



Chereponi-Wenchiki Conflict: Policies, Mediating Roles of Ghana and Togo Governments

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ABSTRACT

The study aims to analyze the Cheriponi-Wenchiki conflict in terms of the origins, the actors involved and their motivations in the conflict. It examines the roles of Ghana and Togo's governments in the conflict, their efforts in resolving the conflict and the myriad of problems/issues. In doing so, the study adopted quantitative methods, in which data was obtained from the field (many communities in Ghana and Togo), in assessing the impact of the conflict on the people, properties, and the associated factors in both countries. The study found that several people died because of the conflict, many properties were destroyed, and thousands of people were displaced in Ghana and Togo. The conflict was found to have drained the coffers of the two countries much more in Ghana in terms of the deployment of troops -military and police personnel to the conflict zone at the expense of development projects. Despite these efforts of the governments of Ghana and Togo, it was found in the study that the main inhibiting factor towards effective resolution of the protracted conflict was the issue of conflict of interest of leaders. It thereby recommends politicians and Chiefs should strive to do away with bias and factionalism.

Keywords: Cheriponi-Wenchiki, Chiefdom, Collaboration, Conflict Resolution, Mediation

I. INTRODUCTION

Eneyew and Ayalew (2023) posit that conflict is akin to a fundamental aspect of human society, a notion that proves challenging to dispute despite his expansive conceptualization of conflict. Even within the most advanced and cultured human communities, conflicts inevitably emerge, with their nature varying based on the parties involved (Ziselberger, 2007). In the 21st century, the haunting memories of past wars and ongoing conflicts, span from World War (WW) I and II to the Cold War, Russian-Ukrainian tensions, and Israeli-Palestinian disputes, Rwanda, Liberia, Sierra Leone, Iraq, Yemen, Libya, and the Democratic Republic of Congo (DR Congo), among others all happened and conflicts persist. While conflict is commonplace in every society, it is imperative to acknowledge that its regularity should not lead to the loss of human lives or the destruction of property (Yaro & Tseer 2019). But most conflicts in all forms in which they manifest often result in loss of lives and properties. When conflicts unfold in this manner, the necessity arises to actively pursue authentic solutions to interrupt their course. Yaro and Tseer (2019) highlight a historical agent for peacekeeping (United Nations, League of Nations among others) were established to work hand in hand to eradicate conflicts and explore enhanced approaches to human coexistence. This underscores the inherent, widespread human yearning for peace and underscores the idea that during conflict true peace is always absent.

Also, Adewoba (2007) stated that conflict is the struggle for resources in a society when two or more actors engage in social interactions. Building on this, Justino (2009) argues that the intrinsic social nature of humans and the reliance of human civilizations on social interactions make conflict an inevitable element in human societies, aligning with Aristotle's perspective of human desires for power which include resources (Justino, 2009). While delving into how the fear of death might constrain social interactions and potentially give rise to conflict is a promising area for exploration, the fundamental truth persists: social interactions are an inherent and unavoidable aspect of human societies (Woods, 2003). Furthermore, as Bircan et al. (2016) point out, the widespread occurrence of conflicts globally cannot be solely explained by conflict theorists as social and economic inequalities as bases, although notable groups such as



the Islamic State of Iraq and Levant (ISIL), Boko Haram, Al-Qaeda, Hamas, etc., seem to be primarily motivated by religious factors rather than economic and social disparities.

In contrast to conflicts during the Cold War that were delineated by geographical state boundaries, contemporary conflicts tend to have a more internal focus rather than being predominantly international, as emphasized by Wallerstein (2010). Across Africa, DR Congo confronted a war with rebel groups, Egypt engaged in conflict against Islamic militants associated with the Islamic State, Libya underwent a civil war, Mali experienced clashes between rebel groups and the army, Nigeria faced a war against Islamic militants, Somalia grappled with a conflict against al-Shabaab Islamic militants, and Sudan dealt with a war against rebel groups in Darfur. Also, South Sudan witnessed clashes with rebels and the Ethiopian government war with the Tigray region group and presently, Sudan is experiencing clashes between government forces and Rapid Response Forces (RSF). In most cases, women and children often find themselves vulnerable and bear the brunt of these crises or conflicts be it internal (national), or external (international) (Wallerstein,2019). Conflicts are costly to governments in any country it manifest. Every government makes conscious efforts to resolve conflicts when it occurs. It is in few cases that governments support or fund conflicts. Where such occurred, the same governments still pay the price in terms of loss of lives and properties. This makes conflict resolution essential in both national and international conflicts.

1.1 Conflicts in Ghana

The engagement of Ghana in conflicts has taken the form of coup d'états, along with intra and inter-ethnic conflicts over governmental power, land, mineral resources, and chieftaincies, as described by Yaro et al. (2018). Also, Tonah (2012) reports that Ghana has witnessed four successful coup d'états and numerous attempted coups since independence in 1957.

Within the Northern region of Ghana, various ethnic groups coexist, and the associated existence of challenges related to ethnic identity, acknowledgement, and competition for scarce resources, coupled with inadequate state institutional control, fosters a vulnerability to violent conflicts (Adewoba, 2007). In the recently created North East region, Chereponi District has emerged as a focal point for diverse conflicts. Tensions have arisen among the Bimobas and the Mamprusis, the Mamprusis and the Konkombas, as well as the Bimobas and the Konkombas within this district. Moreover, there are some tensions between the Anufors and the Konkombas and tensions within the Anufors (Chokosis) particularly in terms of the chieftaincy succession crisis in the Chereponi-Wenchiki areas of the Chereponi District of the North-East Region of Ghana. The crisis has led to casualties, the displacement of individuals, property destruction, disruption of social life and plunging the affected areas into a state of paralysis (Sulemana, 2012; Yaro et al., 2018). As per Yaro et al. (2019), the aftermath of conflicts, consistently leaves individuals traumatized, lacking a means of livelihood, without social connections, and frequently orphaned or widowed leading to complete disconnection from their relatives. In Chereponi, the major ethnic groups—Chokosis, Bimobas, Konkombas and Mamprusis share a history marked by prolonged inter-ethnic conflicts. In 2017, tensions escalated between the Chokosis and Bimobas, revolving around a dispute over the right to fish in the Kpembu River (Yaro et al., 2019).

District Police Commander in 2018 indicated two lives were lost, more than five hundred houses were destroyed, and numerous people were displaced. The conflicts involved the Chokosis and the Konkombas. The involvement of the Konkombas, as an ethnic community, in a series of ethnic conflicts within the Region is noteworthy. This shows how complex and sophisticated the Chereponi conflict is, it has multiple actors and varied interests. Thus, the frequent tensions and conflicts over land, chieftaincy, and access to water for fishing among others. In 2018, Konkombas clashed with the Chokosis, a scenario not surprising given their history, as the Konkombas had previously been engaged in conflicts with almost all their neighbours in the Northern Region. This resulted in over twenty-eight fatalities in a single day, with more than half a million individuals displaced and five hundred houses set ablaze (Mahama, 2011).

In 2022 and 2023, the Chokosis were involved in internal conflicts in Wenchiki over chieftaincy, and this issue remains unresolved. These incidents constituted communal clashes within the Chereponi-Wenchiki District. Wenchiki is a border town which lies very close to the Togo border. So, the chieftaincy conflict in Wenchiki had a spillover effect on the governments of Ghana and Togo as both citizens of Ghana and Togo suffered the negative effects of the Wenchiki conflict.

Conflicts in Northern Ghana commonly encompass the incineration of dwellings, devastation of crops, and plundering of livestock (Adewoba, 2007; Sulemana, 2012; Yaro et al., 2018). The severity of destruction has become particularly pronounced in recent conflicts among ethnic groups such as the Chokosis, Konkombas, and the Mamprusis. A notable characteristic of many of these conflicts is their alignment along ethnic lines, indicating an inherent animosity among ethnic groups (Marfo & Halidu, 2018). These conflicts are commonly classified as both intra and inter-ethnic

conflicts, a recurring pattern observed throughout human history (Mudi, 2017) Nevertheless, modern ethnic conflict theories like instrumentalism and relative deprivation theories have taken precedence over this theory. Researchers have directed their attention to numerous ethnic conflicts in Northern Ghana, to comprehend their causes and consequences. Some studies have delved into the broader landscape of conflicts in Northern Ghana, while others have examined the relationship between ethnic conflicts in Ghana and the policies enacted during the era of British colonial rule. Furthermore, specific conflicts, such as the Dagbon Chieftaincy succession conflict resulting in the assassination of Yaa-Naa Andani II in 2002, have been explored by researchers (Sulemana, 2012; Mahama, 2011; Talton, 2003).

Despite the abundance of studies on conflicts in Ghana, there is a notable gap in research focusing on the specific role of the governments of Ghana and Togo in general and specifically the roles both national governments of Ghana and Togo played in the Chereponi-Wenchiki Chieftaincy Succession Conflicts within the Chereponi district. This study aims to fill this gap by investigating the roles and the impact of the governments of Ghana and Togo on conflict resolution, examining their collaboration in conflict resolution, and identifying factors that impede the effectiveness of government involvement in conflict resolution. This study's findings will contribute to establishing a framework for discussing policies designed to prevent and manage conflicts in the Chereponi District, North East region, and the two countries (Ghana and Togo) as a whole.

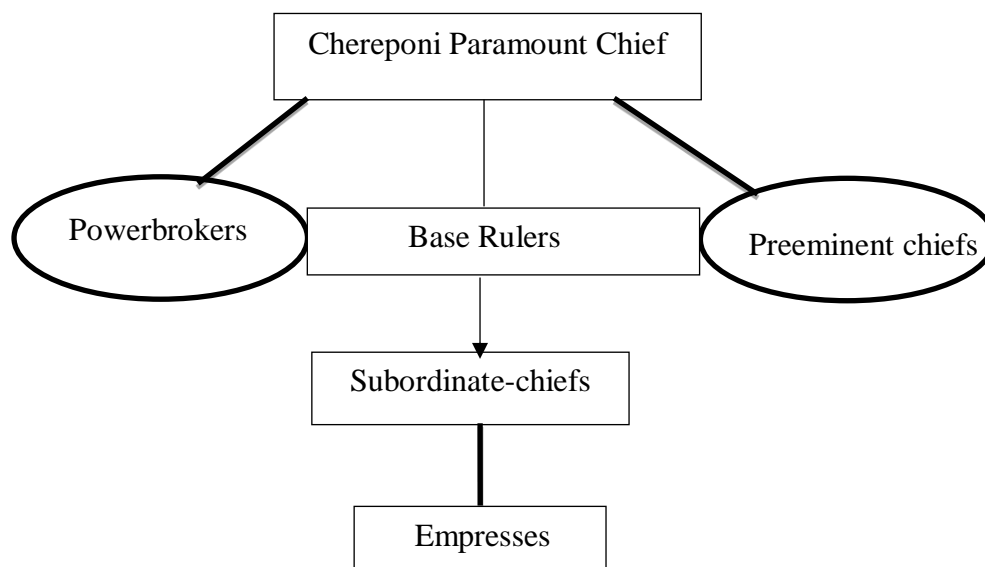


Figure 1

Composition of chieftaincy establishment in Chereponi-Wenchiki Chieftaincy

Source: Authors' Construct

1.2 Theorising the Conflicts in Chereponi-Wenchiki

In determining the Chereponi-Wenchiki conflict occurrence, numerous theories come into play. Predominantly, the power or competition theory states that conflicts can be resolved through the exertion of power, position, or strength. When one faction holds superior power, it can dominate the weaker opponent, leading to a victory. This dynamic is particularly relevant when power is tied to a recognised position of authority within society (Weeks, 2014). Mostly in such situations, the losers may lack alternative possibilities for looking for redress, rendering them powerless to express their concerns. This shows that conflict resolution occurs automatically when one group holds power and authority over the other (Wallenstein, 2019). This viewpoint is in line with the power-elite theory proposed by Wright Mills (1956), which asserts that the ruling class dominates society, acting in its interests rather than those of the larger population. This influential group often includes the military, large businesses, and the government. When applied to the Chereponi-Wenchiki conflicts, documented instances reveal faction members being attacked and killed (Tonah, 2005; Olaniyan et al., 2015).

The theories of power or competition in conflict resolution may not be conducive to resolving Chieftaincy conflicts, especially when the protagonists are intricately connected with various gates or parties to the conflict. On the other hand, collaboration entails mutual respect and a shared commitment to working together to address lingering



differences, ensuring satisfaction for each party involved. This necessitates the availability of time, allowing parties to dedicate themselves to collaborative efforts, framing the conflict as 'we versus our problem' rather than 'we against them.' While collaboration could be an ideal approach to resolving the Chereponi-Wenchiki conflict, the assurance of adequate time, commitment, and capability may not always be guaranteed to ensure effective collaboration.

In summary, the theory of Compromise or Negotiation emerges as relevant for addressing the conflicting issues in the Chereponi-Wenchiki region. Compromise entails each party conceding something to reach a middle ground, often resulting in both parties being somewhat dissatisfied, fostering a scenario of 'we are both sort of okay (Zartman, 2007).' Considering the significance of issues like land and chieftaincy to human well-being, it would be prudent for the involved parties to embrace compromise, softening their stances to accommodate each other. Opting for compromise proves more beneficial for both parties than adopting a 'win-lose' approach. However, the challenge inherent in this theory lies in the potential dilution of solutions, raising doubts about the commitment of both parties/factions in the conflict.

II. METHODOLOGY

2.1 Research Design

In conducting the research, a descriptive survey design was employed, incorporating quantitative instruments for data collection by Creswell (2008). The study specifically targeted residents of Chereponi and neighbouring communities in the study area, leveraging their practical familiarity with the conflict to obtain first-hand information on the crises in Chereponi. The selection of participants involved the use of simple random sampling techniques, and the sample size of 100 was determined through the application of the Miller and Brewer formula, considering a population of 87,176 respondents.

2.2 Study Area

Chereponi and Wenchiki are in the North-East Region of Ghana. Chereponi district is one of the districts that were carved out of the Northern Region. The district has a population of 87,176, males constituting 49% and females 51% of the population (GSS, 2021). Notably, the youth is half of the entire population. A good number of persons are working in the formal sector of the economy, and the formal sector workers include administrators, teachers, nurses, and development practitioners, although they constitute a smaller number than those involved in the informal sector within the district. A larger number of the inhabitants are engaged in areas such as agriculture, forestry, fishing, and trading (GSS, 2021). The study involved numerous communities around both Togo and Ghana. The study covered these communities Chereponi and Wenchiki (Togo), Ango (Ghana), Chereponi and Wenchiki (Ghana) Daabu, Akobila, and Ango (Togo).

2.3 Target population and sample size

The total population of the Chereponi and around the Togo border area is 87176 (Ghana Statistical Service, 2021). The study employed Miller and Brewer's (2003) formula to determination of the sample size to avoid bias in the selection of the number of people for the study.

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

n is the sample size, 1 is the constant, N is the total population under investigation, and α is the significance or margin of error. The sample size is set at a 90% confidence level to have a fair and representative sample size (at a 0.1 significance level). Therefore, the study population of 87176 was used to calculate the sample of 100 participants below.

$$n = \frac{87176}{1+87176(0.1)^2}$$

$$n = 99.885$$

$$n = 100$$

2.4 Data Collection

To explore the factors influencing the Chereponi-Wenchiki chieftaincy succession conflicts in Ghana, an in-depth review of critical literature on conflict processes was undertaken. The collection of data on the Chereponi-Wenchiki conflict involved the use of questionnaires, with a focus on capturing respondents' experiences at the household level. The questionnaires specifically delved into the role played by the governments of Ghana and Togo in



the Chereponi-Wenchiki Chieftaincy Succession conflicts at the community level. Throughout the research, strict adherence to ethical standards in Ghana was maintained, including obtaining research approval from relevant institutions and ensuring the consent, confidentiality, and anonymity of respondents. The data was collected between July and September 2023.

2.5 Data Analysis

Utilizing the Statistical Package for Social Science Services (SPSS) version 26.0, the analysis of quantitative data gathered from the field involved the application of fundamental statistical tools. Metrics including means, standard deviation, percentages, frequencies, and Mean Item Scores (MIS) were employed in this analysis. A validation process was executed before the final interpretation and discussion of results to ensure the accuracy and reliability of the quantitative data gathered from the field.

III. RESULTS

3.1 Demographic Characteristics of Respondents

3.1.1 Sex of Respondents

On the issue of sex, data from the analysis revealed that 60.9 per cent of the respondents were males, while 39.1 per cent of them were female as shown in Figure 2 below.

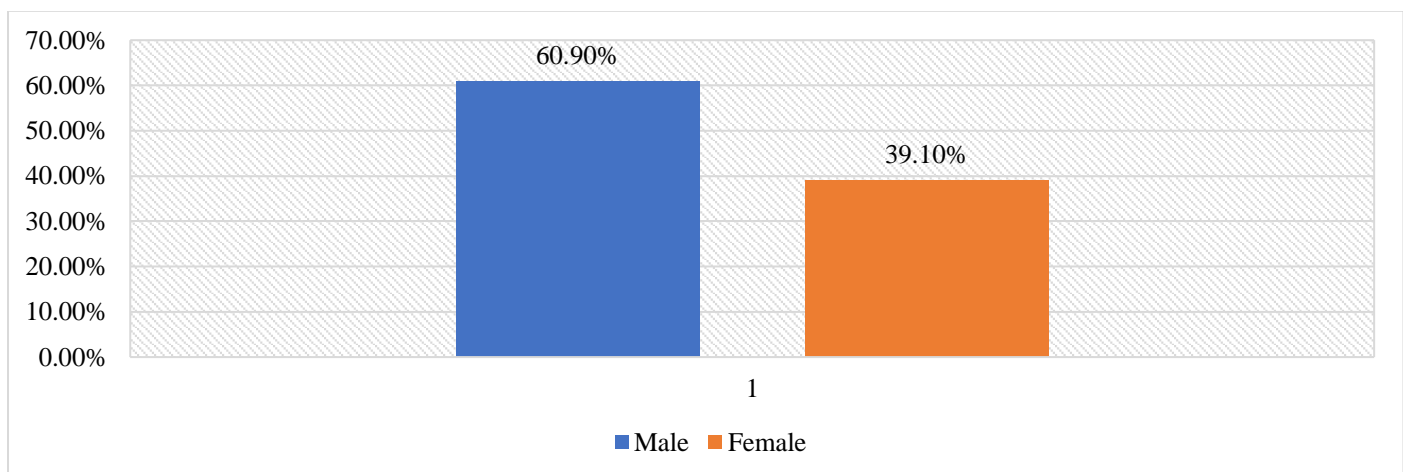


Figure 2
Sex of Respondents

3.1.2 The Educational Level of Respondents

The educational level of respondents was also looked at and the analysis shows that 42.6 per cent of the respondents had no formal education. It further revealed that 26.5 per cent of the respondents had secondary education, 22.1 per cent of the respondents had Basic education, and 8.8 per cent of the respondents had their education up to the tertiary level as shown in Figure 3.

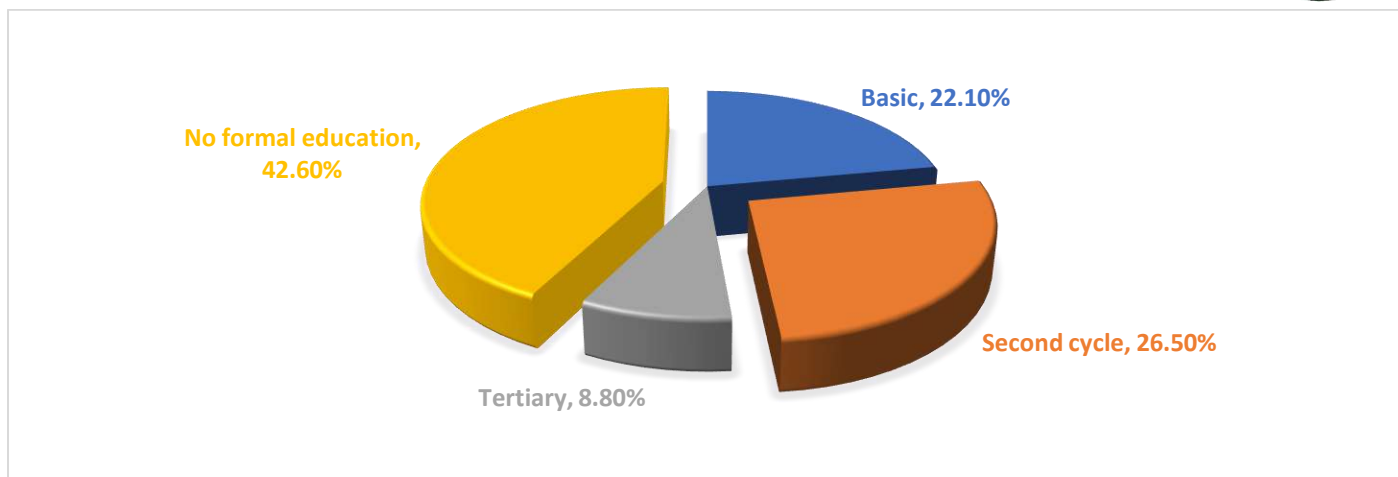


Figure 3
Educational Level of Respondents

3.1.3 The Chieftaincy Gate of Respondents

On the issue of the chieftaincy gate to which the respondent belongs, data from the field shows that 43.5 per cent of the respondents selected both Fambol and Jaabu as their gates, while 13.0 per cent of the respondents were neutral indicating that they don't belong to either Fambol or Jaabu gates as depicted in Figure 4 below.

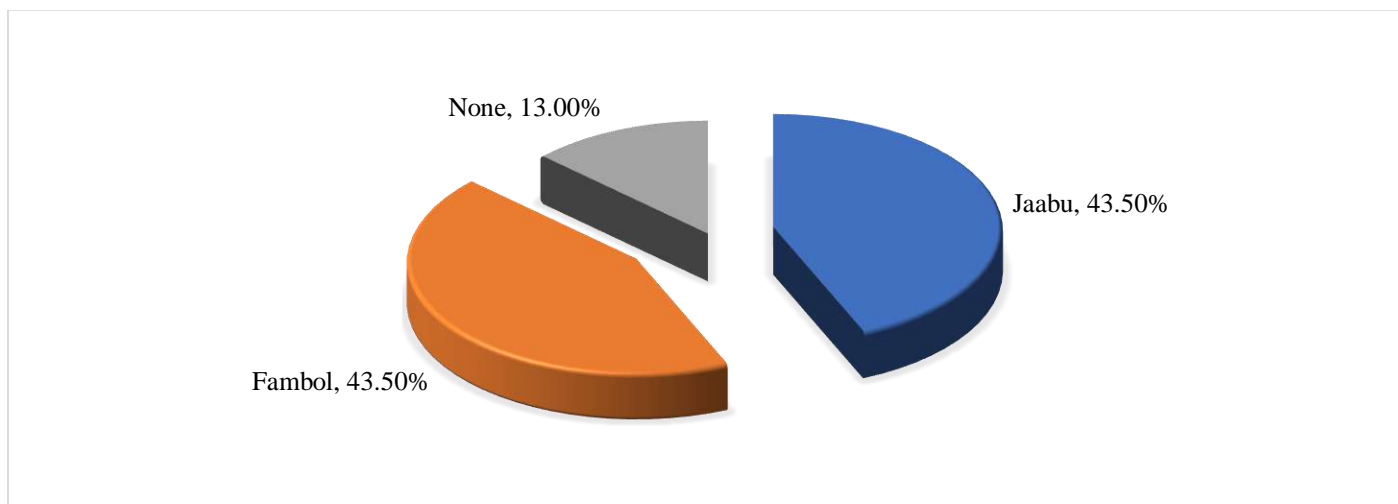


Figure 4
Chieftaincy Gate of Respondents

3.2 Impact of the Role of the Government of Ghana and Togo on the Conflict Resolution

3.2.1 Descriptive Statistics for the Role Played by the Government of Ghana and Togo on the Conflict Resolution

Table 1 shows the results of the role played by the Ghana and Togo governments in conflict resolution. The study revealed that Ghana and Togo governments play a very significant impact (mean = 4.54) on the resolution of the Chereponi-Wenchiki Chieftaincy succession conflict. Further analysis shows that Ghana and Togo governments play a moderate impact (mean = 4.07) in the mediation of the Chereponi-Wenchiki Chieftaincy succession conflict. Also, the study revealed that Ghana and Togo governments play a moderate impact (mean = 3.97) when it comes to impartiality in granting judgments for the Chereponi-Wenchiki Chieftaincy succession conflict. The study revealed that Ghana and Togo governments play a moderate impact (mean = 4.44) when it comes to implementing resolutions for peace talks in the Chereponi-Wenchiki Chieftaincy succession conflict. The study again shows that Ghana and Togo governments play a moderate impact (mean = 3.59) when it comes to housing and feeding internally displaced persons in the Chereponi-Wenchiki Chieftaincy succession conflict.

