% of respondents disagreeing that stakeholders were engaged prior to project implementation. This lack of early involvement suggests insufficient preparation and inadequate communication of project objectives, potentially undermining project success. These findings align with those of (Olander & Landin, 2005), who identified poor stakeholder engagement as a common factor contributing to project delays and inefficiencies, particularly in development-focused initiatives. The absence of early stakeholder involvement in the current study reflects challenges in fostering collaboration, trust, and shared ownership among stakeholders, which are critical to effective implementation.

Conversely, (Bourne & Walker, 2005) emphasized the positive impact of engaging stakeholders from the project's inception, noting that such involvement enhances project outcomes by promoting a sense of ownership, reducing resistance, and ensuring alignment with community needs and expectations.

Stakeholder Engagement at the Start of Activities

The findings highlighted a significant gap in stakeholder engagement at the beginning of project activities, with 41.9% of respondents expressing doubts about the involvement of stakeholders early on. This observation is consistent with (Davis, 2014), who argued that inadequate early engagement can lead to delays, stemming from misunderstandings and misaligned expectations. The results of this study align with this perspective, emphasizing the need for proactive efforts to secure stakeholder buy-in at the outset to avoid potential obstacles during the implementation phase. The findings of the present study suggest that addressing this gap in early engagement could lead to more effective and efficient project implementation, in line with the broader literature on project management best practices.

Ownership of Project Activities

The study revealed that 48.6% of respondents doubted whether stakeholders truly assumed ownership of project activities, raising concerns about the sustainability of project outcomes. This finding aligns with (Cleland, 1986), who emphasized that stakeholder ownership is vital for the long-term success and sustainability of development projects. Cleland argued that without genuine ownership, projects are prone to failure, as stakeholders may lack the motivation to invest in and support the project beyond its initial stages. The findings of this study echo this concern, highlighting a gap in stakeholder engagement and investment that could hinder the sustainability of donor-funded agricultural projects. Conversely, (Turner J. , 2006) posited that stakeholder ownership can

be nurtured through consistent communication and active involvement throughout the project lifecycle.

Consultation in Project Implementation

The study revealed that 38.1% of respondents disagreed with the notion that stakeholders were consulted prior to changes in project implementation, highlighting a significant gap in stakeholder engagement during project adaptations. This finding aligns with (Pinto & Slevin, 1987), who stressed the importance of stakeholder consultation as a critical component of adaptive project management. According to Pinto and Slevin, engaging stakeholders during periods of change ensures that their concerns and insights are addressed, helping to mitigate resistance and foster a collaborative approach to overcoming challenges. Lack of consultation in this study reflects a missed opportunity to adapt and respond to project dynamics with the input of key stakeholders, potentially compromising the effectiveness and efficiency of the project.

Communication in Project Implementation

The study found that while 55.2% of respondents agreed that stakeholders were informed about project progress, a significant 24.8% remained neutral, indicating inconsistencies in communication efforts. This aligns with the (Project Management Institute, 2013), which emphasizes that structured and transparent communication is key to aligning stakeholders with project goals. The findings from this study suggested that while some level of communication was achieved, its inconsistent nature, as reflected by the neutral responses, could undermine the full engagement and alignment of stakeholders, thus posing a challenge to successful project implementation. In contrast, the study's findings concerning lack of written and accurate dissemination of information aligns with (Flyvbjerg, et al., 2003), who argued that incomplete communication often leads to misaligned expectations and project delays. Table 6 shows the descriptive statistics on effective stakeholder engagement.

Table 6: Statistics on Effective Stakeholder Engagement.

OBJECTIVE NUMBER 1: EFFECT OF STAKEHOLDER ENGAGEMENT DURING IMPLEMENTATION OF AGRICULTURE DONOR FUNDED PROJECTS IN THE PUBLIC SECTOR IN ZAMBIA			
(1= Strongly agree, 5= Strongly disagree)	N	Mean	Std. Dev
1.1 Stakeholder Capacity Building			
Project Stakeholders engaged prior to starting the project activities	105	3.08	1.222
Project Stakeholders are engaged during the start of project activities	105	2.97	1.220
Project Stakeholders assumes ownership of the project activities	105	3.30	.900
1.2 Consultation			
Project Stakeholders consulted prior to changes on the projects	105	2.90	1.055
Project holds stakeholder consultation meetings monthly, quarterly, semi-annually or annually	105	2.81	.708
Stakeholders observations are incorporated into project activities	105	2.57	.719
1.3 Communication			
Stakeholders are always informed on the progress of the project	105	2.45	1.028
Information to the stakeholders is accurate and disseminated in writing	105	2.68	.904
Stakeholders provide accurate feedback on time	105	2.62	.764