**Table 1***Impact of the Role of the Government of Ghana and Togo on Conflict Resolution*

Statement	N	Min	Max	Mean	SD
Organisation of people for peace talk	100	1	5	4.54	0.739
Mediation	100	1	5	4.07	0.982
Heading Negotiations	100	1	5	3.78	1.131
Initiating Reconciliation	100	1	5	3.74	1.244
Settling Minor Disputes	100	1	5	3.84	1.158
Impartiality in granting Judgments	100	1	5	3.97	1.349
Meeting punishment to conflicting parties as a measure of deterrence	100	1	5	4.18	1.239
Implementing Resolutions from Peace Talks	100	1	5	4.44	0.699
Housing and Feeding Internally Displaced Persons	100	1	5	3.59	1.448

1 – Not an Impact, 2 – Minor Impact, 3 – Somewhat of an Impact, 4 – Moderate Impact, 5– Very Significant Impact

3.2.2 Regression Analysis of the Impact of the Government of Ghana and Togo on Conflict Resolution

This section analyzed the regression results of the impact of the government of Ghana and Togo on Chereponi-Wenchiki Chieftaincy Conflict Resolution (IGGTCR). The independent variables are Mediation (MDA), Initiating Reconciliation (INR), Settling Minor Disputes (SMD), Impartiality in granting Judgments (IGJ), Meting punishment to conflicting parties (MPCP), Implementing Resolutions from peace talks (IRPT) and Housing and Feeding Internally Displaced Persons (HFID). The findings were presented in Table 2.

Table 2*Regression Results*

Variables	Coefficient	t-Statistic	Prob.
Constant	1.877	8.836	0.000
MDA	0.406	4.411	0.000
INR	0.038	0.521	0.604
SMD	0.192	2.398	0.019
IGJ	-0.101	-1.325	0.189
MPCP	-0.024	-0.288	0.774
IRPT	0.278	2.255	0.027
HFID	-0.341	-4.053	0.000
R	0.627		
R-squared	0.393		
Adjusted R-squared	0.325		
S.E. of Estimate	0.580		
F-statistic	5.752		
Prob (F-statistic)	0.000		

The analysis revealed some variation in the impact of the government of Ghana and Togo on Chereponi-Wenchiki Chieftaincy Conflict Resolution. The data revealed R-square value of 0.393 indicates that Mediation (MDA), Initiating Reconciliation (INR), Settling Minor Disputes (SMD), Impartiality in granting Judgments (IGJ), Meting punishment to conflicting parties (MPCP), Implementing Resolutions from peace talks (IRPT) and Housing and Feeding Internally Displaced Persons (HFID) accounted for more than 39.3% of difference in government of Ghana and Togo on Chereponi-Wenchiki Chieftaincy Conflict Resolution with a standard error of estimate of 0.580. The adjusted coefficient of determination (R²) shows that 32.5% of the impact of the government of Ghana and Togo on Chereponi-Wenchiki Chieftaincy Conflict Resolution was explained by variations in Mediation (MDA), Initiating Reconciliation (INR), Settling Minor Disputes (SMD), Impartiality in granting Judgments (IGJ), Meting punishment to conflicting parties (MPCP), Implementing Resolutions from peace talks (IRPT) and Housing and Feeding Internally Displaced Persons (HFID). This explains how the variation in the impact of the government of Ghana and Togo on the Chereponi-



Wenchiki Chieftaincy Conflict Resolution was accounted for statistically by the regression equation. Hence, R-squared was significant statistically, with $F = 5.752$ and $p < 0.000$ as shown in Table 2.

For the impact of the government of Ghana and Togo Chereponi-Wenchiki Chieftaincy Conflict Resolution. The results show that impartiality in granting judgments (IGJ) ($-0.101, p = 0.189$), and meting punishment to conflicting parties (MPCP) ($-0.024, p = 0.774$) do not contribute significantly to the effort of the government of Ghana and Togo Chereponi-Wenchiki Chieftaincy Conflict Resolution because their Sig values are greater than 0.05. However, implementing and housing and feeding internally displaced persons (HFID) ($-0.341, p = 0.000$) contribution is significant but had no impact on the government of Ghana and Togo Chereponi-Wenchiki Chieftaincy Conflict Resolution. This is shown by the fitted model below:

$$IGGTCR = 1.877 + 0.406X1 + 0.038X2 + 0.192X3 - 0.101X4 - 0.024X5 + 0.278X6 - 0.341X7 + e \dots\dots\dots 1$$

3.3 Collaboration of Ghana and Togo Government in Conflict Resolution

The study examines how chiefs and the central government of Ghana and Togo collaborate in the Chereponi-Wenchiki Chieftaincy conflict management. The results show that Chiefs are involved moderately (mean = 3.96) in the Ghana government resolution of the Chereponi-Wenchiki Chieftaincy conflict management. It further revealed that the government of Ghana/Togo played a moderate (mean = 3.90) role alongside formal mechanisms for conflict resolution such as the police and military, courts, and commissions of enquiry in the Chereponi-Wenchiki Chieftaincy conflict management. Also, the study revealed that the institution of governance is very much respected by the chieftaincy institution moderately (mean = 3.49) by the government of Ghana and Togo in the Chereponi-Wenchiki Chieftaincy conflict management as shown in Table 3.

Table 3
Collaboration of Ghana and Togo Government in Conflict Resolution

Statement	N	Min	Max	Mean	SD
Chiefs are involved in conflict resolution by the Government of Ghana	100	1	5	3.96	1.277
There is a constitutional provision that spells out the role of the Government in conflict resolution	100	1	5	3.94	1.083
Government of Ghana/Togo Played a role alongside formal mechanisms for conflict resolution such as the Police and Military, Courts and Commissions of enquiry	100	1	5	3.90	1.031
Conflict resolution begins with the chiefs before it goes to the Government	100	1	5	3.52	1.471
The focus of conflict resolution is on reconciliation, not punishment	100	1	5	3.88	1.103
Judgements made by Traditional Leaders are set aside by a formal court	100	1	5	3.87	1.254
Aggrieved parties can go to court straight to seek redress without first going to the government	100	1	5	4.25	1.117
The institution of Governance is very much respected by the institution of chieftaincy	100	1	5	3.49	1.677

1 – Not done, 2 – mildly done, 3 – Somehow done, 4 – Moderately done, 5– very much done

3.4 Factors that Work Against the Role of Governments of Ghana and Togo in the Conflict Resolution

The further examines the various factors that work against Ghana and the Togo government’s role in conflict resolution in the Chereponi-Wenchiki chieftaincy conflict. The data analysis revealed that interventions from foreign mediators are a minor factor (mean = 2.20) that work against the role of the government of Ghana and Togo in the Chereponi-Wenchiki chieftaincy conflict resolution. Furthermore, the study revealed that corruption on the part of leadership is a moderate factor (mean = 4.39) that works against the role of the government of Ghana and Togo in the Chereponi-Wenchiki chieftaincy conflict resolution. Again, the study revealed that Conflict of interest on the part of leaders in Ghana and Togo is a very important factor (mean = 4.62) that works against the role of government in the Chereponi-Wenchiki chieftaincy conflict resolution. Also, a mean of 3.97, which is approximately 4, indicates that inadequate resources are a moderate factor that works against the role of the government of Ghana and Togo in the Chereponi-Wenchiki chieftaincy conflict resolution. Additionally, the study revealed that the Leadership Style of leaders



of both Ghana and Togo is a moderate factor (mean = 4.10) that works against the role of government in the Chereponi-Wenchiki chieftaincy conflict resolution as in Table 4.

Table 4

Factors that Work Against the Role of Government in Conflict Resolution

Statement	N	Min	Max	Mean	SD
Foreign Interventions from foreign mediators	100	1	5	2.20	1.451
Corruption on the part of leadership	100	1	5	4.39	0.927
Conflict of interest on the part of leaders	100	1	5	4.62	0.769
Inadequate Resources	100	1	5	3.97	1.294
Leadership Style of leaders	100	1	5	4.10	1.238

1–Not a factor, 2–Minor factor, 3–Somewhat of a factor 4–Moderate factor, 5–very important factor

3.5 Conflict Resolution Mechanisms

The study examines some conflict resolution mechanisms adopted by Ghana and Togo to resolve the Chereponi-Wenchiki chieftaincy conflict. From Table 6, the analysis shows that police and military were very much used (mean = 4.77) by both Ghana and Togo governments as mechanisms to resolve the Chereponi-Wenchiki chieftaincy conflict. Additionally, the study revealed that traditional council was occasionally used (mean = 3.09) by both Ghana and Togo governments as a mechanism to resolve the Chereponi-Wenchiki chieftaincy conflict. Moreover, the study revealed a mean of 3.87, which is approximately 4 meaning respondents are of the view that the House of Chiefs is moderately used by both Ghana and Togo governments as a mechanism to resolve the Chereponi-Wenchiki chieftaincy conflict as in Table 5.

Table 5

Conflict Resolution Mechanisms

Statement	N	Min	Max	Mean	SD
Police and Military	100	1	5	4.77	0.667
Traditional Council	100	1	5	3.22	1.293
Formal Courts	100	1	5	3.85	1.136
Commissions of Enquiry	100	1	5	3.09	1.358
Houses of Chiefs	100	1	5	3.87	2.612

1 – Not used 2 – rarely used, 3 – occasionally used, 4 – Moderately used, 5– Very much used

IV. DISCUSSIONS

The study found that both the governments of Ghana and Togo are making efforts towards the resolution of the Chereponi-Wenchiki conflict. Both governments worked through the active roles of their military and police. The next visible state engagement is the use of the Regional House of Chiefs and the various traditional Councils. The two governments see the conflict as regarding development and to avoid the state of paralysis in the areas. These empirical observations concur with other studies (Sulemana, 2012; Yaro et al., 2018).

Also, the study found that the conflict is multifactorial, and the best resolution is to adopt a multi-actors and multi-sectoral approach towards an effective resolution of the conflict. Thus, the active roles of the governments of Ghana and Togo, civil society groups, and non-governmental actors. These findings are consistent with previous studies in Ghana (Tonah, 2012; Yaro et al., 2018; Konlan, 2018).

Theoretically, the study findings are inclined towards the theoretical arguments of competition for power and where power is vested in one position, the occupier of such a privileged position and the people around the position tend to dominate over other people who are far from the source or position of power. Thus, the theoretical relevance of the theory of competition puts one ethnic group or faction in a better position acting in the interest of that ethnic group against other groups or acting in favour of the chieftaincy or land dispute faction or party against the other faction. The Chereponi conflict fits into the theory of competition among the main ethnic groups namely the Chokosis (Anufors), the Bimobas, the Konkomas and the Mamprusis which is the conflict complex. The results in the study agree with other studies' results or theorizations (Wright, 1956; Weeks, 2014; Wallenstein, 2019). These arguments are closely linked to



the Chereponi-Wenchiki conflicts, in which several documents and interview results suggest instances of faction members being attacked and killed (Tonah, 2005; Olaniyan et al., 2015).

Several factors were revealed as the causes of the protracted Cheriponi-Wenchiki conflict which has killed tens of people and several properties including houses, cars, motor bicycles, and animals among others being killed or destroyed and several thousands of people in Ghana and Togo being internally displaced. Some key factors identified include land, resources, chieftaincy, and struggle over power. This seems to be consistent with these works (Adewoba, 2007; Sulemana, 2012; Yaro et al., 2018). However, the study findings are inconsistent with these studies (Tonah, 2012; Yaro et al., 2018) which connect the conflicts to externalities including coup d'états and their associated decisions on regions, leaders, or some communities in terms of conferment of chieftaincy titles to some groups or factions and the other groups opposing such political decision.

Despite the efforts of the governments of Ghana and Togo towards the effective resolution of the protracted conflict in Cheriponi-Wenchiki. The study found that the main factor that impeded the efforts or the roles of the two states was a conflict of interest on the part of leaders in Ghana and Togo. These leaders included the political and traditional leaders-the Chiefs.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The study concludes that political leaders and traditional leaders are the key actors and their positive attitude towards the resolution of the Cheriponi-Wenchiki conflict is of paramount importance.

5.1.2 Recommendations

The study recommends that both the political leaders-politicians and the traditional leaders-Chiefs should demonstrate strong commitment for peace in devoid of deception and camouflage. Also, politicians and Chiefs should strive to do away with issues of bias and conflict of interest in the conflict. There is the need for law enforcement agencies or officials-military, police to operate and pick up early warning signs and act swiftly without fear or favour to any factions in the conflict in the Cheriponi-Wenchiki areas. Lastly, joint operations and cooperation of the two states are key.

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Deciphering the Drivers of Food Security in Tanzania: Non-experimental Research Design

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ABSTRACT

Food security is a pressing global concern, particularly in developing countries such as Tanzania, where rural areas, predominantly inhabited by smallholder farmers, bear the brunt of its adverse effects. This study looks into the determinants of food security among smallholder farmers in Tanzania, utilising data from the agriculture sample census survey of 2019/20 conducted by the National Bureau of Statistics (NBS). Employing a Non-experimental research design, the study used a probit regression model to estimate key factors influencing food security. The results underscore the significance of factors such as irrigation (-0.906, $p < 0.01$), extension services (-0.040, $p < 0.05$), crop storage (-1.473, $p < 0.01$), land ownership (-0.070, $p < 0.01$), and female land ownership (-0.909, $p < 0.01$) as crucial determinants of food security in Tanzania. The study advocates prioritising community-based irrigation for reliable water sources, expanding targeted extension programs, investing in modern crop storage, ensuring secure land tenure, implementing comprehensive seed subsidies, and adopting a holistic approach to soil fertility management. Policymakers are urged to support these measures to enhance food security among smallholder farmers in Tanzania, promoting resilience, productivity, and sustainability.

Keywords: Agribusiness, Extension Services, Food Security, Irrigation, Poverty, Tanzania

I. INTRODUCTION

Food security is a growing concern worldwide. According to estimates, over 1 billion individuals do not get enough energy from their diets, and at least twice as many have deficiencies in some micronutrients (Cafiero, 2019; Reincke et al. 2018). Statistics show that global food insecurity and malnutrition have increased recently, despite notable advancements made toward the 2030 Sustainable Development Goals objective of "zero hunger and malnutrition" across nations (Kitole et al. 2024b). Between 2014 and 2020, the percentage of people experiencing food insecurity rose by 7.80% points, from 22.6 to 30.4%. However, the increase during the Covid-19 pandemic in 2020 (3.80% points) was nearly equal to the increase during the five years prior, from 2014 to 2019 (Food and Agriculture Organization [FAO], 2023; 2020). As a result, improving food security is still a hot concern in the development and scientific communities (Gil et al., 2019; Getaneh et al. 2022).

In Africa, the number of people who are food insecure is still increasing (Mwanga, 2020). As a result, the COVID-19 pandemic, conflicts, export restrictions by the world's leading suppliers, and climate change have led to a rise in global food prices, which, in turn, significantly contributed to the rising food and nutrition insecurity across the globe (Enilolobo et al., 2023; International Food Policy Research Institute [IFPRI], 2022; Headey & Ruel 2020; World Bank [WB], 2020). Sub-Saharan African [SSA] countries are disproportionately affected by this unprecedented rise in global food insecurity and malnutrition due to the combined effects of the factors as mentioned earlier (Azomahou et al., 2022; Cassimon et al., 2022; Onyeaka et al., 2022). However, the potential impact of food security in African urban areas has received less attention than other elements that have been explored to address the food crisis (Dake, 2021).

Globally and particularly in developing countries like Tanzania, enhancing good security has remained to be an important topic in both scientific and development communities. For example, countries in the world are implementing various strategies to achieve Sustainable Development Goal 2 (SDG 2) of Zero Hunger focusing on ending Hunger by ensuring access to safe, nutritious, and sufficient food throughout the year by all people, in particular the poor and people in vulnerable situations, including infants. To achieve this goal, Tanzania as a country, via Five Year Development Plan III (FYDP III), have focused on Promoting investment in the production and consumption of diversified nutritious foods and increasing the production, distribution and consumption of local nutritious food (URT, 2021; Kitole & Utouh, 2023). In addition, the country has been implementing various



Productive Social Safety Net (TASAF-PSSN) intervention programmes to provide social funds to protect people experiencing poverty, not through relief or welfare handouts, but through investments, people chose to guard or improve their well-being (Kitole, 2023; Rukiko et al., 2023)

Despite various initiatives to address the problem in Tanzania, food security remains a persistent challenge. For example, according to the 2011/12 Household Budget Survey (HBS), the issue of food security was a major concern in rural areas (11.3%) compared to urban areas (8.7%), while in 2017/2018, the average food insecurity in Tanzania was 19.4%, with 24.6 and 10.6% for rural and urban areas respectively (NBS, 2020), and the proportional grew to 20.01% and 11.26% in 2022 (Kitole & Sesabo, 2024). As the situation of chronically food insecure people is becoming an increasingly severe living condition, these statistics indicate the intensity of the problem in the Tanzanian context.

The disparity in food insecurity between the rural and urban areas has been documented; however, there are limited studies conducted during the past COVID 19 pandemic. It is argued that the pandemic may exacerbate the pre-existing vulnerabilities to enhance the accessibility and inequalities in food security. Thus, it is crucial to identify the determinants of food security at the household level through a cross-sectional study based on households to design appropriate strategies to address the problem of food insecurity. Having data on the national food balance sheet is insufficient to understand the country's food security dynamics, especially in the rural areas (Saruni et al., 2018). Therefore, this paper aims to provide insight into the factors that contribute to food security in Tanzania. Specifically, the research aims to explore the dimension of food availability. This will provide important information which will serve as a crucial guiding principle for academics, decision-makers, aid organisations, and development professionals as they build sustainable and urgent development plans or interventions.

II. LITERATURE REVIEW

2.1 Empirical Literature Review

The empirical reviews offer insights into various aspects of food security, exploring different geographical locations and factors influencing it. Bawadi et al. (2012) conducted a cross-sectional study in Northern Jordan, emphasising the prevalence of food insecurity among women. The study highlighted the influence of education levels on food security in the Jordanian context. Moreover, other studies have also shown that demographic factors such as family size, age of the head of household, sex and marital status influence household food availability significantly (Mwanga, 2020; Fumbwe et al., 2021).

Moreover, Zainab (2023) examined how the crisis between Russia and Ukraine has affected food security in Africa, highlighting the continent's reliance on food imports. Using cutting-edge approaches, Mumuni and Aleer (2023) investigated how climate change affects African context food security. The study emphasised how closely temperature, precipitation, and carbon dioxide emissions relate to food security. Also, the study by Enilolobo et al. (2023) also found that agricultural imports and exports positively impacted food security. They emphasised the need for stable exchange rates to maintain the affordability of imported food.

Saruni et al. (2018) focused on the Tanzanian semi-arid region, using a binary logit model to identify factors affecting food security. The study highlighted the inverse relationship between household dependency ratios and food security. Regarding the effect of climate change on food security, the studies by Islam et al. (2022), Mekonnen et al. (2021), Randell et al. (2021), Erasto, (2021), and Randell et al., 2022 found that climate extremes negatively affect food security in Bangladesh, Ethiopia, Nepal, and Tanzania.

Also, Mutea et al. (2022) addressed shocks, socioeconomic status, and food security in Kenya, underscoring disparities and the impact of shocks on food security. Utonga et al. (2023) highlighted institutional determinants in the Singida Region, Tanzania, emphasising the significant impact of institutions on food security. Likewise, Yilmaz and Njora (2021) analysed the impact of agricultural policies on food security in Kenya, recommending subsidies, reduced taxation, and increased allocations to agriculture and food sectors.

The above studies have provided insights regarding various aspects of food security, exploring different geographical locations and influencing factors. These studies indicate that the factors influencing food security include external factors such as the Russia-Ukraine conflict, which impacted those African countries negatively depend on food imports (Zainab, 2023; Enilolobo et al., 2023) (ii) agricultural imports and exports which influence the domestic market prices (Yilmaz & Njora, 2021); climate change-related factors (Mekonnen et al. 2021; Islam et al., 2022; Randell et al. 2021; Randell et al. 2022); households characteristics such as household's dependent ratio and socio-economics status (Saruni et al., 2018; Mutea et al. 2022), institutional factors (Utonga et al. 2023), and agricultural policies (Yilmaz & Njora, 2021). While most studies have shown that food security is highly attributed by



social and demographic factors little has been explored on term of women resource ownership particularly land and the effects of remittances. Therefore, this study adds this information to the existing body of knowledge in analyzing factors influencing households' food security status in Tanzania.

2.2 Theoretical Framework

This study utilised the System Food Approach (SFA), a comprehensive theoretical framework encompassing a myriad of interconnected actors and value-adding activities within the entire food supply chain. The SFA comprises food products' production, distribution, consumption, and disposition (FAO, 2023). Additionally, it includes the social, economic and environmental factors that may affect the household's ability to produce and, hence, lower food security or directly affect food security. The household socioeconomic factors highlighted include education, income, family size and many others that describe household characteristics.

Therefore, the SFA integrates various dimensions of human life, translating into one's ability to access food within a given period. The system of food approach goes beyond the normal food poverty assessment because it even explains the institutional and government position on food security across households. The system argues that households are not the sole actor in the existence of food security as government and other institutions play crucial roles in shaping the status of food security in communities (Dekeyser & Rampa, 2021; FAO, 2023). Moreover, one of the SFAs is considered an important asset in explaining food security because it integrates many components that affect people's welfare, particularly regarding food security status. Therefore, SFA aligns with this study as it emphasize on the interrelation of number for components affecting household food security, moreover, it acknowledges the importance of socioeconomic, institutional and environmental factors that shapes food accessibility across households hence facilitating good understanding on factors influencing household food security in Tanzania.

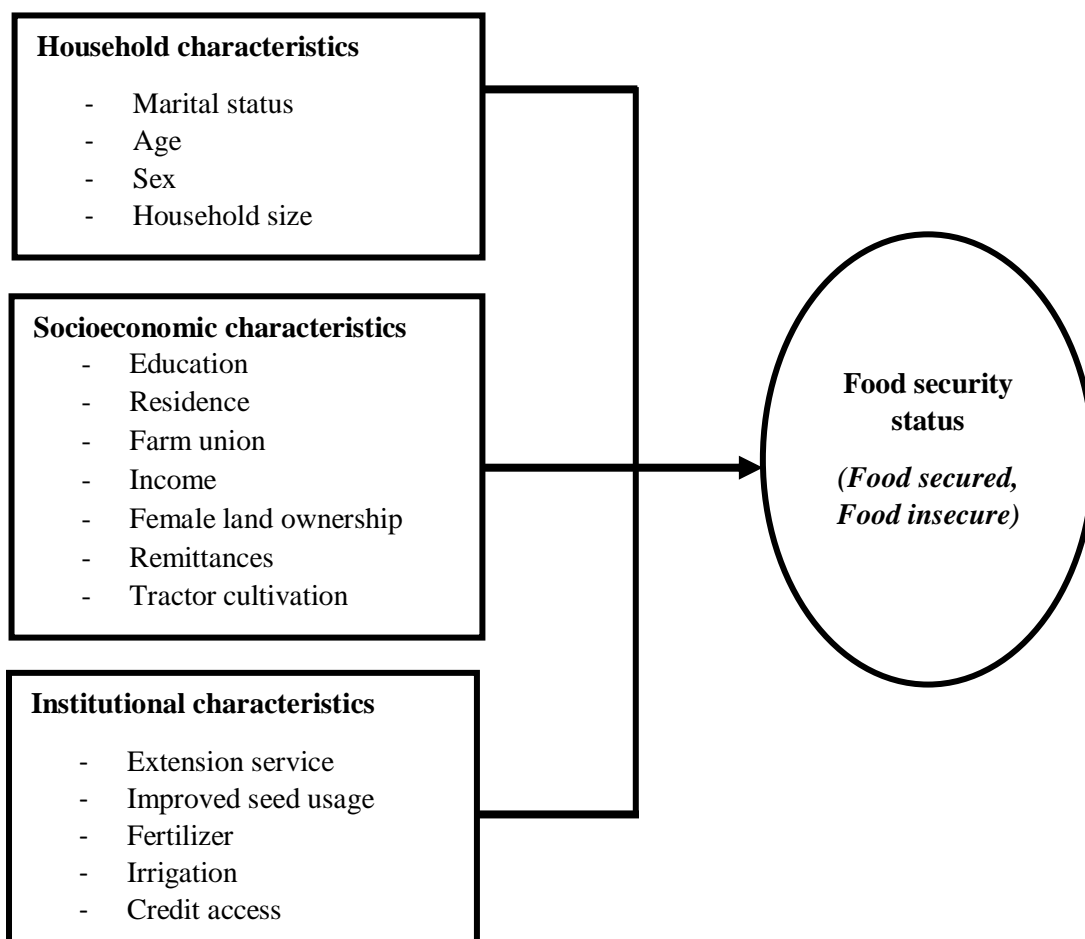


Figure 1
Conceptual Framework for Drivers of Food Security in Tanzania



Within the System Food Approach framework, particular attention is given to the socioeconomic characteristics of farmers. Therefore, drawn from an empirical and theoretical framework, factors influencing food security among households include socio-demographic factors (sex, age, household size, marital status, level of education); socio-economics factors, and institutional factors (Enilolobo et al., 2023; Saruni et al. 2018; Mekonnen et al. 2021). Therefore, Figure 1 presents a conceptual framework for the study.

III. METHOD

This study employs non-experimental research design due to its ability to handle variables without manipulating them (Kitole et al. 2023d; Kitole et al. 2024c). The non-experimental design does not allow the manipulation of variables, hence making it easier to get real results or information from respondents. (Kitole et al. 2024c; Kothari, 2019; Kitole et al. 2023a). The method is more convenient because of the use of secondary data that was sourced from the National Bureau of Statistics for wave five of the Agriculture National Census Survey 2019/20.

3.1 Modelling Household Food Security

In explaining factors influencing household food security in Tanzania by the use of the agriculture census survey data, the current study uses a probit regression model to explain the probability for which various factors influence Tanzania households towards food security (Webele & Greene, 2011; Dimoso & Andrew, 2021; Kitole et al., 2023c). The use of probability helps to enhance clarity on the likelihood of which various factors, including demographic, economic and institutional affect households in attaining food security status.

Therefore, for the probit model, the study considered an equation which describes the household food security status with the following relationship.

$$y_i^* = \beta w' + \mu_i \text{ where } \mu_i \sim (0, \delta^2) \dots \dots \dots (1)$$

y_i^* is the dependent variable, which assumes unobservable status, β represents the independent variable, w' represents the coefficient of the independent variable and μ_i is the error term with standard normal distribution. Since y_i^* is unobservable; what we observe is y_i which takes only two values as described here under:

When $y_i^* > 0, y_i = 1$ if household is food secured

When $y_i^* \leq 0, y_i = 0$ if household is food insecured

Because the probability that the household is food-secured is greater than zero ($y^* > 0$)

$$prob(y = 1) = prob(y_i^* > 0) \dots \dots \dots (2)$$

Or less than or equal to zero ($y^* \leq 0$)

$$prob(y = 0) = prob(y_i^* \leq 0) \dots \dots \dots (3)$$

The likelihood of a household to be food-secured is herein presented by unobservable factors through the dependent variable as follows:

$$Food\ security = \begin{matrix} 1\ if\ Household\ is\ food\ secured^* > 0 \\ 0\ if\ Household\ is\ food\ insecured^* < 0 \end{matrix} \dots \dots \dots (4)$$

If $y_i^* = 0$ then $y = 1$ implying that household is food secured. Therefore, the probability that the household is food-secured assumes that the probability density function of e_i assumed being $f(\mu_i)$ which results in the creation of a new parameter:

$$Prob(y_i = 1|x) = \int_{-\infty}^{x'\beta} f(\mu_i) du = F(x'\beta) \dots \dots \dots (5)$$

$$Prob(y_i = 1|x) = 2\pi^{-\frac{1}{2}} \exp\left(-\beta x_i^2\right) \dots \dots \dots (6)$$

Now, based on the variables used in this study the probit model is therefore presented as;

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 D_i + \mu_i \dots \dots \dots (7)$$

Of which the β_0 is the constant term while β_1 and β_2 are the parameters that will be estimated in the probit equation. On the other hand, X_i are the covariates while D_i represents a group of all dummy variables used in this study. Now, since the probit model is well addressed under the marginal effects which help to explain the extent of effects, then equation 7 is therefore transformed into equation 8 to get the marginal variations in the repressors as shown in equation 8:



$$\frac{dy}{dx_i} = \beta_i \phi(\beta_1 + \beta_n) \dots \dots \dots (8)$$

Moreover, the variables employed in this study have been elucidated, and their measurements are presented in Table 1. This table provides a concise explanation of the measurement of each variable and outlines their utilisation in the study.

Table 1
Description and Measurement of Variables

Variable name	Operational definition	Expected sign
Food security	Household food availability status (1= yes, 0= no)	
Household size	Number of family members in a household	+/-
Age	Age in years	+/-
Residence	Category, 1=Rural, 2 =Urban	+/-
Sex	Category, 1 = Male, 2 = Female	+/-
Marital status	Marital status of the head of household (Married, never married, divorced, widowed)	+/-
Irrigation	Access to irrigation (1=yes, 0=otherwise)	+
Extension service	Dummy, 1=yes, 0= otherwise	+
Crop storage	Dummy, 1=yes, 0= otherwise	+
Improved seed usage	Dummy, 1=yes, 0=otherwise	+
Access to credit	Dummy, 1=yes, 0=otherwise	+
Farm union membership	Membership in farmers' organisation/union	+/-
Remittance	Dummy, 1=yes, 0=otherwise	+
Female land ownership	Dummy, 1=yes, 0=otherwise	+/-
Fertiliser usage	Dummy, 1=yes, 0=otherwise	+
Tractor cultivation	Dummy, 1=yes, 0=otherwise	+

IV. FINDINGS

The findings in Table 2 present the characteristics of smallholder farmers in Tanzania, focusing on various variables and their respective attributes. Findings indicate that 29.76% of smallholder farmers in Tanzania reported having sufficient food availability, while the majority, accounting for 70.24%, reported insufficient food availability. This suggests a significant portion of the smallholder farming population faces challenges in ensuring an adequate food supply. On the other hand, results show that 84.08 percent of households do not access irrigation schemes, while only 15.92% have access to irrigation schemes or services in their areas. This justifies the fact that most Tanzanian households depend on rain-fed farming.

Furthermore, results indicate that 96.13% of all households have no access to extension services, while only 3.87% have access to extension services. This justifies that most households do not receive agriculture production advice. In addition, 75.35% don't have crop storage facilities, while only 24.65% have crop facilities.

Table 2
Characteristics of Smallholder Farmers in Tanzania

Variables	Attributes	Frequency	Percentage
Food availability	Yes	41,891	29.76%
	No	98,872	70.24%
	Total	140,763	100.00%
Irrigation	Yes	22,409	15.92%
	No	118,354	84.08%
	Total	140,763	100.00%



Extension service	Yes	5,448	3.87%
	No	135,315	96.13%
	Total	140,763	100.00%
Crop storage	Yes	34,698	24.65%
	No	106,065	75.35%
	Total	140,763	100.00%
Female land ownership	Yes	30,616	21.75%
	No	110,147	78.25%
	Total	140,763	100.00%
Fertiliser usage	Yes	27,688	19.67%
	No	113,075	80.33%
	Total	140,763	100.00%
Improved seed usage	Yes	42,060	29.88%
	No	98,703	70.12%
	Total	140,763	100.00%
Tractor cultivation	Yes	23,395	16.62%
	No	117,368	83.38%
	Total	140,763	100.00%
Access to credit	Yes	15,019	10.67%
	No	125,744	89.33%
	Total	140,763	100.00%
Remittance	Yes	30,531	21.69%
	No	110,232	78.31%
	Total	140,763	100.00%
Marital status	Married	63,906	45.40%
	Never married	42,581	30.25%
	Divorced	20,819	14.79%
	Widowed	13,457	9.56%
	Total	140763	100.00%
Farm union membership	Members	23,550	16.73%
	Non-members	117,213	83.27%
	Total	140,763	100.00%

Besides, results on gender differences in land ownership have shown that most females do not own land (78.25%) as only 21.75% of females own land. This calls for equity in resource ownership across males and females. On the other hand, results have shown that only 19.67% of households utilised fertiliser while the majority 80.33% did not use fertilisers in their agricultural production. Likewise, the majority, representing 70.12% do not use improved seeds while only 29.88% use improved seeds.

Moreover, results in Table 2 show that 16.62% of farmers reported using tractors or animals in their farming practices, while 83.38% did not. It indicates a significant reliance on manual labour or traditional farming methods, which might affect efficiency and productivity. Nevertheless, only 10.67% of smallholder farmers reported access to credit, while the majority (89.33%) did not. Limited access to credit could hinder investments in farming inputs, technology, and other resources essential for agricultural development. On top of that, results indicate that 21.69% of farmers reported receiving remittances, while 78.31% did not. It suggests that a notable portion of smallholder farmers rely on external financial support, potentially indicating economic challenges within the farming community.

Regarding marital status, most smallholder farmers are married, with 63,906 individuals constituting 45.40% of the sampled population. The "never married" category includes 42,581 individuals, representing 30.25%, while 20,819 individuals (14.79%) are classified as divorced, and 13,457 individuals (9.56%) are widowed. For the union membership, the result shows that only 16.73 percent are members of the farm union, while 83.27 percent are non-members. This indicates that it is hard to convey some important information on agriculture as most are not members of the farmers union.



Table 3
Household Involvement in Farming Activities

Involvement in farming activities	Freq.	Percent	Cum.
Work full time on the farm	51210	36.38	36.38
Work part-time on a farm	6348	4.51	40.89
Rarely work on farm	23473	16.68	57.57
Never worked on the farm	59732	42.43	100.00
Total	140,763	100.00	

Results presented in Table 3 show that 36.38% of households are working on farms as their full-time income activities, while 4.51% are working part-time. Also, the results show that 16.68% of households rarely work on farms, and 42.43% have never worked on farms. This may indicate diversified income sources or additional non-farm occupations within these households. Furthermore, about 16.68% of households reported rarely working on the farm. This category suggests irregular or occasional involvement in farming activities, indicating a potential reliance on other income-generating activities or seasonal agricultural engagement. The majority, 42.43% of households, reported never working on the farm. This group likely relies on alternative sources of income, and their lack of involvement in farming activities may be attributed to various reasons, including non-agricultural occupations or urban lifestyles.

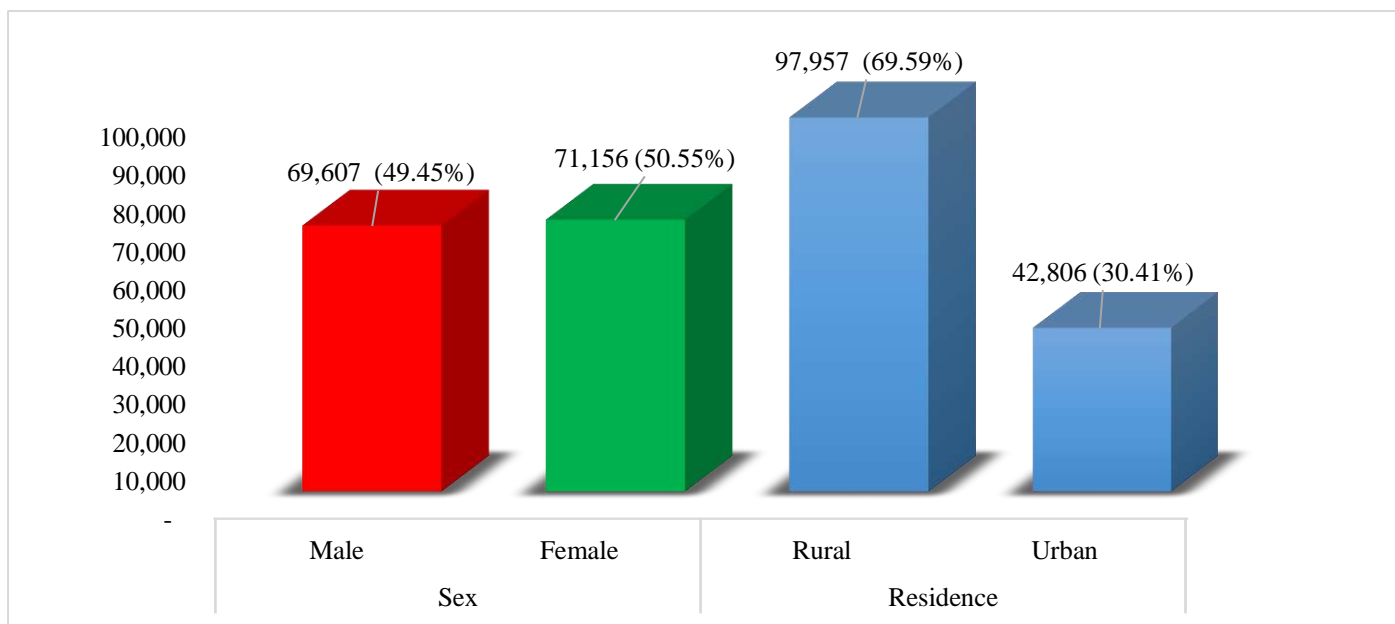


Figure 2
Distribution of Smallholder Farmers across Gender and Residence

Figure 1 illustrates the distribution of smallholder farmers based on gender and residence. Among the sampled population, 69,607 individuals, constituting 49.45%, are identified as male farmers, while 71,156 individuals, representing 50.55%, are female farmers. The data further delineates the distribution across residences, revealing that most smallholder farmers, comprising 97,957 individuals (69.59%), reside in rural areas. In contrast, 42,806 individuals (30.41%) are in urban areas. This distribution underscores the predominantly rural nature of smallholder farming activities, aligning with the common narrative that agriculture, mainly small-scale farming, is a cornerstone of rural livelihoods.

**Table 4***Probit Regression on Factors Contributing to Food Security in Tanzania*

Variable	Simple probit			Marginal effects		
	Coefficient	Standard error	P-values	dy/dx	Standard error	P-values
Sex (Male)	0.1965031	0.390311	0.164	0.345055	0.60631	0.640
Age	0.5407320	0.740228	0.359	0.463232	0.75230	0.431
Residence (Rural)	0.347317*	0.150852	0.067	0.294210	0.195075	0.163
Irrigation	-0.9064085***	0.0266118	0.000	-0.156624 ***	0.00729	0.000
Extension service	-0.0401233**	0.0207295	0.043	-0.003387 ***	0.00171	0.048
Crop storage	-1.47302***	0.0138913	0.000	-0.3018763***	0.00445	0.000
Land ownership	-0.0709893***	0.0136624	0.000	-0.00645***	0.00129	0.000
Female land ownership	-0.9094785***	0.0134312	0.000	-0.1450897***	0.00329	0.000
Improved seeds usage	-0.4243595	0.668594	0.526	-0.02517	0.02503	0.315
Fertiliser usage	-0.1872232**	0.8863544	-0.016	-0.0189609**	0.10411	0.031
Credit access	0.1228941	0.0946833	0.194	0.0095089	0.00654	0.146
Farm union	-0.160732**	0.031732	0.026	-0.096743***	0.00263	0.001
Remittances	0.0359841	0.046644	0.440	0.0030059	0.03378	0.426
Tractor cultivation	-0.3539828***	0.0160715	0.000	-0.039935***	0.00230	0.000
Number of observations	140,763					
Pseudo R²	0.4108					
Chi square	2943.06					

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The probit regression analysis in Table 4 illuminates the intricate determinants of food security among smallholder farmers in Tanzania. Regarding gender, the coefficient for males is 0.1965 ($p = 0.164$), indicating a positive, albeit statistically insignificant, association with food security. The marginal effect of 0.3451 suggests that, on average, males exhibit a 34.51% higher probability of experiencing food security than females. Moving to age, the positive but statistically insignificant coefficient of 0.5407 ($p = 0.359$) implies that, with each additional year of age, the probability of experiencing food security increases by 46.32% (marginal effect). In terms of residence, the positive and marginally significant coefficient of 0.3473 ($p = 0.067$) suggests that residing in rural areas is associated with a 29.42% higher probability of food security (marginal effect) compared to urban areas.

Irrigation emerges as a pivotal variable. The highly significant negative coefficient of -0.9064 ($p < 0.01$) underscores the substantial influence of irrigation in reducing the likelihood of food insecurity. The corresponding marginal effect of -0.1566 indicates a 15.66% decrease in the probability of food insecurity with the presence of irrigation. Crop storage, another influential factor, exhibits a highly significant negative coefficient of -1.4730 ($p < 0.01$). The marginal effect of -0.3019 suggests a notable 30.19% decrease in the probability of food insecurity when crop storage is employed.

Ownership of land is found to be significantly associated with food security. The negative coefficient of -0.0710 ($p < 0.01$) implies that land ownership is linked to a lower likelihood of food insecurity. The marginal effect of -0.0065 indicates a 0.65% decrease in the probability of food insecurity with land ownership. Female land ownership, specifically, emerges as a powerful determinant with a highly significant negative coefficient of -0.9095 ($p < 0.01$). The marginal effect of -0.1451 signifies a substantial 14.51% decrease in the probability of food insecurity when females hold land ownership.

Regarding agricultural practices, tractor cultivation is a robust factor in enhancing food security. The highly significant negative coefficient of -0.3539 ($p < 0.01$) indicates a strong positive impact on food security. The corresponding marginal effect of -0.0399 implies a 3.99% decrease in the probability of food insecurity with tractor



cultivation. Variables such as extension services, use of improved seeds, fertiliser usage, credit access, and remittances exhibit varying degrees of impact, though some are statistically insignificant.

Therefore, these findings shed light on the nuanced dynamics of food security among smallholder farmers, emphasising the substantial roles of irrigation, crop storage, land ownership (especially female land ownership), and tractor cultivation.

V. DISCUSSION

The probit regression analysis revealed insights into factors affecting food security among Tanzanian smallholder farmers. Irrigation showed a negative coefficient, consistent with studies highlighting the positive impact of reliable water access on crop yields and food security, suggesting investment in irrigation infrastructure is vital (Bwambale et al., 2023; Kitole, 2023). Similarly, the negative coefficient for extension services aligns with literature emphasising their role in knowledge transfer, supporting the argument for targeted extension programs to enhance food security (Jambo et al., 2021; Kitole et al., 2023b).

Negative coefficients for land ownership, especially female ownership, echo theories emphasising secure land tenure and gender empowerment's role in agricultural development (Kitole & Sesabo, 2022; Nyikahadzoi et al., 2013; Manda et al., 2023). This underscores the potential positive impact of policies promoting secure land tenure, particularly for women, on food security. However, despite some literature suggesting its positive impact, the non-significant coefficient for improved seed usage highlights the need for context-specific examination of factors influencing seed effectiveness in Tanzania (Chegere et al., 2020; Silambi et al., 2023).

Furthermore, while aligning with the literature on its role in improving soil fertility, the negative coefficient for fertiliser usage underscores the importance of considering contextual factors like soil type and crop choice (Masuku et al., 2023; Kitole et al., 2024a). The non-significant coefficients for bank loans/credit, remittances, and tractor cultivation may indicate differing influences in Tanzanian smallholder farming, emphasising the necessity for nuanced policy considerations (Jena & Tanti, 2023; Kitole and Sesabo, 2024; Erickson and Fausti, 2021). These findings underscore the complexity of factors influencing food security in Tanzania, necessitating further research to inform targeted policy interventions tailored to local conditions.

VI. CONCLUSIONS & RECOMMENDATIONS

6.1 Conclusion

The current study investigates factors affecting household food security in Tanzania among the most important group of smallholder farmers who are the major producers of agriculture in the country. The study reveals that major factors influencing household food security among smallholder farmers in Tanzania are extension services, women land ownership, and crop storage. Moreover, despite remittance was not found to be a significant factor affecting household food security among smallholder farmers, it had negative correlation with food security indicating household with poor or no remittance has higher likelihood of falling into food insecurity compared to those who receive remittances.

6.2 Recommendations

These results inform several policy implications that must be taken into consideration not only in Tanzania but in the entire developing world; these include the following:

First, increasing investment in the construction and expansion of irrigation schemes will help to increase the number of smallholder farmers to increase production and develop climate resilient strategy by having reliable sources of water instead of just depending on rainfed agriculture which is sometimes done just once in a year and as climate changes continue to grow in most of the developing countries they sometimes associated with the long dry seasons. Therefore, these strategies help increase production across farming societies and overcome food shortages that may lead to food insecurity.

Second, the government should enhance the provision of extension services to reach a large number of farmers in rural areas to improve farmer's production knowledge and be able to fight against diseases and understand the right time to use several production inputs including fertilisers, as results of the study have shown that the use of fertiliser reduces the likelihood of households falling into the food insecurity as it increases food production. These extension services are important because they enable farmers to understand the characteristics of various diseases and



how they change with time; therefore, it helps to find the right pesticide to use and the usage time, and increase production.

Last, policymakers must design mechanisms to enhance access to agricultural subsidised inputs such as fertiliser and pesticides to improve agricultural production for smallholder farmers. This will be a panacea to overcome the food shortage problem across these farming communities, especially rural ones. In achieving this, the government needs to establish agricultural input funds that facilitate the stabilisation of prices, especially for agricultural inputs, to reduce the burden of incurring costs related to agricultural production, which might impact the welfare of the smallholder farmers.

6.3 Limitations of the Study

Although the current study presents important information on the factors or determinants of household food security in Tanzania, several limitations have to be acknowledged as a result of the choice of data and methodology employed in the study. Relying on secondary data poses challenges related to limited control over the data collection process. Additionally, there is a need to ensure alignment of the problem to be studied for the data to be relevant and adequate regarding population and variables. It is acknowledged that the data may lack sufficient context to comprehend fully the factors contributing to food security in Tanzania. For instance, when examining farmers practising irrigation, determining the significant contribution of irrigation to food security solely based on their responses is challenging.

Similarly, assessing the contribution of crop storage to food security encounters difficulties due to limited responses from a few individuals. To enhance the quality of future studies, it is essential to thoroughly assess data sources, evaluate their quality, and address potential biases. This critical evaluation will improve the reliability and validity of research outcomes.

Statements and Declarations

Funding

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Ethics approval

Not applicable

Availability of data

Data and all materials will be available upon reasonable request.

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External Debts as Panacea to Economic Growth Challenges in Selected Eastern African countries: An Application of the Autoregressive Distributed Lag Model

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ABSTRACTS

Foreign aid has significantly influenced medium- and long-term development initiatives in Eastern African countries. Project aid and non-project aid are the two main categories that describe foreign economic assistance (loans, credits, and grants). The primary aim of foreign aid has been to supplement the internal resources needed to quicken the economic development of the nations in Eastern Africa. This study investigated the influence of external debt on the economic growth of Eastern African countries (Kenya, Uganda, Rwanda, Burundi, and Tanzania) using the autoregressive distributive lag mode and panel data (1970–2020). The findings revealed that external debt had a significant adverse effect on economic growth. In Burundi, an increase in external debt reduces GDP by 5% in the short run, while in the long run, it reduces GDP by 19%; in Tanzania, it decreases GDP by 22%; and in Kenya, it reduces the GDP by 13%. Conversely, the findings indicated that the increased level of external debt positively influenced Uganda's GDP (0.03%) but was not statistically significant. Therefore, it is recommended that Eastern African countries source their income, apart from more external concessional debt, through bilateral or multilateral arrangements to plug into their budget deficits. Also, it is recommended that East African governments develop their external debt initiatives that offer further profitable investment opportunities to repay their foreign debt gradually. Moreover, strategies in the East African countries must be geared towards strengthening revenue mobilization to provide avenues to balance their external debts. For instance, improving the informal sector in these countries is a viable base for increasing revenue through taxes.

Keywords: Autoregressive Distributive Lag, Eastern African Countries, Economic Growth, External Debts

I. INTRODUCTION

Almost every government worldwide has budget deficits because their expenses exceed their income. According to Muoki and Fatoki (2021), these jurisdictions could increase their revenue by printing money, raising taxes, borrowing money from abroad or domestically, or, if available, using budget surpluses from previous periods. Governments typically turn to borrowing to address budget deficits when alternative policies are deemed inappropriate due to their negative impacts. This results in financial commitments known as public debt (Arčabić et al., 2018). When borrowing to cover budget shortfalls, a government has several options, which include borrowing from outside sources, commercial banks within the country, a federal or central bank (which is akin to printing money), and domestic financial institutions (GGmez-Puig & Sosvilla Rivero, 2017). Every option affects the economy differently and has long- or short-term ramifications.

In developing countries such as Tanzania, increases in their external debt loads indicate a slowing economy and poor debt management. For example, Manasseh et al. (2022) indicated that inappropriate structural reforms, a lack of sustainable macroeconomic adjustment policies, diverse export bases, and political instability primarily cause a more significant external debt burden. The immediate effect of rising debt is seen in the fall in net foreign and domestic investments, further reducing capital accumulation and output in an economy. Furthermore, increased public debt negatively impacts human capital accumulation and pushes out physical capital (Yousaf & Mukhtar, 2020). According to economic theory, prudent borrowing promotes capital accumulation and productivity growth, which drives economic growth. Developing nations often have lower capital stocks and less favorable investment prospects. Consequently, these nations guarantee increased rates of return on investment (Azémar & Giroud, 2023).

Nonetheless, growing debt loads in developing countries seriously endanger macroeconomic stability since they impact foreign direct and local investments. Without question, adding to one's resources through foreign economic assistance is crucial for starting and accelerating economic growth. Conversely, a sustained increase in one's



external debt load over an extended period can seriously impede a nation's ability to grow economically (Sapkota, 2023). The type of debt incurred and economic activity are closely related; debt can be categorized as productive or unproductive. Raising debt for productive reasons boosts an economy's potential for production.

Conversely, unproductive debt does not increase an economy's potential for production and is not self-liquidating (Savvides, 2019). A debt-financed investment must be profitable to generate a return more significant than the interest paid on the debt. Like many other emerging nations, Eastern African nations struggle with a lack of financial resources. Eastern African nations have used external borrowing to close the resource gap and manage this issue (Ibrahim & Farah, 2020). Since the early 1950s, Eastern African nations have received international economic aid to meet their development needs (Fentahun, 2023). Foreign aid has significantly influenced medium- and long-term development initiatives in Eastern African countries. Project aid and non-project aid are the two main categories that describe foreign economic assistance (loans, credits, and grants). The primary aim of foreign aid has been to supplement the internal resources needed to quicken the economic development of the nations in Eastern Africa (Abdullahi et al., 2016).

The rapid escalation of external debt has become a prevalent concern globally, with wealthy nations and emerging economies experiencing substantial increases in their debt-to-GDP ratios. For instance, Miningou (2023) reports that external debt surged to 102% of GDP in wealthy nations and 50% in poor and emerging economies, up from 70% and 35%, respectively. In Kenya, the state debt relative to GDP nearly doubled from 31% in 2010 to 62% by the close of 2019 (Njoroge, 2021). Similarly, Tanzania's debt-to-GDP ratio stands at 38%, Uganda's is at 40%, and Burundi and Rwanda recorded ratios of 51.47% and 63.0%, respectively. Despite these escalating debt levels, GDP growth across these countries has largely stagnated, prompting significant discourse on the repercussions of mounting debt burdens (Adnan et al., 2019; Gómez-Puig & Sosvilla Rivero, 2017).