Source: (Field Data, 2024)

Impact of supplier/contractor capacity during implementation of selected agriculture donor funded projects in the public sector in Zambia

Transparent Supplier Selection in Projects Implementation

Transparent supplier/contractor selection is crucial to project success. The study revealed that only 42.9% of respondents believed the selection processes adhered to established guidelines, such as the National Public Procurement Act. This aligns with (Ahsan & Paul, 2018), who noted that non-adherence to procurement rules often leads to inefficiencies in donor-funded projects.

Capacity of Suppliers/Contractors in Project Implementation

The study revealed significant concerns regarding the technical and financial capacity of selected suppliers, with 42.8% of respondents doubting their technical know-how and 43.8% expressing doubts about financial resources. Similar to findings by (Watt, et al., 2010), this study underscores the need for stringent prequalification criteria to ensure supplier credibility. The delays caused by inadequately qualified suppliers further echo studies by (Memon, et al., 2011), which identified supplier capacity as a major factor affecting timely project completion. Table 7 shows the descriptive statistics on the impact of supplier/contractor capacity.

Table 7: Statistics on Impact of Supplier/Contractor Capacity

OBJECTIVE NUMBER 2: IMPACT OF SUPPLIER/CONTRACTOR CAPACITY DURING IMPLEMENTATION OF SELECTED AGRICULTURE DONOR FUNDED PROJECTS IN THE PUBLIC SECTOR IN ZAMBIA			
(1= Strongly agree, 5= Strongly disagree)	N	Mean	Std. Dev
2.1 Transparent Selection			
Supplier/Contractor selection process is always competitive	105	2.93	1.227
Supplier/Contractor selection is conducted in accordance with the public procurement act and/or the funders guidelines	105	2.99	1.312
There is an invisible hand in the selection of suppliers/contractors	105	2.95	1.304
Transparent supplier/contractor selection helps avoid delays	105	2.88	1.306
2.2 Capacity of Suppliers/Contractors			
Selected suppliers/contractors have the technical know-how to execute the contracts	105	3.12	1.261
Selected suppliers/contractors have sufficient financial resources	105	3.14	1.259
Selected suppliers/contractors with capacity delivers/completes their contracts on time	105	2.96	1.300
Capacity of the supplier/contractors affect the delivery of contracts	105	2.57	1.262

Source: (Field Data, 2024)

Agreement and Disagreement with Past Literature

While the findings generally align with past literature, some areas of divergence were noted. For example, the study found no substantial evidence of external interference ("invisible hand") in supplier selection, contrasting with the findings of (Ameyaw, et al., 2012), which documented widespread corruption in procurement processes across African countries. This suggests that Zambia's procurement systems may have achieved a degree of autonomy and integrity, though more research is needed to substantiate this claim.

Impact of contract management during implementation of agriculture donor funded projects in the public sector in Zambia

Contract Management and Project Implementation

Under contract management the study revealed key challenges in staff competence, resource availability, and workload management, all of which significantly affected project outcomes. Below is a detailed analysis of each of these factors, comparing the findings with existing studies.

Staff Competence and Its Impact on Project Implementation

The study revealed that although contract managers were appointed, they often lack the capacity to navigate complex procurement requirements. Approximately 41.9% of respondents disagreed with the competence of contract managers, highlighting a gap in skills essential for successful project management. This aligns with (Walker & Lloyd-Walker,

2016), who emphasize the critical need for specialized training for contract managers to effectively handle procurement processes. Similarly, (Ramus & Steger, 2000) stressed that contract managers' inability to interpret legal clauses accurately can delay project timelines. The current study corroborates these findings, suggesting that the lack of capacity in managing complex contracts hampers the efficiency and timeliness of donor-funded projects. In contrast, some studies suggest that specialized training may not always be the sole solution. For example, (Jepsen & Eskerod, 2013) highlight that the presence of well-structured guidelines and strong institutional support can sometimes offset the need for specialized skills, particularly when project scopes and contracts are clearly defined. This difference in perspective may reflect varying levels of project complexity and the availability of institutional support in different contexts.