While public debt is often necessary to bridge budget deficits, sustained high debt-to-GDP ratios can have detrimental effects on economic health (Ehikioya et al., 2020). Prolonged and substantial budget shortfalls can impede economic growth, foster fiscal imbalances, and deter private investment. However, the relationship between public debt and economic development is complex and multifaceted, varying by country and influenced by a myriad of external factors (Dimoso and Andrew, 2021; Mohsin et al., 2021). Scholars have sought to unravel this intricate relationship, with Karahan (2020) finding that the country's risk environment plays a pivotal role in determining the impact of public debt. In South Africa, for example, public debt has exhibited a long-term negative correlation with economic growth (Musyoka, 2017; Sapkota, 2023), aligning with findings from previous studies (Karahan, 2020).

Contrary to these findings, Mohsin et al. (2021) suggest that while public debt may negatively affect economic growth, its impact may not be statistically significant. These divergent conclusions underscore the methodological complexities inherent in assessing the impact of public debt on economic growth, with previous studies predominantly relying on time-series regression analyses. In the context of East African countries, where external debt is often incurred for infrastructure and productive sectors, servicing this debt does not necessarily translate to tangible economic growth. However, defaulting on external debt obligations can erode a nation's creditworthiness, potentially curtailing access to foreign financing and impeding economic performance. Ultimately, the primary objective of external debt should be to foster the socio-economic development of the populace rather than serving as a means to enrich government officials at the nation's expense (Ibrahim & Farah, 2020; Hung, 2021).

However, all these studies have been analyzed using time series data, and they did not cover all periods, the short run and long run; they only covered an extended run period. This study used an autoregressive distributive lag approach, especially the mean group entire, which can show all the estimations between the short run and long run. This study also aims to contribute substantively to the ongoing discourse surrounding external debt dynamics in Eastern African nations, focusing on Tanzania. An argumentative debate continues within this region regarding the consequences of the Tanzanian government's heightened borrowing from international sources. While some political figures express apprehension, positing that such actions may precipitate harmful effects on the nation's economic landscape in the future, governmental authorities assert a contrasting perspective, contending that strategic borrowing initiatives portend a promising trajectory for Tanzania's economic prospects. This study provides nuanced insights into this multifaceted dialogue. It offers empirical evidence and analytical frameworks to inform policy decisions and public discourse regarding external debt management in Tanzania and its broader implications for regional economic stability.



II. LITERATURE REVIEW

2.1 Theoretical Underpinnings

The debt-cum growth theory and the neoclassical growth theory serve as the theoretical cornerstones of this study. According to the former theory, a nation's debt and economic performance are directly correlated. Also, it made the case that borrowed money used for successful investments should positively affect economic production in environments with stable macroeconomic variables and investment-friendly policies (Matthew & Mordecai 2016). However, the burden of repaying the debts would reduce the resources available for profitable investments in cases where the debts are not used properly.

In contrast, a later theory argued that debt from external borrowing is a better option than domestic savings in terms of a nation's ability to finance productive investment. The scenario where domestic savings and investment are crowded out of the business cycle, however, presents a limitation to the debt-cum growth theory (Matthew & Mordecai, 2016; Kitole et al., 2024; Tornell & Velasco, 1992). The theory submits that the size of a country's debt should be justified in terms of the cost and benefit of borrowing for economic growth. According to the theory, the capacity of a country to take on additional debt service obligations should be considered along with the contribution such borrowing would have on economic performance (Abdullahi et al., 2013).

A country with a high debt load may allocate a large percentage of its resources to debt repayment, reducing the resources available for productive investments (Krugman, 1988). Hence, it can reduce the country's economic growth rate. Reduced rates of economic growth may result from this. In light of this, the long-term interest rate is the main channel through which public debt can impact economic growth. The government will pay a higher long-term interest rate because of its excessive borrowing to cover the fiscal balance deficit. Thus, through crowding out private investments, the higher long-term interest rate tends to slow economic growth (Alshammary et al. 2020).

2.2 Empirical Reviews

External debt in most developing countries, particularly in SSA, primarily provides additional funding to meet infrastructure development and growth objectives. There is vast and voluminous literature to empirically explain the link between external debt and economic growth in African countries in the last decade. However, the findings have been mixed and conflicting. For instance, Muoki and Fatoki (2021) examined the effect of public debt on the economic growth of three East African countries using time series data spanning 57 years (1963–2019). Their results indicated that domestic debt significantly negatively impacted economic and concessional debt, and external commercial debt had a positive effect. In their estimation, Ehikioya et al. (2020) found a long-term equilibrium relationship between external debt and economic growth in Africa, whereby the outcome revealed that over a certain threshold, the short-run converges to equilibrium in the long run, and external debt will begin to affect African economic growth negatively.

Ayana et al. (2023) examined the effect of external debts on the short- and long-run economic growth of 39 SSA countries from 2011 to 2021. The findings revealed that external debt has a significant negative impact in the short and long run. Similarly, Yusuf and Mohd (2021) investigated the effect of government debt on Nigeria's economic growth using annual data from 1980 to 2018. The findings from the autoregressive distributed lag technique indicated that external debt limited long-term growth while enhancing short-term growth. Also, the findings indicated that domestic debt had a significant positive impact on long-term growth, while its short-term effect was negative.

Mohsin et al. (2021) assessed the relationship between external debt and the economic growth of the selected countries in the South Asian region. Also, it utilized multiple methods such as the panel ordinary least square (OLS), fixed effect, quantile regression, robust output regression, and the World Bank data from 2000 to 2018. The results showed that while external debt stock has a favorable effect on economic growth, external debt has a negative effect. The results were supported by a rigorous regression analysis, which produced impact estimates for external debt service and total external debt of 39% and 31%, respectively. Furthermore, threshold analysis shows that external debt becomes a drag on growth because of a country's growing indebtedness and causes a more significant negative effect on growth than domestic debt. Along the same vein, Abate (2023) in Ethiopia analyzed the relationship between debt and economic growth using ARDL models and time series data for the period 1982–2018. The findings indicated an asymmetric relationship between the indicated variables, whereby it was found that the major positive shock in debt is favorable to economic growth. In contrast, the effect of a minor and negative shock on debt is unfavorable. Also, the results showed that debt has a threshold effect that makes it advantageous for Ethiopia's economic growth when it is significantly lower than 66.75% of GDP or 36.27% of GNI. Debt incurred above these threshold levels worsens the nation's economic growth.



Using selected SSA countries, Manasseh et al. (2022) also revealed a negative correlation between external debt and economic growth. By applying the dynamic Generalized Method of Moments (GMM) to a panel of thirty SSA nations between 1997 and 2020, they concluded that foreign debt has a negative impact on economic development. Using panel data from 1997 to 2019, Hoti et al. (2022) examined the impact of public debt on the Western Balkan countries' long-term growth. Their research, which used the pooled mean group estimator, found that public debt does not negatively impact the growth of Western Balkan nations.

The existing pieces of literature on external debt and economic growth report contradictory findings, as there is no common consensus among the literature. Various empirical studies conveyed a positive relationship between the two variables, while numerous others likewise reported a negative relationship between external debt and economic growth (Rahman et al., 2019; Ayana et al., 2023). Also, the literature indicated that studies are not homogeneous in the context of the empirical models with linear and nonlinear relationships and data types used. These arguments necessitate the need to continue researching the relationship between debts and economic growth of SSA countries because of their volatile nature of economic and social conditions, especially after the COVID-19 pandemic (Ayana et al., 2023).

III. METHOD

The study used data sets from the World Data Bank for each country between 1990 and 2020, and a non-experimental research design was used. These world data were gathered from various sources, including the United Nations Population Division, global population projections, census reports, statistical materials from the National Statistics Office, demographic data, and population. The use of World Bank data presents several benefits owing to its accessibility and appropriateness for scholarly purposes (Kitole et al., 2022; Tile et al., 2023; Kitole et al., 2023). The non-experimental research design helps provide a realistic picture of the connection between foreign indebtedness and GDP. Additionally, the non-experimental research design addressed the drawbacks of experimental research designs, including the inability to change variables of interest and the lack of control over unimportant variables (Tile et al., 2023). Furthermore, including a large and representative sample of East African countries as the unit of analysis - Tanzania, Uganda, Kenya, Burundi, and Rwanda - improved the study's external validity. It suggests that the study's conclusions may be relevant to similar situations in other countries in Sub-Saharan Africa.

3.1 Model Estimation

This study employed the Autoregressive Distributed Lag (ARDL) model to study effects of external debts on the economic growth in East African member states. The choice of the model is based on its ability to provide dynamic relationship between variables, and its ability to see their short run and long run convergence in influencing the outcome variable. The general equation for the ARDL is given by;

$$y_{it} = \sum_{j=1}^p \gamma_{ij} y_{i,t-j} + \sum_{j=0}^q \delta_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it} \dots \dots \dots 1.1$$

Now since the nature of the dataset in panel involve five countries in East Africa, the model helps to study the panel and time data all together at once. Now, in sticking to the time series observations (T) in each group, then equation 1.1 can be written as

$$\Delta y_{it} = \phi_i y_{i,t-1} + X_i \beta_i + \sum_{j=1}^{p-1} \gamma_{ij}^* \Delta y_{i,-j} + \sum_{j=0}^{q-1} \Delta X_{i,-j} \delta_{ij}^* + \mu_i \mathbf{l} + \varepsilon_i \dots \dots \dots 1.2$$

Now if the disturbances $\varepsilon_{it}, i = 1, 2, \dots, N$ and $t = 1, 2, \dots, T$ in equation 1 are independently distributed across i and t with means of zero (0) and variance greater than zero ($\delta_i^2 > 0$) and finite fourth-order moment. The condition that stochastic disturbances are time-independent is also not extremely limiting and, in most cases, may be met by raising the number of the distributed lag orders on y_{it} and x_{it} . The independence of the disturbances and explanatory variables is required for consistent estimations of short-run coefficients; notwithstanding, x_{it} has a finite order for autoregressive representations and it is simple to accommodate the possibility of x_{it} influence on ε_{it} when forecasting the long-run coefficients (Kitole and Utouh, 2023; Pesaran, 2008).

Moreover, the long-run coefficients on X_i , defined by $\phi_i = -\frac{\beta_i}{\delta_i}$ are similar across groups with the error correction components as $\Delta y_i = \phi_i \varphi_i(\theta) + W_i k_i + \varepsilon_i$. Moreover, the likelihood of the panel statistics model can be denoted as a product of the likelihoods for every group therefore we directly focus on log-likelihood functions since



the variables of interest are the long-run impacts and adjustment coefficients. On the other hand, the Pooled Mean Group (PMG) model relies on maximum likelihood estimators to ensure normality and consistency. This approach can identify homogeneity restrictions for the long-run coefficient and average across all groups and estimate both short-run and error correction coefficients. The PMG estimators are obtained using the Newton-Raphson algorithm. Therefore, the estimated long-run regression model explaining the dynamic effects of the external debts on East African country's economic growth is presented as:

$$GDP_{it} = \theta_{it} + \theta_{1i}CPF_{it} + \theta_{2i}FDI_{it} + \theta_{3i}EXDP_{it} + \theta_{4i}TV_{it} + \theta_{5i}EXR_{it} + \mu_{it} \dots \dots \dots 1.3$$

Whereas GDP_{it} is the natural logarithm of GDP, CPF_{it} is the Capital formation, $\theta_{2i}FDI_{it}$ is the foreign direct investment while $\theta_{3i}EXDP_{it}$ is the government expenditure, TV_{it} is the trade volume, and EXR_{it} is the exchange rate.

Table 1
Variable measurements

Variable	Measurement	Source	Expected sign
Gross domestic product (GDP)	GDP is the total of the gross value added by all producers who are residents of the country, plus any product taxes and minus any subsidies that aren't factored into the product value.	World Bank	+/-
External debt	International reserves to total external debt stocks.	World Bank	+/-
Gross capital formation	Gross capital formation growth rate annually expressed in constant local currency. The aggregates are provided in US dollars and are based on constant prices from 2015. The net changes in the level of inventories and the expenditures on additions to the economy's fixed assets make up gross capital formation, formerly known as gross domestic investment. Land improvements (fences, ditches, drains, and the like), the acquisition of plant, machinery, and equipment, and the building of roads, railroads, and similar structures, such as offices, hospitals, schools, and private residences, are examples of fixed assets.	World Bank	+/-
Trade volume	Trade is the total of products and services exported and imported expressed as a percentage of GDP.	World Bank	+/-
FDI inflow	The net inflows of capital intended to obtain a long-term management stake (10 per cent or more of voting shares) in a business that operates in a different economy than the investors are known as foreign direct investment.	World Bank	+/-
Exchange rate	The rate set by national authorities, or the rate established in the exchange market that is authorised by law. Based on monthly averages, it is computed as a yearly average.	World Bank	+/-

IV. FINDINGS

Results in Table 2 show that on average, East African external debt stock is 5.2 percent per year, and the minimum external debt stock recorded for all selected East African countries from 1970 to 2020 is 3 percent; furthermore, the maximum value of the external debt stock rate recorded for the years mentioned is 7 percent per year. But also, the results show that on average, capital formation in East African countries was 8.26E+10 between 1970 and 2020, and the minimum amount of capital formation recorded was 0; moreover, the maximum record was 2. Trade volume on average was 36 imports and exports in eastern African countries; the minimum, maximum, and minimum recorded were 0 and 74.5734, respectively.

**Table 2***Descriptive Statistics*

Variable	Observation	Mean	Min	Max
External debts stock	250	4.28E+09	2.62879	3.82E+10
Capital formation	250	8.26E+10	0	2.42E+12
Trade volume	250	36.36897	0	74.5734
GDP	250	2.68E+11	0	6.20E+12
FDI Inflow	250	1.102289	-0.7978	6.656597
Exchange rate	250	597.4933	0.070215	3727.069

Furthermore, Table 2 shows that the average gross domestic product in East African countries is 2.6, while the minimum gross domestic product is 0 recorded per year and the maximum is 6.20E+12. Additionally, the FDI inflow rate in Eastern Africa by average from 1980 to 2020 was 1.102289 percent, negative 0.7978 was the minimum recorded rate, and the maximum percent of foreign direct inflow was 6.656597 of the proportion GDP that is readily accessible for the creation of goods and services since 1980 to 2020. Finally, the exchange rate is determined by national authorities, or the rate determined in the legally sanctioned exchange market. The average Eastern African country recorded 597.4933, and the minimum and maximum records were 0.070215 and 3727.069, respectively.

4.1 Tests for Unit Root

The panel unit root test results proposed by Pesaran (2007) are presented in Table 3. Findings indicate that the null hypothesis of the unit root is rejected at 1% of significance for all series. However, by testing for the unit root in the first difference, all panel unit root tests reject the null hypothesis at the 1% significance level. Hence, the cointegration can be examined using the Pedro Cointegration Test.

Table 3*Im-Pesaran-Shin Unit root Test (IPS Test)*

Variables	T-bar	T-tilde-bar	Z-t-tilde-bar	P-value	Fixed N-exact critical values		
					1%	5%	10%
GPD	-18.3454	-6.3764	-13.569	0.000	-3.02	-2.76	-2.62
External Debt stock	-11.7056	-5.8769	-12.1866	0.000	-3.02	-2.76	-2.62
Capital formation	-5.957	-4.4873	-8.3403	0.000	-3.02	-2.76	-2.62
Trade volume	-12.9321	-5.9891	-12.4971	0.000	-3.02	-2.76	-2.62
Exchange rate	-8.9905	-5.4176	-10.9151	0.000	-3.02	-2.76	-2.62
FDI inflow	-15.0861	-6.1197	-12.8586	0.000	-3.02	-2.76	-2.62

4.2 Cointegration Tests

The cointegration test is carried out using the Pedroni Cointegration Test. The findings in Table 4 provide strong evidence that all panels in the data are cointegrated. This is true for the test statistics of Phillips-Perron, and the Augmented Dickey-Fuller reported in Table 4, which indicate that the results are significant at a 1 % significance level.

Table 4*Pedron Cointegration Test.*

	Statistic	P-Value
Modified Phillips-Perron t	-0.9637	0.1676
Phillips-Perron t	-2.5292***	0.0057
Augmented Dickey-Fuller t	-3.3987***	0.0003
Number of Panels	5	
Number of periods	40	

*** $p \leq 0.01$, ** $p \leq 0.05$, * $p \leq 0.1$

4.3 Hausman Test for Best Estimator

The Hausman test chooses the preferred estimator between the PMG or MG estimator and the PMG or DFE estimator. According to (Shaari et al., 2020), the MG estimator allows parameters to be independent across groups and



does not consider the heterogeneity between groups. However, (Pesaran, 2008) argued that the PMG is better because it gives coefficients of different short-run variances by country. In contrast, for long-term coefficients, it is assumed that all countries are homogeneous (similar).

In contrast, the MG estimator allows only short and long-term coefficients with heterogeneous (different) lengths of time between countries. The choice between PMG or MG estimators depends on the null hypothesis testing. If the null hypothesis is accepted, the PMG estimator is selected because it is more efficient than the MG estimator. If the null hypothesis has been rejected, then the MG estimator is chosen over the PMG estimator. Next, to choose either the PMG or DFE estimators, if the null hypothesis is accepted, the MG estimator is better than the DFE estimator. If the null hypothesis is rejected, the DFE estimator is better than the MG estimator.

Table 5*Hausman Test of Best Estimator between MG and PMG*

Variables	Coefficients		(b-B)	sqrt(diag(V _b -V _B))
	(b)	(B)		
	MG	PMG	Difference	SE.
External debt	-0.0759129	-0.1821512	0.1062383	0.0883516
Capital formation	-0.057945	-0.0319191	-0.0260259	0.25412
Trade volume	-0.0378842	0.2236758	-0.26156	0.1150599
FDI inflow	0.2610446	-0.0029419	0.2639864	0.355823
Exchange rate	-1.596618	-0.1347913	-1.461826	2.646928
chi ² (7) = (b-B)'[(V _b -V _B) ⁻¹](b-B)			6.91	
chi ² >0			0.0027	

Table 5 shows the Hausman test is unordered to test the best and unbiased estimator among herein used Mean Group (*mg*) and Pooled Mean Group (*pmg*). Therefore, since the probability values are less than 0.05 or 5% of the precision level, you can reject the null hypothesis that MG is the most efficient estimator, which is indicated by the probability values being less than Chi-square results at 0.0027. To examine if pooled mean regression (MG) is more consistent and the best estimator, it is therefore tested by using Hausman against the dynamic fixed effects (DFE).

Table 6*Hausman test*

Variables	Coefficients		(b-B)	sqrt(diag(V _b -V _B))
	(b)	(B)		
	MG	PMG	Difference	SE.
External debt	-0.0759129	0.1902408	-0.2661538	0.0483516
Capital formation	-0.057945	-0.1170639	0.0591189	0.05412
Trade volume	-0.0378842	0.9474815	-0.9853657	0.10599
FDI inflow	0.2610446	0.1237976	0.137247	0.260791
Exchange rate	-1.596618	-0.7086306	-0.8879871	1.940244
chi ² (7) = (b-B)'[(V _b -V _B) ⁻¹](b-B)			41.31	
chi ² >0			0.0000	

Additionally, the results in Table 6 show that the probability values are less than 0.05 or 5% of the precision level then you can reject the null hypothesis that MG is the most efficient estimator, which is indicated by the probability values being less than Chi-square results at 0.0000. Therefore, the Mean Group (MG) is still the best estimator compared to the Dynamic Fixed Effect model. This is justified by the ability to reject the null hypothesis, which implies MG is more efficient.

4.4 Short Run and long-run estimation results of the effects of external debts on economic growth

Results in Table 7 present the long-run and short-run effects of the external debts on the East African countries' member states' economic growth, including the error correction term (ECT). The significance of the error correction term further supports the results, which show a stable long-term link between the variables under three different sets of estimates (Mean group (MG), Dynamic Fixed Effects (DFE), and Pooled Mean Group (PMG)). Moreover, across all sets of estimates, the ECT is positive and statistically significant, implying that a change in the



one-period lagged value of the External Debt Stock (EDS) positively and substantially influences economic growth in the short run by 0.98 in Burundi, 0.82 in Kenya, 0.925 in Rwanda, 0.91 in Tanzania, and 0.84 in Uganda. These results imply that external debts need to be an important economic factor that must be moderated all the time to ensure sustainable economic growth.

Additionally, the results show that external debts have negative and statistical significance in the short run and long run, where one increase of international reserves to total external debt stocks in Burundi decreases gross domestic product by 5% in the short run and 19% in the long run (Table 7). This might be because most large debt service obligations use up foreign exchange and capital, which are transferred to lenders to repay interest and principal funds. These results align with those of Ibrahim & Faraha (2020), who suggested that debts have short and long-run effects on economic growth by lowering the capacity of the economy to expand.

Moreover, the results in Table 7 illustrate that capital formation has a significant positive impact on the economic growth of Kenya and Rwanda in the short run 16% and 5%, respectively. This suggests that higher capital formation increases economic growth for Kenya and Rwanda in the short run. Moreover, for the long run, the results show that capital formation negatively influences the economic growth of Kenya, Rwanda, and Uganda at 12%, 31% and 48%, respectively. Conversely, FDI inflow was found to have a positive influence on economic growth in the long run, in line with the results of Bal et al. (2016) and Kitole and Utouh (2023) who emphasise the role of FDI in enhancing economic growth in Tanzania and therefore leads to the industrial growth.

Furthermore, the exchange rate positively influenced economic growth in the short run. Still, it has negative effects in the long run, indicating that economies in the East African countries enjoy changes in the currency rate that favour their economies in the short term. In the long run, it has negative effects (Table 7). These results in the short run are similar to the study of Rapetti (2019) while in the long run are similar to the findings of Karahan (2020). Generally, the exchange rate is an important macroeconomic parameter that determines the growth of the countries' economies. Therefore, having stable economic policies that mitigate the effects of the exchange rate on the economy helps to stabilise the country's economic growth.



Table 7
Long and short-run estimates of growth (GDP) in East African countries, panel ARDL (PMG, MG and DFE)

Variables	Mean Group (MG.)										Dynamic Fixed Effect (DFE)		Pooled Mean Group (PMG)	
	Burundi		Kenya		Rwanda		Tanzania		Uganda		ECT	SR	ECT	SR
	LR.	SR.	LR.	SR.	LR.	SR.	LR.	SR.	LR.	SR.				
ECT		0.988*** (0.0097)		0.828*** (0.0674)		0.925*** (0.0462)		0.911*** (0.144)		0.840*** (0.0994)		0.930*** (0.0568)		0.820*** (0.068)
External debts		-0.0591*** (0.00091)		0.6754 (0.3425)		-1.3010 (6.68)		3.4410 (4.8010)		0.4532 (0.054)		7.0511 (1.1310)		-0.0011 (0.0011)
Capital formation		-0.00141 (0.0135)		0.164** (0.0676)		0.0561** (0.0239)		0.100 (0.154)		0.125 (0.0746)		0.023 (0.0591)		0.136** (0.0614)
Trade volume		0.0122 (0.0106)		-0.0103 (0.0089)		-0.0237 (0.0128)		0.0394 (0.306)		-0.001 (0.0124)		0.00683 (0.046)		-0.0025 (0.00284)
FDI inflow		-0.00501 (0.011)		0.0073 (0.0153)		-0.0057 (0.0199)		0.343 (0.478)		-0.0134 (0.0266)		0.111 (0.12)		0.0151 (0.02)
Exchange rate		0.000558 (0.0003)		0.00552 (0.0036)		-0.00029 (0.0011)		-0.00404 (0.00924)		-0.000249 (0.00013)		0.000164 (0.00128)		-0.00212 (0.00282)
External debt	-0.196*** (0.0575)		0.171 (0.17)		-0.138** (0.0676)		-0.22 (2.14)		0.00312 (0.166)		0.19 (0.46)		-0.18*** (0.0413)	
Capital formation	-0.00312 (0.0258)		-0.123** (0.0731)		-0.31*** (0.0759)		0.631 (1.798)		-0.48*** (0.0893)		-0.117 (0.241)		-0.0319 (0.0204)	
Trade volume	0.417 (0.339)		-0.427 (0.621)		-0.507 (0.506)		0.0212 (13.41)		0.307 (0.457)		0.947 (1.846)		0.224 (0.222)	
FDI Inflow	-0.00401 (0.00394)		-0.00415 (0.0098)		-0.00472 (0.018)		0.325*** (0.498)		-0.00711 (0.0194)		0.124* (0.0681)		-0.00294 (0.00331)	
Exchange rate	-0.241 (0.148)		0.985*** (0.223)		0.763*** (0.268)		-9.461** (4.39)		-0.0289 (0.069)		-0.709 (0.508)		-0.135** (0.0677)	
Constant		0.430*** (0.157)		0.546* (0.322)		0.265 (0.503)		-0.301 (0.995)		1.071 (0.813)		1.140*** (0.417)		1.098** (0.498)
Observations	250	250	250	250	250	250	250	250	250	250	250	250	250	250



V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

Many developing nations view external debt as a significant source of income to supplement domestic sources for economic development and prosperity. Most Eastern African nations, however, have not been able to use this foreign cash to boost their economies successfully; some have even seen their economic situation worsen due to issues including liquidity shortages and an overhang of debt, among other things. This study examined how external debt affected economic growth in Eastern African nations using panel data from 1970 and 2020. The results indicate that external debt has a negative effect on economic growth, suggesting that large current and future debts and the failure to deploy borrowed funds for the region's capacity building all inhibit economic growth.

5.2 Recommendations

Given the heterogeneous nature of countries in EA and the evidence of a nonlinear relationship between public debt and economic growth, policymakers should consider utilising external debts strategically for investments in high returns projects in both the short and long run. It implies that before obtaining such loans, it is crucial to thoroughly examine the economic and social profitability of all projects supported by debt to guarantee that the returns exceed the interest and capital repayments. This approach provides potential benefits of debt for economic development while avoiding over-indebtedness. Likewise, Eastern African countries should ensure that their governance can support the equitable distribution of all external debt in a way that will encourage economic growth throughout their nations. Moreover, strategies in the EA countries must be geared towards strengthening revenue mobilisation to provide avenues to balance their external debts. For instance, improving the informal sector in these countries is a viable base for increasing revenue through taxes. Also, enhancing tax collection mechanisms and exploring non-tax revenue avenues is vital for the countries in EA to reduce external debt dependence.

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Structure and Functions of Student Councils in Secondary Schools in Kericho County, Kenya

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ABSTRACT

In Kenyan secondary schools, student conflicts pose significant challenges in the 21st century. This study aimed to evaluate the structure and functions of student councils in secondary schools in Kericho County, Kenya, based on the functionalism theory. The evaluation research design was employed, targeting students, teachers, and school principals, school boards of management, County director of education, and sub-county directors of education in Kericho County. A combination of probability and non-probability sampling techniques was used to select 568 respondents, including 384 students, 120 teachers, and various school administrators. Data was collected through questionnaires, interviews, and focus group discussions. Quantitative data was analyzed using descriptive statistics, presenting frequencies, percentages, mean, and standard deviation. Qualitative data was analyzed through data coding and narrative analysis, presented using graphs, charts, and tables. Results showed that 81% of respondents indicated the student council was elected by students, although the administration had significant input. Only 16% agreed that there was no administration interference in the council formation process. Most student councils (47%) comprised 21-40 prefects, with only a few (10%) having 1-20 students. Regarding effectiveness, 68% of respondents were comfortable with the council's performance, while 20% believed it was too large to be effective, and 12% considered it too small. In conclusion, the student council structure allows for effective discipline management and conflict resolution. However, the administration's influence in council formation affects its perceived efficacy, leading to student perception of loyalty to the administration. The study recommends government intervention to limit administrative interference in student council formation, fostering true democratic processes in school governance.

Keywords: Functions, Kericho County, Secondary Schools, Student Councils, Structure

I. INTRODUCTION

Student unrest has become a common occurrence in Kenyan secondary schools, leading to closures and significant property damage in recent years (Mukiti, 2014). Notable incidents include those at Kericho Boys High, Londiani Boys High School, Keben Secondary School, and Kiptewit Secondary School in 2016, where dormitories were set ablaze and unruly behavior was exhibited by students.

The prevailing view among educational stakeholders suggests that the leadership structure among students may contribute to these incidents. Historically, prefects appointed by school administrations were often disliked by fellow students, potentially leading to unrest (Murage, 2014). To address this, Kenya's 2010 constitution empowered individuals to exercise their sovereign power, prompting the Ministry of Education to develop sessional papers such as Act 14 of 2013. These initiatives aimed to ensure students were adequately represented to prevent chaos and property disruption in secondary schools.

In response, student councils were established in 2008 to facilitate student advocacy, allowing for active student participation in school decision-making processes (Murage, 2014). However, despite being elected by students to act as intermediaries between students and school administrations, these councils have not been fully empowered to address critical issues such as financial management, disciplinary actions, or examination matters. Consequently, conflicts persist, leading to unrest despite the presence of student councils.

Instances of student conflicts, including those in Kericho County, continue unabated, with conflicts escalating into dangerous unrest causing economic, psychological, and physical harm (Koross, 2015). Even after the establishment of student councils in 2013, conflicts persisted, as evidenced by incidents at Kericho Boys High, Londiani Boys High School, Keben Secondary School, and Kiptewit Secondary School in 2015 (Kigotho, 2000). These events underscore the need to investigate the effectiveness of student councils in mitigating conflicts in Kericho County's secondary schools.

1.1 Research Objective

Examine the nature of student unrest in secondary schools in Kericho County, Kenya



II. LITERATURE REVIEW

2.1 Theoretical Framework

The study was guided by functionalism theory, primarily developed by Herbert Spencer, Emile Durkheim, Talcott Parsons, and Robert Merton (Gómez-Diago, (2019). Adopting Spencer's perspective, the theory likens society to a human body, with various parts working collaboratively for effective functioning (Gómez-Diago, (2019). According to Spencer, societal structures, including beliefs, norms, behaviors, and patterns, are essential for maintaining peace and stability. The theory asserts that different social institutions must remain intact and interdependent for societal harmony (Urry, 2000).

Functionalism posits that society functions as a system of interconnected parts, each contributing to maintaining balance and social equilibrium. For instance, family, education, politics, economics, and religion serve vital functions within society, such as socialization, governance, production, and moral guidance (Mooney, Knox & Schacht, 2007). The theory underscores the interconnectedness of society, highlighting how each part influences and is influenced by others.

In the context of secondary schools, functionalism emphasizes the importance of cohesion and stability, where every component – including the student council, administration, students, teaching and non-teaching staff – plays a crucial role. Failure of any unit to fulfill its role effectively can lead to conflicts. Thus, cooperation among all units is necessary for the smooth functioning of schools.

Functionalism theory facilitated an examination of the student council's role in mitigating student unrest in Kericho County's secondary schools. By analyzing this role, the study identified gaps contributing to tensions among stakeholders and proposed recommendations for effective mitigation measures. The theory's emphasis on cooperation among societal components guided the study's focus on fostering collaboration to ensure proper functioning of educational institutions and societal stability.

2.2 Empirical Review

According to Kumwenda (2010), a student council is an organization of students that entails curricular and extracurricular activities in which it provides a platform for students to exercise leadership skills and democratic rights. It's a body constituting selected students who are either nominated or elected to represent the affairs of students. The student leaders have adhered to work under the supervision of a superior body guided by a constitution that contains a variety of rules and regulations (Kumwenda, 2010). The collaboration of students is facilitated by the student's council, which increasingly impacts the activities within the schools' premises.

Mwanza, (2013) states that the student's council as a representative structure of student's works together with the school management to ensure the successfulness of the institution is attained by helping it in achieving its goals. The instances of indiscipline within a school institution are attributed by non-participative decision-making process (Mwanza, 2013). Behavior is referred to the way a person conducts oneself toward a particular attribute, the management of discipline within a school institution is aimed at ensuring that the students are able to conduct themselves responsibly and abide to the rules and regulations that are laid down by the institution (Daniel, 2015). Discipline is a form of guidance that helps in maintaining order; it forms the blood life of the successfulness of the institution. It is achieved when a school provides a conducive environment in which the student is aware of the need to be responsible and the consequences of being irresponsible. The students' leaders are responsible for facilitating coordination of activities with the rest of the students. The good quality leadership within the student's council impacts positively to the community as they develop to be responsible adults.

In the USA, student councils are known as student governments. These student governments are found in both secondary education as well as higher education. The students' governments in the USA vary across institutions depending on the composition of the student population in those institutions. In the USA, the student governments are structured like the federal system of government with three branches of government including the executive, legislature and judiciary. These three branches of students' governments in the USA have distinct roles but are also interdependent on each other. In the USA the executive arm of student government is led by the students President who has a cabinet. The students 'government also has a legislative arm which has the legislative veto, recall, and referendum.

In the UK, the structure of the students' leadership is different from that of the USA. In the UK, students unions are led by a trustee board which is headed by the Sabbatical trustees elected on one term basis of a maximum



two years each. The Trustees are in charge of all matters concerning student including reputational, legal and financial integrity. They also manage student unions and act as stewards of students' assets. The Trustee board can delegate its powers to operations group and union councils which then would work towards ensuring the daily operation of the unions are properly coordinated. The operations group is led by an executive officer who has delegated powers to manage the daily operations of the students' union. The Union council on the other hand represents students and formulates policies on behalf of the students. The council also holds powers from the Trustee board to amend the union's constitution and also do follow ups on any issues approved by the trustee board.

Just like in other parts of the world, Adelabu and Akinsolu (2009) observed that students unions in Africa often are run like "a typical government; it has senate and also examines legislative procedures". Additionally, the scholars assert that the student unions provide a platform where students practice political leadership roles. Akinboye and Eesuola (2015) further emphasize that, students' unions are made up of three branches of government: executive, legislature and judiciary. In this regard, the Unions practice representative democracy in which different faculties and halls of residents are represented as part of the leadership representing various student constituencies.

In Nigeria, traditions of the University student Unions, just like other parts of the world emerged from traditions of the Medieval Europe (Utomi, 2006). The use of conventional governance systems in the Universities is to enhance the smooth operations of the Universities. The government operations also enhance the involvement of the students in political roles and socio-political affairs in the country (Eesuola 2012). Succinctly put, the students' union can be a fertile soil for experimentative political skills and leadership (Akinboye & Eesuola, 2015).

Student councils in Kenya have been known more in the Universities until recently when the system of students electing their own leaders was introduced in Secondary schools. In the past, students in secondary schools were led by prefects who were appointed by the school administration (Idu & Olugbade, 2011). The prefects were not representatives of the student but rather acted as "eyes" of the teachers when students were left alone. The narrative of student councils in Kenya has mainly been associated with activism, riots and protest which have for many years been common in Kenyan public universities.

Despite the fact that the student council has been effective, it has not managed to resolve most of the conflicts that the students have with the administration. In fact, as studies have proved, the student of the council requires some adjustment so that it can create an effective platform to resolve conflicts (Mukiti, 2014). Thus, this study concentrates on the role of the student council in mitigating conflicts in secondary school. It also focuses on the structure and functions of the student council with the aim of identifying the gaps in the structure, which should be fixed to come up with an effective student council.

III. METHODOLOGY

The study utilized a descriptive research design to investigate the role of student councils in managing student unrest in secondary schools in Kericho County, Kenya. It involved describing the nature of student unrest, the structure and functions of student councils, and the successes and challenges faced by these councils. The research was conducted in Kericho County, which comprises six constituencies and 15 administrative divisions. The county has varied topography, with undulating terrain and a moderate climate. The study population included students, teachers, school principals, deputy principals, members of school boards of management, county director of education, and sub-county directors. Sampling strategies included both probability and non-probability sampling methods, and data were collected using questionnaires, interviews, and focus group discussions. The total sample size was 568 respondents. Ethical considerations were observed throughout the research process, ensuring confidentiality and voluntary participation of respondents.

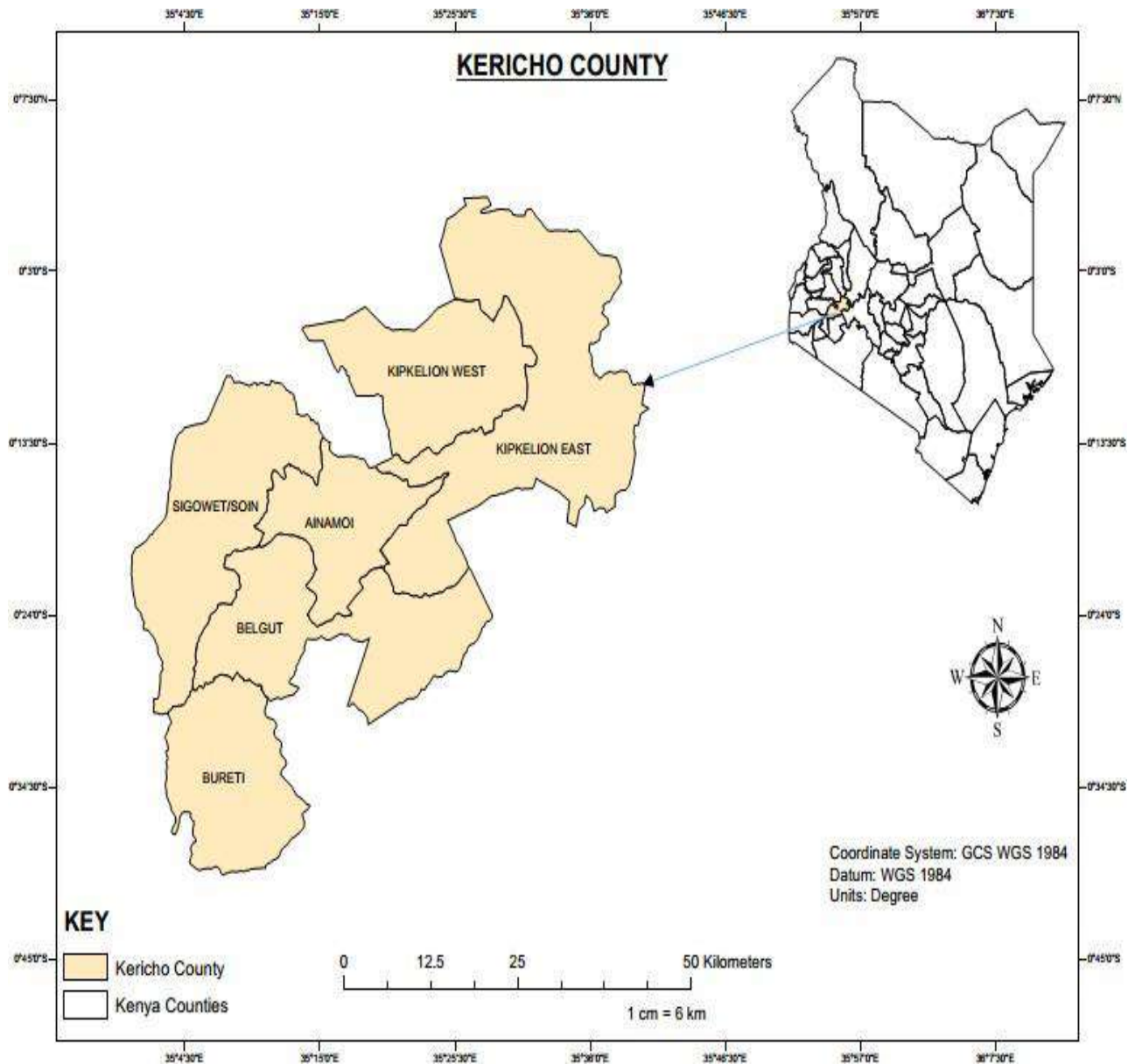


Figure 1
 Map of Kericho County
 Source: Researcher, (2018)

IV. FINDINGS & DISCUSSIONS

4.1 Response Rate

The objective sought to assess the structure and functions of Student Councils in secondary schools in Kericho County, Kenya. The researcher gave questionnaires students and teachers from various secondary schools. Key informants such as school principals, deputy principals, county director of education, and sub-county directors were interviewed.

4.1.1 Formation of Student Council in Schools

According to the results from the questionnaires, the majority of the respondents agreed that the student council is elected by student with the input from the administration. In fact, 81% of the respondents in the questionnaires, both for the teachers and students, pointed out that there was the input of the administration in the

election of the council. This indicates that the students are not allowed to select the students they want on their own.

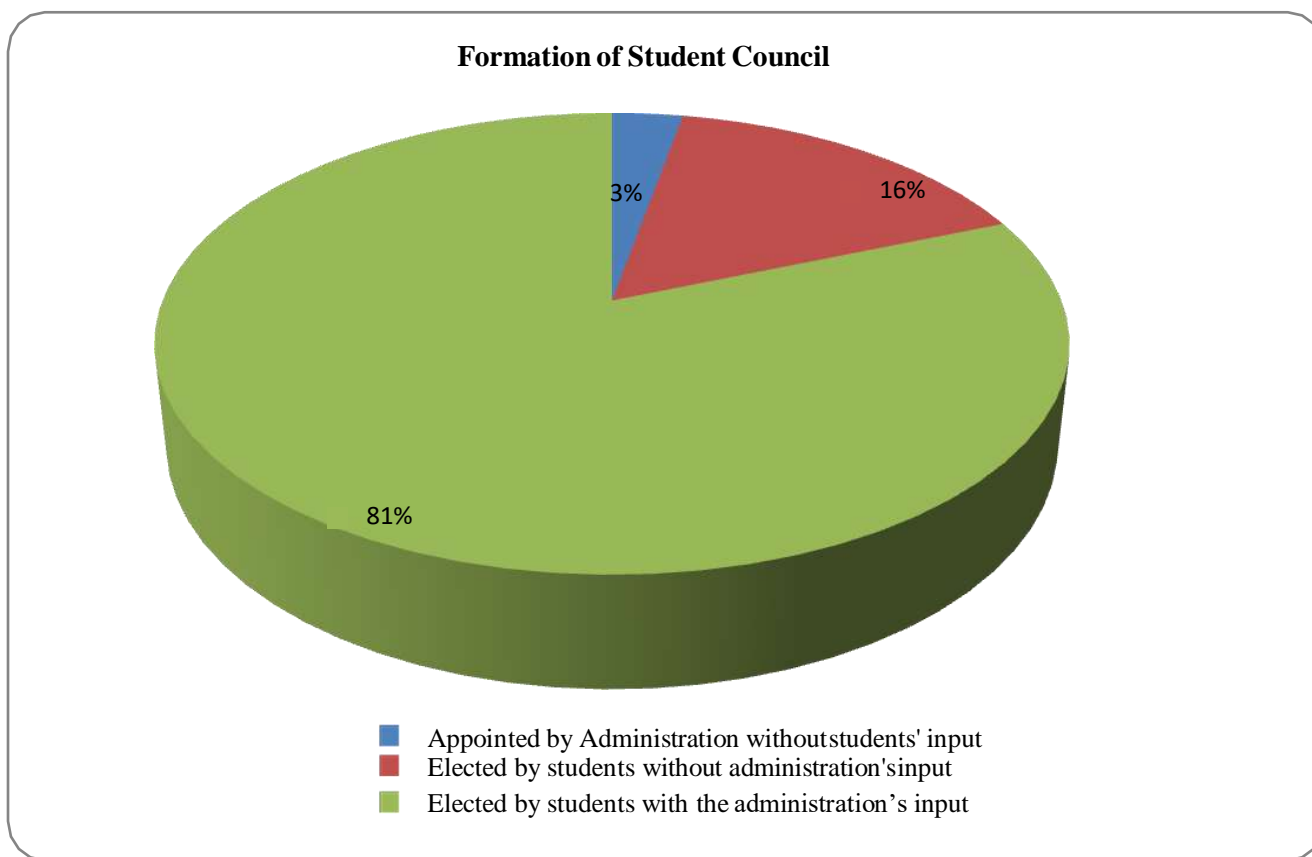


Figure 1

Formation of Student Council

During the focus group discussions with the students, the respondents argued that they are not allowed to elect their leaders. It is the administration that determines who will be selected in the posts, especially the most powerful position such as the head-boy/school president. They feel that the administration selects the people they know will cooperate with them. They do not allow the student to democratically elect their own leaders.

During the interviews, the principals agreed that they have a hand in the student leaders' election. They pointed out that they cannot allow the students to elect the leaders alone because they will give immature students who can easily be comprised by a group of students. In fact, one of the principals argued that they have the final say in the election results. After the students do their work in choosing, the teachers announce the final results. The announced results comprise the list they are comfortable with, without considering the will of the students. The principal said that:

"We do not allow pure democracy when electing the student council. The disciplinary committee has the final say on who will be in the council. We fear allowing student leaders who will be comprised by students" (Respondent, Kericho County, 2018).

According to Ojwang' (2012), the lack of democracy or fairness in the election of the student leaders is a cause of strife in schools. Although it is paramount for the administration to have students they can work comfortably with, they should also factor in the needs, and opinions of the students that the student council should be representing. If the student leaders only represent the needs and support the opinion of the administration, the schools will be running under tyranny, which does nothing to ease unrest. There should be balance between what the teachers want and who the students want, in the representation in the council. That is the only way the students' opinions and grievances will be aired to the administration. If the administration and students have a compromise in the student council, both parties will have faith in the operation of the council and the cooperation between them.

In all the schools that participated in the study, the student council positions were elective. The students are



elected once every year. In most schools, there is vigorous vetting by the administration. The vetting committee comprises of the disciplinary committee which is chaired by the deputy principal, while others have the entire teaching staff and administration doing the vetting. The candidates who are interested in the positions fill the forms which are taken to the administration for vetting. Only the most qualified students are allowed to campaign. In most schools, the factors that are considered include discipline, academic performance and ability to pay fees. During the interviews, one of the principals argued that discipline and academic performance were the key factors that they consider. They want leaders who can command the students knowing that they perform well in class. Those who do not perform well are not allowed to campaign because they should give all their time to academic work to try and improve their studies. On the same note, discipline is very crucial. Students who are in the council must be disciplined for them to help in enforcement of discipline. One of the principals pointed out that they demote any student who is found to be indiscipline. The student must maintain discipline for them to be role models to the rest of the students.

In most schools, discipline and academic performance were the main factors. However, in some schools, the ability to pay fees is a key factor. In this case, students who are frequently sent home for school fees are not allowed to hold positions in the student council. During the interviews, principals who had fee payment as a factor argued that they cannot have frequent absentees as leaders. One of the deputy principals in such schools said that:

“We know that it is not the fault of these students to be sent home. However, if they are absent every now and then, who will take their positions? There will be a vacuum every month, and that will give room for indiscipline in that area. Therefore, we must consider fees payment as a factor” (Respondent, Kericho County, 2018).

The results of the study indicated that most of the members of the council are in form three and four. The form ones and twos only have the class representatives. The other positions are in the upper forms to ensure there is command. It is hard for the students in the lower forms to rule those in the upper forms. Therefore, the form three and form four students are given the chance to take the senior posts. The strong positions of school captain, the deputy, dorm captain and the deputies, dining captain and academic counselor requires form four and form threes. In most schools, the captain was in form four while the deputy was a form three. However, some of the schools had changed that strategy. They discovered that the deputies automatically assumed the senior posts when the form four left school. Thus, the posts were only taken over by the deputies irrespective of their previous performances. Thus, they adjusted to adopt a strategy of having the captain and the deputy in form four. Consequently, the posts will be empty and open for any student. One of the deputy principals from such schools indicated that:

“We select a form four as the captain and the deputy to avoid confusion after the form four complete the course. We realized that when the deputy is not working, and is in form three, we were forced to make him the captain irrespective of his underperformance record. For now, every position is open for competition with no one from the previous council being considered” (Respondent, Kericho County, 2018).

During the focus group discussions with the students, they cited a case of a school captain who was overshadowed by the deputy. The captain was elected because he was the deputy captain to the previous captain. However, he was weak and did not have the power to command the entire school. However, because of the previous culture in the school of making the deputies to be the captains, the mistake occurred. As a result, there was unrest in the school as the captain could not maintain law and order when the teachers were absent. The school ended up with a strike. The students are comfortable that the administration had considered the option of having the captain and the deputy in the same class so that they eliminate such cases.

The results of the study, as revealed during FGDs with students, indicated that the student council meets regularly with the administration after the election. They are given leadership tips on how to balance the leadership responsibilities with their academic work. During the interviews, 50% of the principals agreed that they take the student leaders through training that takes one day. The training is aimed at helping the students be effective leaders. They are trained on how to be students and leaders at the same time. Considering the huge responsibility the student leaders have ahead, the one-day training is not enough. They cannot learn enough skills, unless the administration keeps on having refresher courses and reminder workshops to strengthen the leaders. Majority of the board of directors interviewed in this study emphasized on the importance of training the students. They are young students who are given the responsibility of leadership. They have their studies to handle while at the same time they have to take part in administrative duties. However, 50% of the principals said that their student council does not go through any formal type of training. The student leaders start to take their responsibilities immediately after the election.



4.1. 2 Nature of Student Representation in the Student Council

The study sought to understand the nature of student presentation in the council. The results of the study indicated that every class is represented in the council. During focus group discussion with the students, the respondents agreed that there is enough representation at the council. During the interview with school heads, the results of the study indicated that most schools 9(47%) have 10-40 students’ leaders. Also, 5(26%) have 40-60 student leaders. Only 2(10%) have 1-20 leaders, and 3(16%) have more than 60 members of the council.

Table 1

Number of Students in the Student Council

No of Students in the Student Council	Frequency	Percentage
1-20	2	10%
21-40	9	47%
41-60	5	26%
Above 60	3	16%

Every sector is represented fairly at the council. Most of the departments are similar. Even if there are some differences in the names and sections, the structure of the student council in Kericho County can be represented in the following Figure 2.