Resource Availability and Its Impact on Project Implementation

The study found that financial and logistical resources were generally deemed adequate for contract management, with 49.5% of respondents agreeing that these resources were available. This aligns with (Turner R. , 2016), who emphasizes that financial stability is essential to ensuring smooth project execution. Adequate resources including logistical support, are critical for the successful implementation of donor-funded projects, as they help mitigate delays caused by resource constraints. However, the lack of stakeholder involvement, as identified in this study, challenges broader literature that emphasizes collaborative resource utilization. (Reed, et al., 2009) argue that successful project implementation hinges on the collective use of resources by stakeholders, suggesting that merely having adequate resources is insufficient if stakeholder engagement is lacking. This discrepancy may reflect differing expectations of resource utilization—financial and logistical resources alone may not address the broader, collaborative requirements of effective project management.

Stakeholder Engagement in Contract Management and Project Implementation

The study's findings underscored the importance of stakeholder engagement in the successful implementation of agriculture donor-funded projects in Zambia, showing that limited stakeholder involvement contributes to project delays. Approximately 47.6% of respondents expressed doubts about the participation of stakeholders in contract management, which aligns with Reed et al. (2009), who emphasize that stakeholder engagement is crucial for project success, particularly in public sector projects. Similarly, (Ahenkan & Boon, 2011) argued that excluding stakeholders leads to delays and reduced project effectiveness, a view supported by this study. However, (Muriithi & Crawford, 2003) presented a differing view, suggesting that stakeholder engagement is not always critical, especially when roles and responsibilities are well-defined. This difference can be attributed to varying project complexities across sectors, illustrating how context plays a significant

role in determining the relevance of stakeholder engagement in different stages of project implementation.

Workload Management and Its Impact on Project Implementation

Workload management emerged as a significant challenge, with 47.6% of respondents indicating that contract managers were overwhelmed by responsibilities beyond contract management. This finding aligns with (Pinto & Slevin, 1987), who identify workload as a critical factor undermining effective project management. Overloading contract managers with additional tasks reduces their ability to focus on contract-specific issues, ultimately contributing to project delays and inefficiencies. In comparison, other studies, such as those by (Turner R. , 2016), suggest that project success depends not only on workload distribution but also on the overall project environment, including team cohesion and clear task delegation. While workload management is indeed a critical factor, Turner advocates for a holistic approach that integrates human resource management practices with project-specific demands. This broader view highlights the need to balance workload across all project personnel, not just contract managers, to ensure the smooth implementation of donor-funded projects. In line with (Ika, et al., 2012), the study underscores the importance of monitoring, coordination, design, training, and a supportive institutional environment as critical success factors for project implementation. Further, while the study acknowledges that financial resources are generally adequate, it concurs with (Ika, 2012), who asserts that the real limitations often lie in administrative capacity, rather than financial resources. This remains a significant issue in Zambia and many other developing nations, where there is a shortage of trained personnel and effective use of resources, leading to delays in project execution.

(Ahsan & Paul, 2018) called for capacitating project implementation units to manage complex donor guidelines and contracts efficiently. The need for strengthening contract management systems through training, improved workload management, and enhanced stakeholder involvement is clear, as these factors collectively influence the success of agriculture donor-funded projects in Zambia. Table 8 shows the descriptive statistics on the influence of contract management.

Table 8: Statistics on Influence of Contract Management

OBJECTIVE NUMBER 3: INFLUENCE OF CONTRACT MANAGEMENT DURING IMPLEMENTATION OF AGRICULTURE DONOR FUNDED PROJECTS IN THE PUBLIC SECTOR IN ZAMBIA			
(1= Strongly agree, 5= Strongly disagree)	N	Mean	Std. Dev
3.1 Staff Competency			
Contract Managers are appointed for each contract with clear terms of reference	105	2.89	1.463
There is poor contract management system	105	2.82	1.466
Contract managers have the capacity to navigate the complex procurement requirements of both donors and local regulations	105	3.15	1.329
Contract Managers need training for relevant skills and legal knowledge in contracts	105	2.75	1.446
3.2 Resource Availability			
Financial resources are available for contract managers to execute their assignments	105	2.74	1.455
Dedicated transport (Vehicles) is available for contract managers to execute their assignments	105	2.74	1.455
Stakeholders are involved in the projects contract management	105	3.26	1.387
3.3 Workload Management			
Contract Managers are overloaded with work other than contract management	105	2.84	1.408
Contract Managers have enough time to execute their assignments	105	3.37	1.416
Contract Managers are able to deal with unexpected problems such as delays, disputes, or changes in project scope which can require immediate attention	105	3.15	1.329
Contract managers have deliberate mitigation measures in place to manage the risks during the contract execution	105	3.30	1.360

Source: (Field Data, 2024)

Conclusion and Recommendations for Future Research

In conclusion, the study underscored the importance of effective stakeholder engagement, transparent selection of suppliers with adequate capabilities, and robust contract management systems for the successful implementation of agriculture donor-funded projects in Zambia. The recommendations provided are intended to address the identified challenges and enhance the efficiency of project implementation, ultimately contributing to the achievement of sustainable development goals in Zambia's agricultural sector towards vision 2030 of becoming a prosperous middle income nation by 2030.

Recommendations

Based on the findings of the study, the following recommendations were proposed to minimize delays and improve the effectiveness of project implementation in Zambia's agriculture public sector:

Tailored Stakeholder Engagement Strategies:

Projects should prioritize tailored engagement strategies that actively involve stakeholders throughout the project lifecycle. This will enhance community ownership, improve the relevance of activities, and promote long-term benefits within Zambia's agricultural sector.

Continuous Staff Training:

It is essential for project implementation units (PIUs) to invest in continuous training for staff involved in project activities, particularly in areas such as stakeholder engagement, contract management, and procurement best practices. This will improve staff capacity and ensure that they are equipped with the latest knowledge to handle challenges effectively.

Independent Evaluation Committees for Supplier Selection:

Projects should establish independent, multi-disciplinary technical evaluation committees to ensure the selection of competent suppliers/contractors. These committees should rigorously assess the technical and financial capabilities of suppliers to ensure they meet project requirements and minimize delays caused by incompetent contractors.

Dedicated Contract Management Personnel:

To ensure efficient contract execution, projects should recruit dedicated contract managers who will solely focus on contract management. This will alleviate the burden on staff responsible for routine tasks and ensure that contracts are managed with the necessary attention and expertise.

Development of Strong Policy Frameworks:

The government should draft and enforce comprehensive policy frameworks for project implementation. These frameworks should outline clear guidelines for contract management, stakeholder engagement, and supplier capacity, providing a consistent and structured approach to the management of donor-funded projects.

Recommendations for Future Studies

While this study provides valuable insights into Zambia's agriculture public sector donor-funded projects, further research is recommended to broaden the scope and address other sectors. Future studies could explore the following areas:

Cross-Sectoral Studies:

Expanding research to include other sectors such as education, health infrastructure, and rural development could offer a more integrated understanding of the dynamics between contract management, stakeholder engagement, and supplier capacity. This would allow for a comparative analysis and a deeper understanding of project management practices across various sectors in Zambia.

Longitudinal Studies on Capacity Building:

Future studies could focus on the long-term effects of capacity building initiatives for project managers, contractors, and stakeholders. Such studies could provide insights into the effectiveness of continuous training and its impact on project outcomes over time.

Exploration of Technology in Project Management:

With the increasing reliance on digital tools and technology, future research could explore the role of technology in improving stakeholder engagement, monitoring contracts, and enhancing supplier capabilities. This would be particularly valuable for adapting to modern project management practices in Zambia's evolving agricultural sector.

Supplementary Material

The authors declare that all the data and materials used in this study are sufficiently included within the manuscript and therefore no further data or link to the data will be provided.

Credit authorship contribution statement

MZ: Writing – review & editing, original draft preparation, visualization, validation, software development, methodology design, investigation, data curation, conceptualization, coordination and formal analysis.

ES: Writing – review & editing, original draft preparation, visualization, software implementation, methodology development, investigation, conceptualization, formal analysis, data validation and supervisor.

EMM: Writing – review & editing, original draft preparation, visualization, software implementation, methodology development, investigation, conceptualization, formal analysis, data validation and supervisor

HS: Writing – review & editing, original draft preparation, visualization, software implementation, methodology development, investigation, conceptualization, formal analysis, and data validation.

ES, EMM and HS: Writing – review & editing, supervision, resource management, project administration, conceptualization, methodology oversight, and data interpretation.

All authors read, reviewed and approved the final manuscript for publication consideration.

Ethics Approval and Consent to Participate

As part of the master's study, ethical clearance was obtained from the University of Zambia Humanities and Social Sciences Research Ethics Committee. The clearance reference number is **2024-SEP-038 (EXPRESS: REC 2035344)**.

Conflicts of Interest

The authors declare that the study was undertaken without any commercial or financial associations that could be perceived as a potential conflict of interest.

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