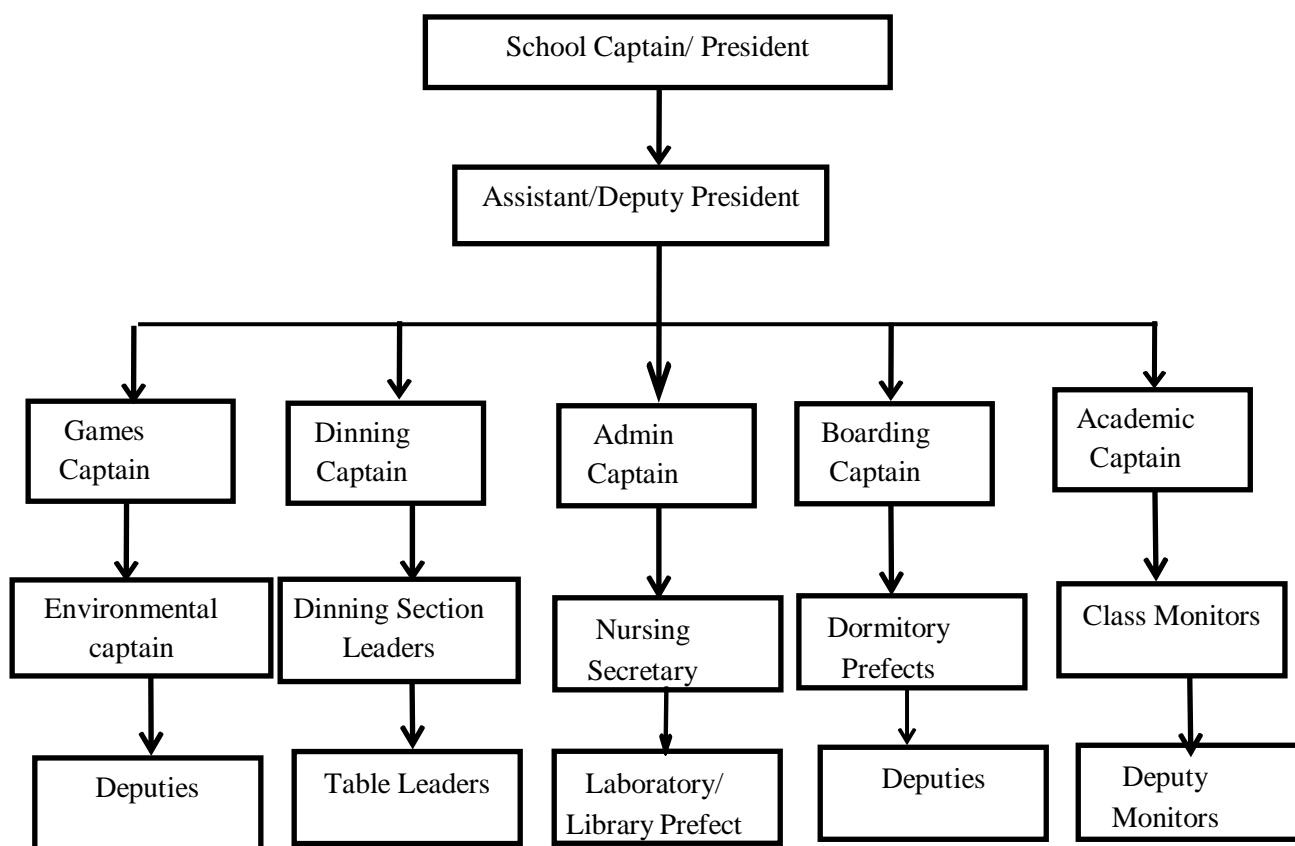


Figure 2

Structure of Student Council

There is the overall head of the student council with different names depending with the school. The most common names are: School captain, head boy/head girl, chair lady/chairman and school president. There are other schools with unique names such as counselors and secretaries of various departments.

The overall head is responsible of overseeing that every leader takes care of his department effectively. The



study found out that the captain is respected by both the teaching and the non-teaching staff. During the focus group discussions with the students, the learners argued that they respect the school captain because he/she has authority. In fact, he/she can influence an indiscipline case. Some respondents cited cases where the captain saved them from being expelled from school, or contributed towards expulsion of some students. He/she reports to the principal's office frequently brief him on the behavior of the students.

During the interviews with school heads, the respondents pointed out similar departments that are headed by the student council. There are five major categories that appear in majority for the schools. They include: games, dining, boarding, academics and administration. The games department is headed by the games captain who is responsible of the gaming activities in the field. According to one of the interviewed sub-county directors of education, the games departments in some schools also have the environment prefect who works together with the games captain to ensure conservation of the environment. He oversees activities such as tree planting, flower watering and proper disposal of waste in the school.

The results of the study indicate that the dining department is a major sector that is highly valued. According to the majority of the board members interviewed, most of the unrest cases in the school originate from this department. One member of the board said that:

"If the students are unsatisfied at school, they will not cooperate. These are teenagers who value food more than anything else. You must give them enough food or they will not cooperate with you. They can cause chaos and burn the entire school if the tea has no sugar" (Respondent, Kericho County, 2018).

The importance of the dining department makes the administration to be extremely keen in the selection of the dining head. The administration desires to have a person who has the power to control the students and convince them that everything is working in their favor. During the interviews with head of schools, one of the deputy principals reported that the dining captain must report to her every evening and brief her on the day's meals and the level of student satisfaction.

The boarding department consists of all dormitories in the boarding schools. There are dormitory monitors and deputies in every dorm. During the focus groups discussions, the students agreed that it was important to have the dorm prefects as they act as a link between the matrons and the learners. According to one of the board members interviewed, the leadership in this department is greatly influenced by the matron and dorm masters/mistresses. They select the person they would like to work with, and the administration does not reject their choice. A deputy principal agreed with this argument during the interviews. She pointed out that the dormitory mothers in her school make the final decision on who will be the head of a particular dorm. Since the dormitory heads work hand in hand with the dorm masters, their say must be respected.

The Academic department is present in every school. Every class has a class monitor who keeps the records of everything that happens in class. They report to the class teachers and the dean of studies. They also report any indiscipline cases to the master on duty. In most schools, the class monitors are elected by the students in that particular class. However, as reported by some respondents during the FGDs with students, sometimes the class teachers influence the election. The class teachers have the power to accept or reject the elected class monitor. These leaders report directly to the class teacher, and he has to work with a person he is comfortable with.

The administration department deals with the daily running of the other sectors in the school. The department has leaders in the laboratory, library, nursing and religious leaders. These members of the council report to the deputy principal as well as the head of specific departments. These sections are important but do not require a lot of interference from the disciplinary committee. The prefects ensure that the school properties in their specific areas of duty are protected.

The constitution of Kenya 2010 gives individual of the country to practice their sovereign power. The education system in the country needed changes to ensure students were well advocated for. So, the ministry of education developed sessional papers of the basic Act of 2013 number 14 to deal with the issue as illustrated by the Ministry of Education Science and Technology (2016). The law was instituted to ensure that students felt well represented, hence avoiding chaos and disruption of property in secondary schools. The student council law was born in the year 2008 with a common goal for the advocacy of student council. The ministry of education with other stakeholders, Children Education Fund, and Kenya Secondary School Heads Association sat together and realized that students need active inclusion in major school decisions.

The law established was designed to involve students in contributing to new ideas of developing the school system. According to Griebler & Nowak (2012) the law gives power to elected representatives to exercise sovereign power beneficial to the institutions they are in. The Ministry of Education Science and Technology (2016) stated that



the law stipulated that student had an upper hand in contributing their ideas in the daily running of the school. The student council is allowed to sit in Board of Management meetings when important matters concerning the school and students are discussed. The student council must set an example to other students through involvement with all stakeholders, while offering strong leadership skills (Mukiti, 2014). The prefect system was pushed away because it was a way that the administration used to subdue the views of the students increasing tension that led to strikes in secondary schools. The student council law protected and gave ownership to students to own their school programs, while bridging a gap between the administration and students.

4.1.3 Size and Effectiveness of the Student Council

When asked about the size and effectiveness of the student council, the majority of the students (68%) who filled the questionnaires agreed that the student council is appropriate and effective. Some respondents (20%) felt that the student council was too big to be effective. A small percentage of 12% indicated that the student council was too small to be effective.

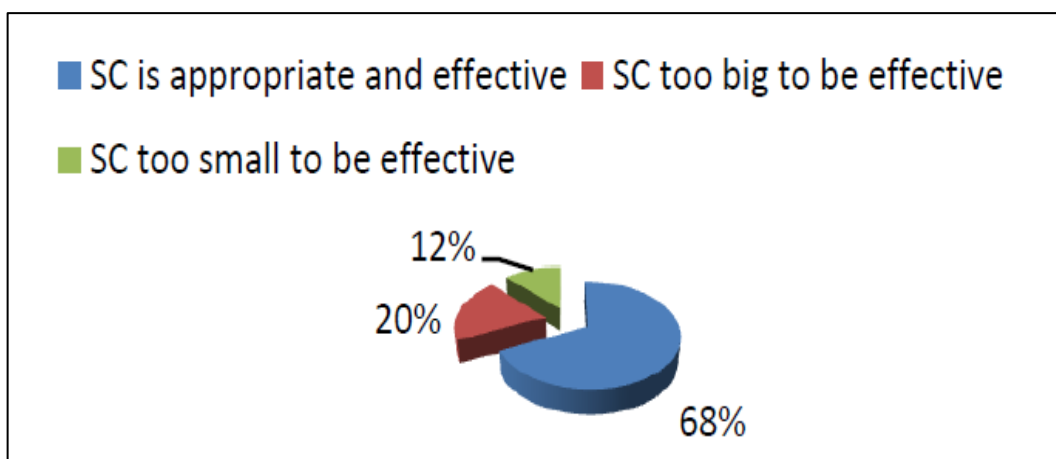


Figure 3
Student Response Size and Effectiveness of Student Council

The questionnaires from the teachers also indicated a similar perception. Most of the teachers (60%) felt that the student council in their school was effective, 26% believes that the SC is too big to be effective while 14% pointed out that the SC is too small to be effective.

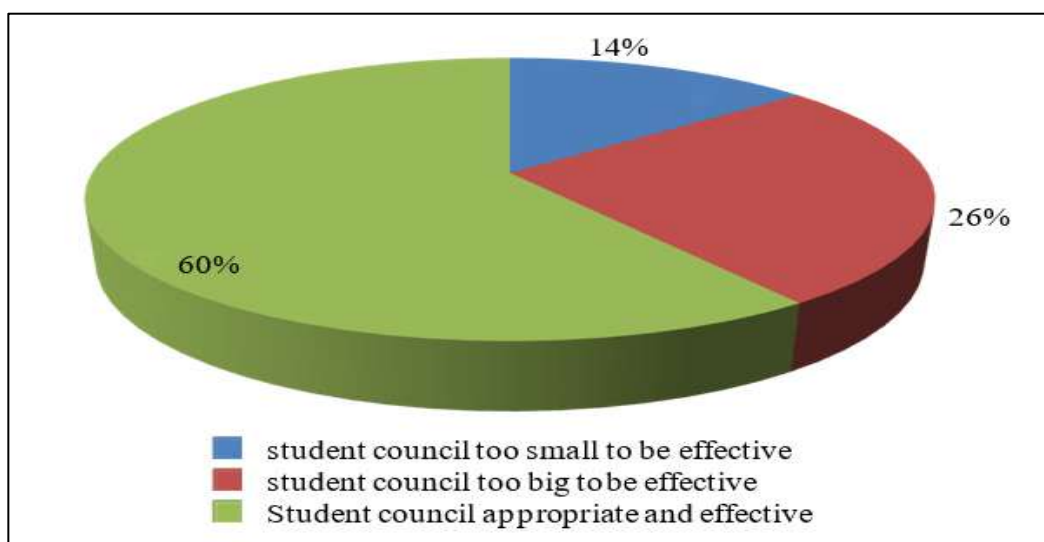


Figure 4
Teachers Response on the Effectiveness of SC



Most of the respondents believe that the student council is appropriate and fairly represents the students. The schools that have a high population have more than 40 student leaders. During the interviews in one of the national schools with more than 1500 students, the principal said that they have many leaders because the students are many. For the schools that have a low population, the size of the student council is smaller. In fact, some of the schools which had less than 300 students had less than twenty members of the council.

During FGDs with students, some respondent argued that the student council was too large to be effective. They felt that there is over-presentation in the council. The prefects are exempted from performing cleaning duties. The students felt that they have to do extra work which should be shared among more students, who are too many in the council. They claim that there should be fewer prefects as they only stand in for the teachers. In their views, some of the dockets should be eliminated. One of the students said that:

“Why should we have a captain and a deputy? A captain is enough. Further, we should not have the games captain, the deputy games captain and the environment leader. They all perform the same duty. This department should only have one prefect. Even the prefect on duty is enough to check how we play in the field. Furthermore, the Sports and Talent Patron is always present. There is no need to have all these leaders. It is a duplication of duties” (Respondent, Kericho County, 2018).

According to the director of education in the county, some of the schools have so many members in the council. The administration allows for a big number because they want to manage everything that the students do. Sometimes the over representation makes the student to be uncomfortable. They lack the freedom to do what they want to do even during games or leisure time that they should be free every time there is a prefect passing nearby. Thus, they must act in a manner that will not annoy the prefect. However, the big size of student council is sometimes very useful, especially in the big schools. During the interviews with the board of directors, one of the respondents agreed that they require a big number because the teachers cannot be present everywhere. Thus, it is essential to have prefects everywhere as they are the “eyes” of the administration.

The student council members spend all their time with their colleagues. In this case, they give first-hand information to the administration. During the interviews, the school heads agreed that the student council has helped them learn of dissatisfaction among the students. In fact, most of the heads are pre-informed of a strike before it occurs. The members of the student council learn through their colleagues that there would be unrest because of various reasons. They have severally controlled the situation before its escalation to chaos. They are grateful that the student council has been very useful to the school. During the FGDs with students, the respondents pointed out that the student leaders relay information to the administration and help them communicate various issues. Thus, the students believe that the student council should remain. The student body acts a link between the students and the administration.

However, some of the students (12%) felt the student council was too small to be effective. They claimed that there were very few leaders. The few who are there are given a lot of responsibilities to the extent that they cannot be effective. During one of the FGDs with the students, the respondents pointed out that the administration only allows them to select class prefects and the head-boy. They are given responsibilities to offer leadership roles in the dining hall, during games, in the laboratory and library. The roles are rotational. As a result, there is no specific role for a particular prefect. As a result, the respondents felt that they do not have a person to ask question pertaining a specific section such as the library. One of the respondents during the FGDs said:

“The person who was in the library last week goes to the laboratory. If you wanted a particular book and you had liaised with that particular prefect, you start the process again. Before the book is returned to the library and reserved for you, another prefect comes in. In this case, the student council becomes ineffective because it is too small” (Respondent, Kericho County, 2018).

It is important to have a moderate student council that will be effective. The administration should avoid over-representation as it makes the students uncomfortable. They feel that there are so many idle prefects who should be sharing duties as normal students. Thus, a very big size creates enmity between the students and the student council. In addition, a small population is not effective, as it does not cover all the required sectors. A small student council leaves gaps in the administration.

When asked to rate the effectiveness of the student council, both the teachers and the students filling the questionnaires agreed that the student council was effective. A moderate number of students comprising of 28% believe that the student council was very effective, while 40% believe that it was effective. However, 32% have a different opinion that the student council is not effective.

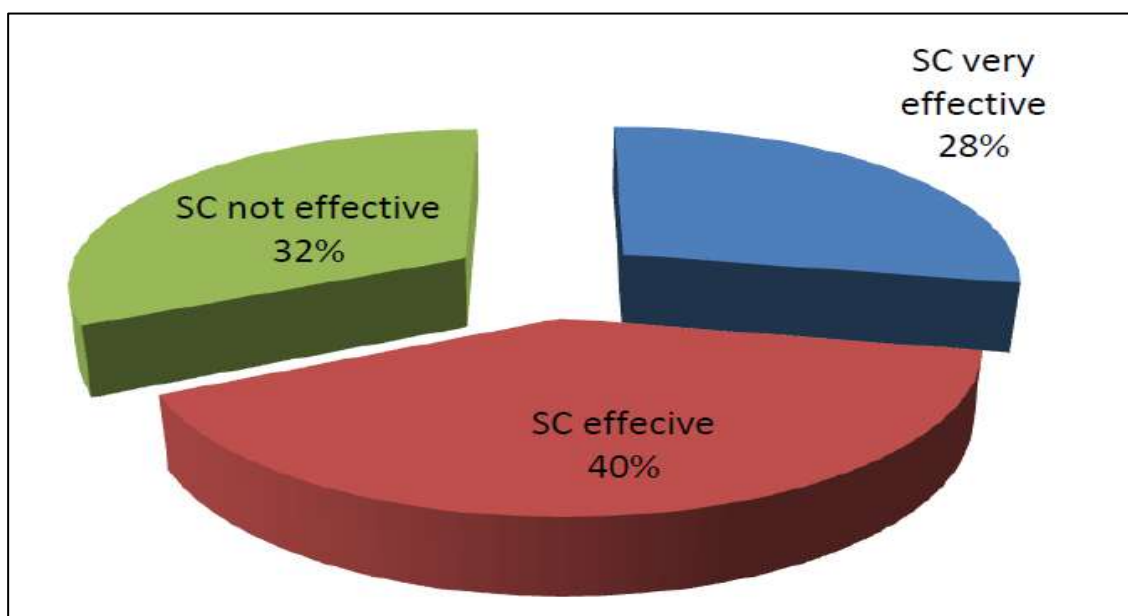


Figure 5
Effectiveness of SC

Most of the students from schools that have had serious unrests in the last two years believe that the student council has not been effective. During FGDs with the students, they argued that the interference of the administration during the formation of the student council is what makes them ineffective. In their views, the administration selects students who can easily be manipulated. One of the students said that:

“The student council in this school belongs to the teachers. They represent the interest of the teachers and not the students. All the leaders we elect are not announced. The administration announces a list that favors them. Therefore, we do not like the student council and it does not help us. It is ineffective to us, but effective for the administration” (Respondent, Kericho County, 2018).

When the students feel that the administration is unfair and that there is no democracy, they reject the student council in place. In this case, the administration should make the election process appear as democratic as possible. Some of the school heads interviewed in this study pointed out that they do not allow the students to democratically elect the council. They “doctor” the results because they cannot allow the student to elect leaders who cannot cooperate with the administration. However, this should happen without the knowledge of the students. It is advisable to make the students believe that the candidate announced as the leader is the one who won the elections. Further, the administration, through the disciplinary committee, should only allow the most qualified candidates to vie for the seat. There should be vigorous vetting of the interest parties so that the administration is comfortable with any of the candidates who win after the campaign. Consequently, the student will only have a choice to elect their leaders from a clean list.

4.1.6 Student Councils’ Role in Management of Discipline

The respondents were asked to state the effectiveness of the student council in the management of discipline. The results of the filled questionnaires were as follows:



Table 2
Effectiveness of SC in Discipline Management

Role of Student Council in Management of Discipline	Agree	Disagree
Student councils take part in school governing body activities	52%	48%
Policies are formed after rigorous deliberations including students	8%	92%
Student councils ensure enforcement of school rules and regulations to the latter	79%	11%
Student councils participate freely in disciplinary meetings with school authority	32%	68%
Student councils are equal partners in decision making about discipline	8%	92%
Decisions about discipline are transparent and open	15%	85%
Student councils cultivate a culture of positive behavior amongst students	51%	49%
Student councils encourage fellow learners to participate and are responsible for the sound functioning of school	64%	36%
Student councils promote positive communication with educators and school management	57%	43%
Student councils are involved in anti-bullying	72%	28%
Student councils promote good discipline by holding regular learners' meetings and discussions	48%	52%
Student councils use communication channels to discuss learners' fears and frustrations	79%	21%
Student councils create clubs and special projects to promote learners' involvement	26%	74%
Student councils act as ambassadors in the school and community	65%	35%
Student councils develop and promote a positive learner spirit and culture within the school	54%	46%

According to the result of the study (52%), the student council is actively involved in the management of discipline. The student council is given the responsibilities of ensuring that the school rules are implemented. During the FGDs with students, they agreed that the prefect body plays a crucial role in ensuring that the students follow the set rules. In most schools, as revealed during the FGDs, the prefects are allowed to give punishments to the students who do not follow the rules. The respondents said that the punishments which the prefects give are fair. They tell them to sweep the compound or redo their duties if they are not done properly. In most cases, the members of the student council report the student found with indiscipline cases to the Master on Duty or to the deputy principal. Class monitors report cases to the class teachers, while the dormitory representatives report to the matron or the boarding patrons.

In some cases, the members of the student council participate in the disciplinary meetings with the authority. Most of the schools' heads agreed that they involve students in the disciplinary meeting if the case being discussed was reported by a member of the council. They involve the prefect so that they can get first-hand information and a witness in the committee. However, the member of the council is not allowed to make any decision. He/she comes to the committee for a short time to give relevant information, and then he is allowed to go back to class. During the interviews, some board members pointed out that the student council should be allowed in the disciplinary meeting if the council will have a positive contribution. However, most of the sub-county directors of education were against that idea. During the interviews, one of the sub-county directors pointed out that:

“Students should not be allowed into the disciplinary meetings at all. These are students and should not be given such privileges. In fact, the student who misbehaved should not even know who reported him. Such instances create enmity between the student and the Student Council. The students might decide to take vengeance on the student leader who reported him to the authority” (Respondent, Kericho County, 2018).

Majority of the students (85%) felt that decisions about discipline were not transparent and open. Students are hardly given a chance to give their views in matters of discipline. During FGDs with students, the respondents argued that the authority makes decision without listening to them. Even their representatives from the council are not given a chance to give their views. According to the school principals interviewed, matters of discipline are administrative. Allowing students to give their views would compromise the discipline of the school. Thus, the disciplinary committee makes the final decision without involving the students.

Majority of the students (92%) disagree that the student council is involved in policy formulation. Only a small percentage of 8% agrees that there are vigorous deliberations before the formulation of the policies. During the FGDs with students, the participants argued that they are not informed of any policies being formulated the administration only reports of new policies and expect the students to obey without objection. When the researcher



asked the principals during interviews on whether they involve the student council in the formulation of the policies, the respondents pointed out that is a purely administrative role. Therefore, they do not involve students. The students are young and have no knowledge of how policies are formulated. Therefore, they should follow the school rules because the stakeholders in policy formulation make policies that are mature. However, some board members have a different view. When interviewing some of the board members, they pointed out that it would be important to involve the students because the policies directly affect them. One of the board members said that:

“Even if the students are young, they should have a say in the new rules and regulations set. We are in the 21st century, and we should let the students air their views. They might have some information that we do not have. Giving them a chance will make the policies friendlier” (Respondent, Kericho County, 2018).

In as far as the management believes that the student council should not be involved in the policy, research indicates that participation of students in their rules bears positive fruits. The students will feel that their ideas are valued. As a result, they will obey the rules and cooperate knowing that the policies are for their benefits.

Student leaders have a role in cultivating a culture of positive behavior amongst student. They remind the students of the importance of doing the right thing at the right time. During FGDs with students, they agreed that they learn a lot from the Student Council. Most of the student leaders are disciplined and good performers in academics. Therefore, they listen to them and emulate them in many ways. The student council encourages fellow learners to participate in different activities. The SC makes the school function smoothly as they promote communication between the educators and the management.

The results of the study indicate that the student council is involved in management of discipline. However, there is little participation of students in administrative decisions. The student council concentrates more on the implementation of the policies. During the interviews, one of the principals pointed out that they allow students to participate in some administrative issues such as the choice of school uniforms. They allow the students, through the student council to give the colors they would prefer. The other administration decision that students have a say in is planning of co-curricular activities. The games captain represents the students when deciding which sports the students should be playing.

The results of the study agree with the view of Basaam (2018) that the students' council is concerned with minor issues within the institution such as conflicts among the students, misunderstandings, allocation of duties and even personal issues of students. Every student has to participate to attain success since the higher the level of participation the higher the probability of good performance which is inversely proportional to the level of discipline (Basaam, 2018). The students' body establishes policies that facilitate the promotion of good behaviors among students since they clearly understand the specific roles that they ought to play. The policies guide the relationship among students in eradicating indiscipline cases such as bullying. Policies also validate that the students are agents of the inevitable change of behaviors.

According to Kennedy (2018), involvement of the students' council in the formulation of rules and regulation within the school premise includes the students' views and negotiations in decision making that are done through a collective dialogue between the students' council and administration. However, as revealed in the study, the extent to which the students' council is involved in the formulation of policies is undermined by the administration because the student leaders are seen as immature and lack the know-how on how to run a schooling institution. It is viewed that the students are to remain passive since they receive instructions from the teachers, parents and the administrators for them to follow, therefore the policymaking process is undertaken by the administration (Kennedy 2018). In this case, the student council fails to work as expected.

In the views of Anderson & Ritter (2017), the students' council involvement in the formulation of rules and regulation is significant in the management of the school concerning issues such as students' welfare. The administration lacks a clear understanding to illustrate various issues that affect student thus the administration to manage discipline within the institution (Anderson & Ritter, 2017). Nonetheless, as revealed during the study, the student leaders' involvement in making decisions is limited because they are only restricted to addressing issues that affect them directly. The induction process is the technique that the student uses to become involved fully hence the student council should be involved in major areas such as planning the development of the school and discipline.

The results of the study agree with the views of Blank and Shivit (2016) that keeping time facilitates the smooth running of the school; the students' council have the responsibility to ensure that time is managed. They ensure that all activities are done on time hence play a vital role in the management of students' discipline (Blank & Shivit, 2016). During the interviews, school principals confirmed that for the efficacy of the students' council in keeping time, the student council is divided into various categories including those in charge of managing time. To



ensure that that the students observe time, the student leaders command respect for their voices to be heard, by doing this their studies conclude on time hence the management of the school's discipline.

The results of the study indicate that the students' council plays an important role in offering instructions to students thus, responsible for managing the pace at which various activities are conducted to achieve the objectives given by the administration. Nekesa (2018) agrees that the SC provides an environment in which the students work and motivate them to enhance greater performance in their school activities (Nekesa 2018). However, Nekesa (2018) further warns that this is only effective if the administration provides a democratic election to acquire a forum of student leaders who are willing to carry out their roles without being forced, and also helping them in achieving good school performance holistically. They alert the administration informing them, of any misconduct within the students.

During the interviews, the county director of education in Kericho county pointed out that punctuality is achieved since the students' council are on their duties at all time in all places during their stay in school, by keeping time order is attained within the school premises, students take their lunch and break the right time. This enhances the enforcement of rules regulation within the institution. This is in agreement with Kennedy (2018) that the student council is capable of ensuring the rules and regulations are followed, including punctuality that is crucial in a learning environment. Involvement of the students' council in the day to day running of the institution ensures that the students are disciplined for they are found at the right time at the right place, this shows their adherence to the school's rules and regulations.

Majority of the school principals interviewed indicated that they no longer allow the student leaders to give punishment to their fellow students. They pointed out that such privileges were previously available, but they were eliminated as they created unnecessary gap between the student council and the other student. In the views of Mboyonga (2018), allowing the student leaders to administer punishment creates enmity between the student and their leaders. The traditional prefect body that was given such responsibilities failed terribly as the students feared and hated them. In fact, Mboyonga (2018) concludes that when student leaders are involved in punishment administration for the management of the school, school unrest increases. Despite the fact that it can be valuable since it tends to make sure there are limited chances of indiscipline and students conduct themselves responsibly when teachers are absent, it creates animosity that can lead to worse situations when the students decide to strike against their leaders. As indicated in the literature review, such cases have in the past caused painful deaths when students targeted their own leaders in a wave of violence in Nyeri High school in 1999 when four prefects were burnt by their fellow students in their cubicles as they were sleeping.

BoM members pointed out that the SC plays a very important role in reporting cases of student having phones and laptops illegally. The student leaders can easily learn who has such gadgets as they live with their fellow students. Damiani (2016) points out that the advancement of science and technology has increased rapidly; it is a major factor influencing student's behaviour. Students are hooked to social media platforms to acquire psychological satisfactions. The mannerisms observed are transferred to the school premises and a couple of time adopted within the institution (Damiani, 2016). Students purchase electric gadgets such as mobile phones for entertainment and carry them to school illegally, hence violating the school's rules. The role carried by the student's council is to keep the administration body aware to search possession of gadgets. Deputy Principals agreed during interviews that students found guilty are expelled or severely punished to act as a good example to others and reduce such cases.

The principals and deputy principals also pointed out that the student council is involved in the indication process. The students' council ensures that the students understand the need for them to observe discipline within the institution from the time they join. According to Mboyonga (2018), student leaders help the new comers especially the first years to quickly adapt to the new environment. They guide them on how to do their daily activities in school. In some schools, the student leaders are given the role of mentors. Each leader has a group that he/she mentors for one whole term. The mentorship program has helped many students adapt to the environment and easily acquire a sense of identity. It sometimes continues until the leaders' complete school, and it has proved to be effective in many schools.

The results of the study agree with Kibui et al. (2014) that the students' council acts as an avenue that connects the administration with the students' body. Issues affecting students are addressed to the administration through the student's council then discussed and resolved amicably (Kibui et al., 2014). This prevents the students from presenting themselves to the administration at a personal level since the ratio of student to administrators is high. Feedback is given out through the students' council to the rest of the students who are involved in the decision-making processes. The students' council has enhanced the welfare, development of good leadership qualities and career choice among the students. The following are just but a few demonstrations of the role of the student's council.



V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusion

The study concludes that the student council is structured in way that it can effectively help in management of discipline and mitigating conflict. However, the administration does not allow the students to democratically elect their leaders. Instead, the administration has a great input in the formation of the student council. Thus, the students feel that the student council is loyal to the administration, and this hinders its efficacy.

5.2 Recommendations

The study recommends that the government should restrict the interference of the administration in the formation of the student council. As indicated in the results, the administration interferes with the formation of the student council. Thus, students have a prefect body that is not their choice. In this case, it becomes hard for the students to relate properly with a student body that was put in place by the administration. Such a student body cannot act as a bridge between the student and the administration. Therefore, the government should make it clear that the student council should purely be elected by the students so as it can achieve the desired goals.

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Factors Affecting Maize Production in Kiteto District, Manyara Region, Tanzania: Cross Sectional Design

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ABSTRACT

Maize is one of the most important food crops globally; however, its production in most of the developing countries has been facing several challenges that also affect the livelihood of the large number of smallholder farmers who highly depend on the crop for food and income. Therefore, to deepen understanding of the same, the current study explores factors affecting maize production in Kiteto district, Manyara, Tanzania. This study employed a cross-sectional research design to gather primary data from a randomly selected sample of 100 individuals. The data was analysed using the multiple linear regression technique. The findings revealed that farm size (0.0083, $p < 0.01$), access to irrigation (0.0878, $p < 0.01$), and access to improved seeds (0.0582, $p < 0.01$) had a significant statistical influence on the level of maize production. Furthermore, regarding the challenges, the results were analysed through the utilisation of measures such as the mean, frequencies, and percentages. Furthermore, the study found that shortage of rainfall, maize price fluctuation, diseases, and pests were the main challenges facing maize farmers in the study area. The study findings recommend that in order to improve maize production, there is a need to increase accessibility to irrigation facilities, improved seeds, fertiliser, and modern farming techniques among smallholder maize farmers, and this may be done by the government in collaboration with the private sector.

Keywords: Agribusiness, Agriculture, Climate Change, Livelihood, Poverty

I. INTRODUCTION

The maize crop is one of the most important staple food crops in the world, where globally it is estimated to be grown on about 197 million hectares of land and on about 40 million hectares of land in Sub Saharan Africa (Abdulai et al., 2017; Huma, 2019). In Africa, maize made up about 20.9% of global land under maize production (Abdulai et al., 2017). This made maize the most widely cultivated crop in Africa (second) compared to other cereals (Epule et al., 2022). Recently, Africa experienced a rapid increase in the demand for maize, which led more land to be devoted to maize production (FAOSTAT, 2019; Romy, 2020; Kitole et al., 2023). However, recently, most developing countries, particularly African countries, have experienced a decline in maize production despite the large area devoted to maize production. In Africa, maize production stands at 2.1 tonnes/ha, which is lower compared to other countries, for instance, Asian countries, whose production stands at 5.4 tonnes/ha (FAOSTAT, 2021). According to Kitole et al. (2024), the East Africa region experienced a maize production deficit of 97,000 million tonnes in 2022/23, which is 112 percent higher mainly due to poor rainfall performance, and Tanzania, since it is a main producer in the region, is expected to have an export surplus of 20% below in 2022/23.

Smallholders are the main maize producers in developing countries, specifically in Africa (Epule et al., 2022). In Tanzania, this group contributes to about 85% of maize production (Suleiman & Rosentrater, 2015), but is exposed to a number of challenges that limit their production capacity. low maize production due to several challenges, mainly drought, political insecurity, poverty, rapid population growth, land shortages, pests and diseases, and shortages of rain, and this situation created some production deficit compared to its level of consumption that led to about 240 million people, which is almost 20% of sub-Saharan Africa, with food shortages (Lee et al., 2022; Kitole et al., 2023). Moreover, in Tanzania, smallholder farmers are facing challenges in their production, including unreliable rainfall, pest and disease fall of army worms, inefficient extension services, and post-harvest loss (Baijukya, 2020).

Tanzania has implemented several initiatives and strategies to address the challenges affecting maize production, aiming to enhance maize production among smallholder farmers, who are the primary maize producers in the country (Utonga, 2022). The new seventeen Sustainable Development Goals (SDG), which include ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture, serve as the foundation for some of these initiatives. The Tanzanian government has taken several measures to boost maize production and agriculture



at large in order to ensure economic development and the availability of food. The country introduced some institutional initiatives, including the National Strategy for Growth and Reduction of Poverty one and two (NSRGP I & II), the introduction of District Agriculture Development Plans (DADPs), and the establishment of the Agriculture Sector Development Programme (ASDP), whereby all these strategies aimed at the transformation of agriculture, promoting yields, including increased maize yields in the country, and promoting livelihood and economic growth (Utonga, 2022; Kitole & Utouh, 2023; Utouh, 2024).

Tanzania's smallholder farmers, who are the primary producers of maize in the country, continue to struggle with low production levels despite the significant contribution of maize to the country's economy (Xiong & Tarnavsky, 2020). Currently, Tanzanian maize production stands at 1.2 to 1.5 tonnes per hectare, which is considerably less than the recommended global average yield of 4.3 tonnes per hectare (Utonga, 2022; Fumbwe et al., 2021). The limited production leads to various shortcomings, including a decrease in personal and national income, amplified food insecurity among Tanzania's growing population, and an escalation in levels of poverty within the country (Lobulu, 2019; Kitole, 23). Gaining a thorough comprehension of the variables that influence maize production among smallholder farmers is crucial for enhancing the effectiveness of response mechanisms pertaining to maize crop growth, both in government and private organisations within the nation. This study aims to fill the existing knowledge gap by conducting a detailed spatial analysis of the factors that influence maize production in Kiteto town and rural areas. The study focuses on three main factors: production factors, institutional factors, and socio-economic factors that impact maize production in Kiteto District.

II. LITERATURE REVIEW

2.1 Theory of Production

This study is guided by the theory of production. The theory of production was developed from the work of in Smith 1776 in his article on the wealth of the nation (Foss, 1997; Lewis, 1988; Smith, 2005; Smith, 2010; Boucoyannis, 2013; Collins, 2017). The classical views of the theory of production only consider the physical factors that are directly involved in production. Basically, the theory of production is simply the application of constrained optimisation, which either minimises the cost of producing a given amount of output or maximises output level with an affordable level of cost.

The production function is a model used to analyse the existing relationship between dependent and independent variables (Ntabakirabose, 2021; Kitole & Sesabo, 2024). The theory of production is a step forward to explain the principles by which a firm decides how much of each commodity that it sells (its "outputs" or "products") it will produce and how much of each kind of labour, raw material, or fixed capital good that it employs (which are inputs or factors of production) it will use. The theory involves some of the most fundamental principles of economics. According to Dhakal et al. (2022), the theory of production is displayed with the aid of the production function. The production function is a mathematical equation that describes the technical relationship that transforms input (resources) into output (commodities). And production function takes a number of forms, but in general, production function can be written as:

$$Y = f(K, L)$$

Where Y represents firm output, K represents the level of capital, and L represents the level of labour force used in production. Thus, the production function represents the maximum quantity of output (Y) that can be produced by the combination of two input factors, labour and capital. The above relation described by the production function is that the given output Y can be produced by using more capital K and less labour or by using more labour L and less capital. In this study, the theory of production provides a basic understanding of how high maize yield or production is obtained at the expense of many factors, such as production factors, institution factors, and socio-economic factors.

2.2 Empirical Literature Review

Njogu (2019) observed that tilling by using tractors has a significant and positive effect on maize production, and the positive impact is due to the fact that preparation of farms by using modern means (tractors) increases maize production since farmers are able to cultivate large areas in a reasonable time, compared to those who apply traditional farm practices, whereby 69.02 of the respondents were using tractors and the remaining 30.98% were using manpower in tilling their farms. On the other hand, Mohammed (2021) found a significant positive relationship between land size under maize cultivation and the quantity of farmers' maize production in the study area, and the study observed that an increase in the land size under maize cultivation resulted in a significant increase in the level of maize production.

According to Ogujuba et al. (2021), the number of labourers working on the farm was found to have a positive and statistically significant influence on small-scale maize production in the study area, where it imposed a



greater influence than any other actor. Additionally, according to Mohammed (2021), access to fertiliser among small-scale farmers is an important factor in their maize production since it increases their production level by enhancing maize yield and quality. The study found that access to fertiliser has a positive and significant effect on the level of maize production. That is, farmers who access and apply fertiliser, both manure and chemical fertiliser, have high production compared to others; hence, the amount of fertiliser used by the farmer leads to a significant increase in the quantity of maize. Also, Eticha (2020) found that improved maize seeds have a positive and significant effect on maize production results; 56.2% (59) of respondents used improved seeds while 43.8% (46) did not use modified seeds, and the results of the study indicated that farmers were aware of the nature and importance of improved seeds. In addition, FAO (2015) argues that the higher the age of the household head, the better the family maize production, due to the fact that elder people have a lot of farm experience. The results are incongruous with the study by Ombuki (2018), which found the age of the farmers had an insignificant influence on maize production in selected areas, and it was proposed from such a result that the result could be linked to the fact that the older the farmer, the less efficient he becomes due to his old age.

Ombuki (2018) suggested that education is social capital that impacts households with the ability to improve maize productivity, since education attainment by the farmers could lead to awareness of the available advantages of modern agricultural technologies, the ability to understand the instructions provided on the input packages, and the ability to easily adopt new and modern farming practices, hence increasing farm production. The study findings indicated that the educational attainment of household heads had a statistically significant effect on maize production. In a study conducted by Yassoungo (2018), it was discovered that 63.5% of the participants did not have any formal education, 24% had never received any type of education, and the remaining 12.5% had acquired a formal education. According to the findings of Yassoungo (2018), a proportion of the participants (63.5%) lacked formal education, while 24% had not attended any educational institution. The remaining 12.5% possessed formal education. The findings of the study indicate that maize production is negatively affected by a low level of education, which can be attributed to a diminished receptivity to modern technologies and innovations. Additionally, family size has a negative and considerable impact on maize production, according to a study by Tuki (2020). This suggests that maize production decreases as the number of households increases, as land fragmentation among the household heads reduces the area designated for maize cultivation, consequently leading to a reduction in the yield attained.

In addition, Ashenafi et al. (2022) discovered that among the respondents interviewed, the proportion of males engaged in maize production was higher than that of females among small-scale crop producers in the three districts. This suggests that female participation in the area is extremely limited. The result demonstrates that the region is predominantly characterised by households led by males. In addition, Utonga (2022) discovered that the number of years experienced in farming had a positive and significant effect on the amount of maize produced. These findings suggest that experienced farmers who have spent a significant amount of time cultivating maize develop a deep understanding of the local climate patterns and are skilled at managing maize diseases. This enhances their maize output.

Moreover, several studies have been conducted in developing countries on assessing the influence of access to credit facilities among farmers on maize production, including one in Zimbabwe by Gracian (2019). The study found that 64.9% of farmers never received loans from financial institutions, while only 35.1% received loans. The results show that the majority of farmers in the study area did not have access to financial services. Also, Urassa (2015) found extension services with statically insignificant effect on maize production, even if extension services is among of key factors affecting the level of maize production, but in the study area the access to extension services was seemed as problem in a study area, and the study found that the access or non- access to extension services among surveyed study respondents was different among various age groups, many elders and middle age respondents found to have low access to extension services, since this group of respondents believe that they had required and appropriate skills based on the number of years they spend on farming experience, while young groups mentioned ignorance as a major factor which hinder them the access to extension service. Furthermore, Eticha (2020) found the majority used irrigation services in their plantations; for instance, 66.7% of the farmers had access to irrigation facilities and only 33.3% did not, and such results reveal that irrigation services have a positive relationship with the quantity of maize harvested. In addition, Tuki (2020) suggested that farmers nearest to the market centres play a significant role in maize production, and it was found to have a positive and significant influence on maize production, and this was because farmers near marketplaces did not incur high marketing costs to reach market centres.



III. METHODOLOGY

The study was carried out in Kiteto District, Manyara Region, Tanzania. The district shares borders with Simanjiro District to the north, Tanga Region to the east, and Dodoma Region to the south and west. Kiteto District has a total area of 16,865 km² which is equal to 34.1% of the total land area in Manyara Region. The district is found between 36 15' and 37 25' east longitude, and between 40° 31' and 6 ° 03' south latitude. Kiteto District is located at an altitude between 1000 metres and 1000 metres above sea level, and there are two weather seasons per year, which are spring and summer. Spring is from December to May, and summer is from June to November. A district also receives an average of 500 mm to 650 mm of rain per year.

3.1 Research Design

This study employed a quantitative research approach to collect data from the respondents in order to respond to the research questions. A cross-sectional research design was employed as a quantitative research methodology, wherein data were gathered from study respondents at a single instance without any repetition from the sample population. The cross-sectional research design is useful and convenient for comprehensive data collection, cost-effective, and efficient in terms of time, as it requires less time to execute. The study employed both probability and non-probability sampling techniques to select a representative sample for information collection. The sampling method known as non-probability sampling selects samples according to the study's purpose. For the study, we applied a purposive sampling procedure based on non-probability sampling to select district maize producer wards, namely Matui, Engusero, Namelock, and Partimbo, based on their maize production intensity and district contribution.

Thereafter, a simple random sampling method was used to determine the size of the sample from a significant population or to determine the sample size of farmers from the purposively selected ward. This simple random sampling is also known as probability sampling because each unit in the population has an equal chance of being selected as a sample for the study. Simple random sampling was applied by the study because it removed bias from the information collected.

3.2 Sample Size

The study employed Yamane's (1967) formula to obtain the sample size to be used in the study. The formula states that $n = \frac{N}{(1+N(e)^2)}$, whereas N is a total population available in four selected wards, which is equal to 97,919, e is the error of 10% (0.1), and n is the calculated sample size. Therefore, based on the formula, the estimated sample size is 100 smallholder farmers;

$$n = \frac{97,919}{(1 + 97,919(0.1)^2)} = 99.9 \approx 100$$

3.3 Data

Based on the nature of this study, which is to examine determinants of maize production among smallholder maize farmers, the primary type of data was used and was collected directly from the selected sample of smallholder maize farmers found in Kiteto District. Also, for this study, primary data were collected by using administered questionnaires, which contained a set of questions predetermined in chronological order to collect quantitative primary data from selected sample respondents.

3.5 Analytical modeling

The production function based on this study is used to show the maximum quantity of maize produced from the combination of various inputs (factors affecting maize production). Therefore, this study uses the Ordinary Least Squares model (Multiple Linear Regression (MLR)) to analyse factors affecting smallholder production in Kiteto District, as shown below:

$$Z = T(Q_1, Q_2, \dots, Q_n) + v$$

Given that the MLR model is just an extended model for simple linear regression normally it has to adhere to the Gaus-Markov assumption of zero mean and constant variance such that $\varepsilon \sim N(0, \sigma^2)$. of which now the general equation of the model that has been employed is given as:

$$Z = \alpha_0 + \alpha_1 Q_1 + \alpha_2 Q_2 + \dots + \alpha_n Q_n + v$$

Whereas Z represents the amount of maize produced, while α_0 is the constant term indicating the value or the amount of maize produced given other factors are constant, and α_1 to α_n and variables or factors that affect maize production, which includes the demographic, socioeconomic and institutional factors, and v is the error term. Moreover, to add value to these variables that have been included in the general MRL equation, Table 1 provides a list of variables and their measurements as used in the study.

**Table 1***Variables Measurements their Expected Signs*

Variable	Type of variable	Unit of measurement
Maize production (DV)	Continuous	Number of bags produced (90kg/bag).
Farm size	Continuous	Number of hectors under maize production
Farming system	Categorical	1= use of tractors; 2= use of oxen; 3= use of hand hoe
Access of fertilizer	Categorical	1= access to fertilizer; 2= not access to fertilizer
Access to improved seed	Categorical	1= access to improved seed; 2= not access to improved seeds
Amount of labor	Continuous	Total number of family and hired labor employed per hector
Age of the farmer	Continuous	Age of the households
Level of education	Categorical	1= primary education; 2= secondary education; 3= university education; 4= never attend to school
Income level	Continuous	Farmers monthly income in TSH
Farming experience	Continuous	Years spending on maize production
Gender	Categorical	1= male; 2= female
Marital status	Categorical	1= married; 2= single
Access to extension service	Categorical	1= access to extension services; 2= not access to extension services
Access to credit	Categorical	1= not access to credit; 2= access to credit
Family size	Continues	Number of family members
Use of irrigation	Categorical	1= use irrigation; 2= not use irrigation
Distance to the farm	Continues	Distance in Km from home place to farm plot
Distance to the market	Continues	Distance in Km from home place to the nearest market
Farming cost	Continues	Cost in TSH

IV. FINDINGS & DISCUSSIONS

4.1 Determinants of Smallholder Maize Production in Kiteto District

Results in Table 2 show that farm size has a positive and statistically significant influence on smallholder maize production at the 1% significant level ($p = 0.002$). The results indicate that an increase in area under maize production results in an increase in maize production by smallholders; thus, in order to increase maize yield, it will greatly depend on an increment in the size of the land. The finding is in line with the study by Tuki (2020) on factors affecting smallholder maize farmers production and market participation in Ethiopia. The study determined that land is the primary determinant of production in rural areas. Land size has a statistically significant positive effect on maize output. Farmers who own larger land areas dedicated to maize production tend to yield a greater quantity of maize compared to others.

The study findings suggest that the availability of improved seeds had a positive and noteworthy impact on the maize productivity of smallholder farmers. The finding suggests that when smallholder maize farmers employ better quality seeds, it leads to a higher level of output of maize. This is because improved seeds enhance the quality and quantity of maize yields in comparison to traditional seeds. The finding aligns with the research conducted by Eticha (2020), which concluded that improved maize seeds had a positive and significant effect on maize yield. The study revealed that the accessibility of fertiliser had a positive and statistically significant impact on maize output in the study region, with a significance level of 1% (0.003). The data suggest that having access of fertiliser to a greater number of farmers leads to a corresponding rise in the level of maize production by smallholder farmers. The rise in the quantity of maize harvested by farmers is attributed to the improved soil fertility of the land, which is a direct result of the application of both organic and inorganic fertilisers. This results aligns with the research conducted by Utonga (2022), which demonstrated that the accessibility of fertiliser among maize farmers had a positive and significant effect on maize output. Furthermore, it was seen that an increase in fertiliser usage resulted in higher levels of maize yields. The study's findings suggest that having access to irrigation has a positive and statistically significant influence on the production of maize by smallholder farmers. This influence was observed at a significant level of 1% ($p = 0.000$). This finding suggests that providing maize farmers with access to irrigation can lead to higher maize yields because irrigation helps farmers mitigate the impact of climate change, particularly in areas with insufficient rainfall. By utilising irrigation, farmers can ensure higher maize yields compared to those who do not have access to it. The finding mirrored the research conducted by Eticha (2020), which revealed that the accessibility of irrigation had a favourable and substantial impact on the yield of maize. The study also revealed that a significant majority of farmers (66.7%) had access to extension services, in contrast to those who lacked access to irrigation (33.3%).



The study's findings suggest that the quantity of labour had a statistically significant positive effect on the level of maize output within the area of the study, with a significance level of 1% ($p = 0.000$). The finding suggests that employing more labourers in maize production will lead to higher maize production among smallholder farmers in the study area. This is because a significant number of labourers are involved in all stages of maize production, which helps to save time for each activity. The research by Dimoso and Andrew (2021) and Ogujiuba et al. (2021) supports the finding that the number of farm workers positively and statistically significantly influences small-scale maize production in the examined region, outweighing the influence of any other factor.

The results indicate that the type of farming system has a statistically significant effect on smallholder maize production. At a 5% significance level, the use of animal oxen and hand hoes both have a negative and statistically significant influence on maize production. The impact of animal oxen is significant, with a p-value of 0.014, whereas the impact of hand hoes is significant, with a p-value of 0.012.

The findings implied that the use of local farming systems led to a decrease in smallholder maize output since these methods are time-consuming and less efficient compared to tractors. The results are inconsistent with the study by which it was observed that tilling by using tractors had a positive and significant effect on maize production, and the positive impact was due to the fact that the preparation of farms by using modern means (tractors) increased maize production since farmers were able to cultivate large areas in a reasonable time compared to those who applied traditional farm practices.

Table 2

Multiple regression model on determinants of smallholder maize production in Kiteto District

maize_productn	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
farm_size	0.0076086	0.0024186	3.15	0.002	0.0027935	0.0124237
ln_farming_cost	0.0083203	0.011117	0.75	0.456	-0.0138118	0.0304525
ln_income	-0.0124274	0.0162104	-0.77	0.446	-0.0446998	0.0198451
Distance_market_place	-0.00373	0.0028884	-1.29	0.200	-0.0094805	0.0020204
Farm_distance	-0.0037069	0.0039863	-0.93	0.355	-0.011643	0.0042292
d_access_irrigation	0.0878051	0.0213716	4.11	0.000	0.0452575	0.1303526
d_access_credit	-0.019011	0.0211742	-0.90	0.372	-0.0611656	0.0231436
d_access_extension	-0.0153325	0.0189737	-0.81	0.421	-0.0531063	0.0224414
d_gender	0.0004357	0.0178005	0.02	0.981	-0.0350025	0.0358739
Farming_experienc	0.0010752	0.0048251	0.22	0.824	-0.0085308	0.0106811
level_education						
secondary education	0.0064483	0.035873	0.18	0.858	-0.0649694	0.077866
university education	0.0093689	0.024233	0.39	0.700	-0.0388752	0.0576131
never attend to school	-0.0071263	0.0215513	-0.33	0.742	-0.0500317	0.0357792
d_marital_status	0.0211261	0.020121	1.05	0.297	-0.0189317	0.061184
Age	0.0003197	0.0008464	0.38	0.707	-0.0013654	0.0020047
Labor_amount	0.0163219	0.0038594	4.23	0.000	0.0086384	0.0240054
d_access_improved seeds	0.0582859	0.022079	2.64	0.010	0.0143301	0.1022418
d_access_fartlizer	0.0662097	0.0214599	3.09	0.003	0.0234864	0.1089331
farming_system						
use of animal oxen	-0.0643691	0.0254906	-2.53	0.014	-0.1151169	-0.0136213
use of hand hoe	-0.0813132	0.0315018	-2.58	0.012	-0.1440285	-0.0185979
family_size	-0.0021192	0.0043298	-0.49	0.626	-0.0107391	0.0065007
_cons	0.1225913	0.2240552	0.55	0.586	-0.3234683	0.568651
Model strength Number of obs = 100 F (21, 78) = 16.46 Prob > F = 0.0000 R-squared = 0.8159 Adj R-squared = 0.7663						



4.2 Challenges Facing Maize Production among Smallholder Farmers in Kiteto District

Results in Table 3 present challenges facing maize production among smallholder farmers in Kiteto district, which were determined by the use of a Likert scale of five points. Specifically, results show that a shortage of rainfall is the leading challenge affecting maize production among smallholder farmers in Kiteto District, and this is due to the fact that agriculture production, specifically maize production, heavily depends on rain-fed cultivation, but in current years, Kiteto District and Tanzania at large as a country is experiencing climatic change that results in very low rain, which impedes farmers from high yields, hence being discovered as a leading challenge. This finding is consistent with the study by Ngonkeu et al. (2017), and Theodory and Kitole (2024) found changes in weather conditions, mainly shortages of rainfall, as a major challenge that impeded maize production among study farmers.

The study's findings reveal that a significant number of respondents identified maize price fluctuation as the second challenge affecting maize production in the study area. Price fluctuation is taken as a critical challenge affecting maize production since the price of maize is not constant over a period of time and sometimes tends to fall to the point where the farmer will not generate profit from selling his output. The findings were in line with the study by Wainaina (2016), who found price fluctuation to be a challenge that impeded maize production in the study area.

Table 3

Challenges for Maize Production among Smallholder Maize Farmers in Kiteto District

Challenges	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
Shortage of rainfall	62%	28%	2%	3%	5%	100%
Shortage of storage facilities	43%	28%	5%	17%	7%	100%
Maize price fluctuation	46%	32%	14%	8%	0	100%
Shortage of market	41%	22%	12%	9%	16%	100%
Diseases and pest	46%	35%	4%	10%	5%	100%
Shortage of physical infrastructure	26%	47%	2%	19%	6%	100%
Inadequacy of modern seeds and fertilizer	38%	20%	14%	21%	7%	100%

The survey findings revealed that diseases and pests were the third most significant challenge affecting maize yield for smallholder farmers. This is because in the majority of smallholder maize farming, there is a lack of effective strategies to address crop diseases due to the exorbitant expense of pesticides. The advent of armyworms, very damaging pests of maize, has exacerbated this issue, making it a major problem. The findings are in line with the research conducted by Wainaina (2016), which identified pests and illnesses as significant obstacles that hinder maize production in the specific region under study.

Additionally, the survey revealed that a deficiency in infrastructure is the fifth most significant challenge that impacts the production of maize. The inadequate infrastructure poses an important challenge to smallholder maize producers, as they face difficulties such as poor road conditions and a lack of efficient transportation options. These challenges impede the easy movement of agricultural services and market access, which is critical for maize farmers. Furthermore, the findings indicate that the shortage or absence of markets is the sixth most important challenge affecting maize production. In terms of maize production, the market presents a significant challenge for smallholder maize growers. Due to the challenges in market accessibility, producers are forced to bear the expenses of long-distance transportation, resulting in a decrease in their income. Furthermore, the market's insufficiency constrains the farmers, compelling them to vend their products to intermediaries at reduced costs (Kitole, 2023). Furthermore, the survey revealed that the insufficient availability of high-quality seeds and fertilisers, listed as the seventh most significant obstacle, had a detrimental impact on maize production. This is a result of the insufficiency of high-quality seeds and fertilisers, which therefore drives up the prices of these inputs for farmers. This may also result in the utilisation of inferior and local seeds in the agricultural process, hence diminishing the overall maize yield. The results align with the research conducted by Abebe and Halala (2020), which revealed that farmers encountered the obstacle of insufficient supply of seeds and improved fertilisers, leading to the elevated costs of these crucial inputs.

4.3 Test of the Model Assumptions

4.3.1 Test for the Multicollinearity

Multicollinearity was tested by using variance-inflated factor (VIF), and the results show that there was no serious problem of multicollinearity between the independent variables, as shown in the table, with an average of 1.45, which is tolerable, and the maximum VIF of the variable was 1.89.

**Table 4***Multicollinearity Test Results for Independent Variable*

Variables	VIF	1/VIF
farm_size	1.51	0.661853
ln_farming_cost	1.67	0.597971
ln_income	1.39	0.719067
Distance_market_place	1.26	0.794615
Farm_distance	1.21	0.823695
d_access_irrigation	1.67	0.598775
d_access_credit	1.36	0.737070
d_access_extension	1.27	0.785474
d_gender	1.11	0.901996
Farming_experien	1.16	0.861435
level_education		
secondary education	1.42	0.703396
university education	1.41	0.709054
never attend to school	1.44	0.696640
d_marital_status	1.52	0.658225
Age	1.17	0.853109
Labor_amount	1.89	0.529314
d_access_improvenseeds	1.83	0.547534
d_access_fartlizer	1.72	0.580744
farming_system		
use of animal oxen	1.50	0.666218
use of hand hoe	1.57	0.635738
family_size	1.30	0.769469
Mean VIF	1.45	

4.3.2 Test for the Heteroscedasticity

The test for heteroskedasticity in the model was done by using the Breusch-Pagan test, where the null hypothesis is that there is homoskedasticity. The test yields a high $\chi^2(1) = 0.23$ statistic, which is insignificant ($\text{Prob} > \chi^2 = 0.6332$), as shown below. In which the null hypothesis failed to be rejected and concluded that there was no problem of heteroskedasticity in the model.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of maize production

$\chi^2(1) = 0.13$

$\text{Prob} > \chi^2 = 0.7160$

4.3.3 Test for normality

The normality assumption of linear regression was checked by using the histogram of residuals. Figure 2 shows that the residuals of multiple regressions were normally distributed.

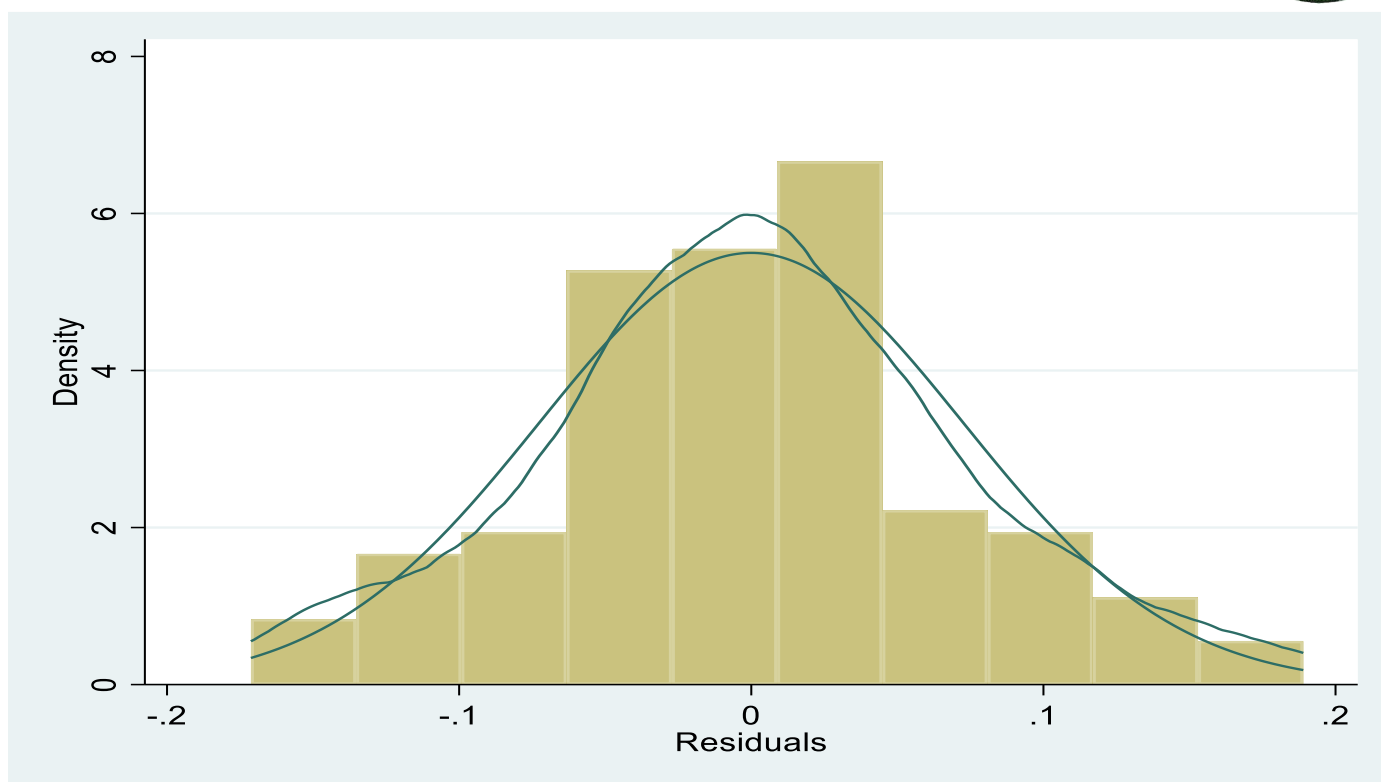


Figure 1
Histogram for Normality Test

V. CONCLUSIONS & RECOMMENDATIONS

This study has shown that maize production is highly influenced by farm size, access to irrigation, the size of the labour force, the use of improved seeds, and fertiliser usage in crop production. On the other hand, the study has shown that major challenges affecting maize production are weather variability, especially shortages of rainfall, excessive dry seasons, price fluctuations of the maize crops, as well as diseases and pests. In addition, this result informs several policy recommendations that need to be considered for the proper production of maize and to enhance the livelihoods of smallholder farmers who depend on maize for their livelihood.

These recommendations include the provision of assistance to maize growers, especially by helping them access fertiliser at lower prices. This should go hand in hand with the development of proper subsidy schemes that help farmers get fertiliser on time. Therefore, the government can increase subsidies and its supply among smallholder farmers in order to ease the accessibility of modern seeds and fertiliser at a reasonable price that is affordable to a large number of smallholder farmers. By doing so, the quality and quantity of maize will be improved.

In addition, the government, in collaboration with the agriculture research centres, should conduct research and produce a variety of maize seeds that will be primarily resistant to diseases, have a short growth period, and have low water requirements. By doing so, this approach will effectively address the problems of pests, diseases, and the shortage of rain. Furthermore, it is imperative for the government and private institutions to expand the construction of cost-effective storage facilities, such as public warehouses, to cater to the needs of smallholder maize farmers. This measure will effectively mitigate post-harvest losses.

Finally, the government must provide farmers with reliable climate variability data to enhance their understanding of optimal maize planting seasons and strategies for mitigating the impact of pests and diseases, often influenced by changing weather conditions. Furthermore, it is imperative for the government to provide farmers with accurate information regarding crop-specific farming techniques. This would enable them to achieve higher levels of output, resulting in an increased food supply for both personal and commercial purposes.



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Effect of Employee Coaching Practices on Universities' Performance in Tanzania

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ABSTRACT

This study assessed the effect of employee coaching practices on the performance of universities in Tanzania. It was guided by one alternative hypothesis; there is a significant positive linear relationship between employee coaching practices and performance of universities in Tanzania. The Human Capital Theory (HCT) anchored the study. It was underpinned by positivism philosophy. The study was a census and the design was descriptive. 379 academic staff from Tanzanian Universities constituted the study's respondents. This study used a quantitative approach that made use of survey questionnaires in data collection. Data were collected from academicians in Tanzanian Universities (Mainland and Islands, Zanzibar) and analysed by using descriptive and inferential techniques. The study found that employee coaching practices had a significant positive effect on performance of Universities in Tanzania at $r=0.834$, and $p<0.001$, respectively. Universities should consider designing and implementing coaching programmes to help them perform better. To make this more effective, the need to show commitment to coaching practices should also be considered.

Keywords: Employee, Employee Coaching, Performance, Tanzania, University, University Performance

I. INTRODUCTION

1.1 Introduction

Globally, most organizations are besieged by numerous forces affecting their ability to survive and perform as expected. Trends of the 21st century have pushed organizations to seek superior ways to attain and retain competitiveness leading to such for ways to subdue the turbulence (McRae, 2023; Rego et al., 2022; Woo et al., 2021). Succession planning has been put forward as one of the initiatives that could enable organizational growth and sustainability hence good performance. Succession help organizations identify and develop talent to fill leadership roles, increases the availability of experienced staff and creates a pipeline for future higher responsibilities (Gillis et al., 2023; Ryba, 2023). One important succession planning strategy is employee coaching. Employee coaching is all about helping or guiding someone to achieve their goals and objectives without hampering their morale (Rabha, 2023).

Employee coaching in higher education has been playing a pivotal role in enhancing employee abilities by equipping people with relevant skills and knowledge. The fact that universities invest enormous resources in their human resources, knowledge and skills transfer should be given top priority (Hakro & Mathew, 2020). Through coaching, experienced staff may help those with little experience to acquire hands-on skills which could not be provided by using other approaches such as class lessons (Achi & Sleilati, 2016)

By considering that there is a higher rate of turnover in higher learning institutions in Tanzanian universities like in so many other higher learning institutions in Africa and beyond, those leaving these institutions should not leave before helping others through coaching (Mwita et al., 2023). This may help these institutions to retain valuable knowledge and skills and improve performance of these institutions.

With specific focus in Tanzania, universities have not been performing very well as expected by different stakeholders. Management experts and researchers have been looking for various performance drivers that can help Universities to perform exceptionally (Muya & Tundui, 2020). Numerous determinants of performance in universities have been uncovered by empirical studies. Succession planning practices particularly coaching has not been given



sufficient attention. This study focused on examining the effect of employee coaching practices on performance of universities in Tanzania.

1.2 Statement of the Problem

Tanzanian Universities like any other organisations have been striving to ensure that they perform well. Various management practices have been put in place to ensure that these Universities are supplied with competent human resources particularly the academic staff (Kipesha & Msigwa, 2013). Undoubtedly, despite the efforts that any organisation may use to keep her competent employees, they will one day leave the organisation willingly or unwillingly. Competent academicians in universities retire, resign, get fired, get transferred or die (Lindfelt et al., 2018).

One of the questions that academicians and practitioners in management tend to ask themselves is how an organization can facilitate transfer of knowledge, skills, and competences from the experienced to the inexperienced staff. One of the most effective practices to do that is through coaching (Hill & Wheat, 2017). Coaching has been playing an important role to equip academic staff with relevant knowledge and skills. This practice has been commonly used in higher learning institutions globally. Employee coaching has been pivotal to organisational success in different ways including improving performance of universities. In the midst of these encouraging findings, Universities in Tanzania have been reported not to perform well (Muya & Tundui, 2020; Mwita, 2018). Little is known on whether employee coaching influences performance in Tanzanian Universities. This study was done to bridge this empirical gap.

1.3 Research Objective

The objective of this study was to assess the effect of employee coaching practices on performance of universities in Tanzania.

1.4 Research Hypothesis

The study was guided by the following alternative hypothesis:

H_a : There is a significant positive linear relationship between employee coaching practices and performance of universities in Tanzania

II. LITERATURE REVIEW

2.1 Theoretical Review

This study used Human Capital Theory (HCT) in laying its theoretical foundation. The Human Capital Theory (HCT) is a 1960s addition to the body of knowledge by Theodore Schultz and Gary Becker (Ross, 2023). HCT acknowledges the immense value people can contribute and add to an organization and that it regards people as the most valuable asset of the organization and investing in them will generate worthwhile returns (Tan, 2014). The assertion embodied in the HCT is that, "It is more profitable to invest in individuals' education and training than in machines and factories, the return on investment is higher in the long term" (Andlil, 2017).

Becker (2006) and Teixeira (2014), advanced that education and/or training increases the productivity of workers by instilling useful knowledge and skills. Human capital embodies the combined intelligence, knowledge, skills, competencies, and expertise in individuals or groups of individuals that give the organization its distinctive character in its goods and services (Omwenga, 2017; Pettinger, 2017).

The human resources are capable of learning, changing, innovating, and creating and when properly motivated the organization's long term survival is guaranteed (Armstrong, 2009). The theory links with the study since its emphasis is on ensuring the employees have knowledge, skills, expertise, and varied experiences acquired through employee coaching. The aim of these is to ensure organizations have continued circulation of needed knowledge, skills, competencies, expertise, and experiences to best run their activities and perform better.

2.2 Empirical Review

The study by Utrilla et al., (2015) used the Spanish case study to establish the effects of coaching in employees and organizational performance. Structural equations modelling were used to test and analyze the hypotheses. 498 Spanish firms were studied using a sample of 2,303 sampled human resource managers from those firms. The researchers used questionnaires for gathering required data. The results confirmed that coaching had an influence on both employees' performance and organizational performance. This was established after the coefficient relationship between individual performance and organizational performance that confirmed a positive relationship between individual performance improvements because of coaching and organizational performance. Same as above established results come from a meta-analysis synthesizing by Jones et al., (2016) on the effectiveness of workplace



coaching on learning and performance outcomes from coaching. The study's results indicated the existence of positive effects of coaching on overall organizational outcomes such as performance.

Similar findings were found by Raza et al., (2017) in their study that sought to examine the impact of managerial coaching on employee performance and organizational citizenship behaviour: intervening role of thriving at work. The employed hierarchical regression analysis revealed managerial coaching directly influenced job and organizational performance. This study was quantitative and cross sectional and had 280 respondents sampled and obtained through a simple random technique from the pharmaceutical sector in Pakistan.

Survey questionnaires were used to collect data from the sample. The regression coefficients run through SPSS showed coaching to have a positive impact on in-role (job) performance and the general performance of the organization. However, the findings are contrary with the study of Kim and Kuo (2015) who found no positive relationship existing between managerial coaching and in-role (job) performance. Also, the study by Schermuly (2014) found negative effects of coaching for clients due to 10.7% of respondents citing lack of supervision from a coach, 10.6% pointing the lack of elaborate knowledge about the organization from a coach, 10.5% suggesting that coaches had too little professional expertise, and 9.5% of the respondents bemoaned to be overworked by the coach.

Schermuly (2014) undertook an explorative study on the negative effects of coaching for coaches in Germany. A total of 104 German coaches and 90 supervisors were quantitatively surveyed using questionnaires and expert interviews respectively to collect the information required. The study findings established a small negative relationship between supervision amount in the job and negative coaching effects perception. Furthermore, a study by Albizu et al., (2019) that focused on analyzing the effectiveness of executive coaching from a coachee perspective, found there to exist a positive and significant relationship between coachee's readiness and satisfaction and hence, improved performance. It was a survey study comprising of 176 sampled Spanish executives; 38.1% had responsibilities in the human resources area, 19.3% were middle managers or project leaders, 17.6% were chief executives, managing directors or presidents, and functional managers were 16.5%. Data was collected using electronic survey.

The findings of the previous study are in unison with those of Bozer and Sarros (2012). These examined the effectiveness of executive coaching on coachee's performance in the Israeli context. The study was quasi-experimental involving an experimental group and a control group and 197 participants from four Israeli firms that primarily provide professional executive coaching services to government, commercial and education sectors all over Israel participated. The 72 executives, and their coaches (68) and direct supervisors (28) formed an experimental group whereas 29 other executives from whence the experimental group was obtained formed a control group.

The mean results drawn from the two groups showed higher scores in the post coaching than the pre-coaching scores since $M=3.97$ and $M=3.67$, respectively. That means there was a significant improvement in job performance and the overall organizational performance after coaching was instituted. The study supported by the ANOVA results showing a significantly higher post-coaching effect on career satisfaction and job performance. Also, the ANOVA test by Losch et al., (2016) almost came up with similar but significantly higher results as the above, on individual coaching significant effect on job satisfaction and the general organizational performance when the coaches' transactional and transformational behaviours acted as intervening factors. The study also found job satisfaction to be significantly higher after individual coaching was done at ($M=7.52$, $SD=1.33$) $p<0.001$ as compared to the control group at ($M=5.23$, $SD=2.08$).

That is in line with the findings of Mühlberger and Traut-Mattausch (2015) with their experimental research that confirmed the significant effect of both the transactional and transformational leadership behaviours of coaches on the satisfaction of individual employees and the general organizational performance.

III. METHODOLOGY

3.1 Research Design

This study employed a descriptive research design. Descriptive research design is used to establish behaviour patterns or relationships that exist between phenomenon by gathering, analysing and presenting data for studying variables and normally uses questionnaires as a tool for data collection to know peoples' perceptions, beliefs, opinions, and attitudes that currently surround the phenomenon under study (Bhat, 2019; Remcos, 2019).

3.2 Target Population

This study's target population were 7071 academic staff from Tanzania full-fledged universities, which were thirty (30) (TCU, 2019, 2020). TCU (2020) report showed that among the 30 universities, 28 were accredited and chartered and 2 had provisional licence and not permitted to admit students yet.



3.3 Sample Frame

The study's sample frame included the academic staff from the 28 universities from Tanzania available in the list of universities from TCU. These were specifically targeted since they directly engage in the core activities and functions of universities and therefore gave reliable information.

Table 1

Sampling Frame

Country	Number of Universities	Sample frame (Academic Staff)
Tanzania	28	7071

3.4 Sample Size

The study used Yamane's formula to calculate the sample size which led to a sample size of 379. The study employed simple random sampling to arrive at the required sample of the study. Simple random sampling which is a probability type of sampling in which every member of the population has an equal chance of being selected (Grand Canyon University, 2019).

3.5 Data Collection and Analysis

Data was collected by using a questionnaire and analysed by using descriptive and inferential statistics techniques.

IV. RESULTS AND DISCUSSIONS

4.1 Response Rate

The respondents of this study were academic staff from the twenty eight (28) full-fledged universities in Tanzania, East Africa. A total of 306 copies of questionnaires were returned out of 379 questionnaires that were administered to respondents. This response rate is equivalent to 81%. A response rate of 50% and higher is considered excellent (Planet, 2022). Most responses came from male respondents (68.6%) followed by female (31.4%).

4.2 Descriptive Statistics

4.2.1 Descriptive Analysis for Employee Coaching Practices in Tanzania

The study's descriptive results were run, and Table 2 shows their thorough display.

Table 2

Descriptive Statistics Results for Employee Coaching Practices in Tanzania

Statements	Mean	SD
There are normally different trainings done to all academic staff of the university	4.34	0.603
The job is performed best after trainings	4.36	0.574
Trainings that improve performance are preferred with all academic employees	4.45	0.543
Weighted Mean & SD	4.40	0.573
Skill specific programs organized by the university make academic staff perform their job better	4.45	0.530
With skill specific programs offered by the university, academic staff can readily take on future responsibilities	4.42	0.533
The job would have been difficult without skills improving programs	4.42	0.603
Weighted Mean & SD	4.43	0.555
Staff usually get opportunities to learn work related issues alongside experienced colleagues	4.33	0.593
Junior academic staff like to be assigned to work alongside experienced senior academic staff	4.42	0.557
There is always time for learning alongside experienced academic colleagues	4.40	0.599
Weighted Mean & SD	4.38	0.583

From Table 2, it was found that, Employee performance coaching garnered a weighted mean of 4.40 and standard deviation (SD) of 0.573. Similarly, employee skills coaching had a weighted mean and standard deviation of 4.43 and 0.555 respectively. Consequently, employee work shadowing gathered a weighted mean of 4.38 and standard deviation of 0.583. On a 1 to 5 points Likert scale, all the employee coaching practices scored a 4 weighted mean and above. Hence, the results showed that employee coaching practices are highly practiced in Tanzanian universities.



4.2.2 Descriptive Analysis for Performance of Universities in Tanzania

Table 3 depicts the descriptive results for the dependent variable. University performance was the dependent variable.

Table 3

Descriptive Statistics for Performance of Universities in Tanzania

Statements	N	Minimum	Maximum	Mean	SD
Every academic staff does publications	306	1	5	4.08	0.813
The motivation to publish is high in this university	306	1	5	4.12	0.755
The university gets enough publications from academic staff	306	1	5	4.07	0.851
The enrolment of students is satisfying in this university	306	1	5	4.15	0.742
The academic staff help in the enrolment of students	306	2	5	4.19	0.717
This university has good enrolment trends	306	1	5	4.29	0.684
The academic staff help in graduating of students	306	2	5	4.35	0.616
The university environment supports a good number of students to graduate	306	2	5	4.31	0.653
The university's student's graduation rates are high	306	3	5	4.27	0.611
Weighted Mean & SD				4.20	0.712

Results from Table 3 show that the highest mean of 4.35 was obtained by the statement, "the academic staff help in graduating of students", whereas the lowest mean was with the statement, "the university gets enough publications from academic staff" at 4.07 mean score. On average, performance of universities in Tanzania scored the mean of 4.20. This means that most respondents highly agreed that university performance is well measured by levels of publications, enrolment, and graduation. This is in sync with King (2024) who suggests university performance to be measured along the parameters of publications, enrolment, and graduation among others.

4.3 Correlation Analysis

This segment presents the correlation analysis of the study variables, focusing mainly on employee coaching (EC) and university performance (UP) in Tanzania. The relationships between these two variables were assessed using Pearson's correlation analysis. The results are presented in Table 4.

Table 4

Correlation Matrix Results

Indicator		Employee Coaching	University Performance
Employee Coaching	Pearson Correlation	1	
	Sig. (2-tailed)		
University Performance	Pearson Correlation	.834**	1
	Sig. (2-tailed)	<.001	

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

Results from Table 4 indicate that employee coaching practices had a strong positive correlation with the dependent variable ($r=0.834$, $p<0.001$). This signifies that, as employee coaching practices increase, the performance of universities in Tanzania also positively increases.

4.4 Hypothesis Testing

The alternative hypothesis of the study was tested at a 5% significance level. The results summary of hypothesis testing is depicted in Table 5.

Table 5

Hypotheses Testing Results Summary

	Hypothesis	Results		Decision
		Beta (β)	p-values (sig.)	
H_a	There is a significant positive linear relationship between employee coaching practices and performance of universities in Tanzania	0.305	0.000	Accept



From Table 5, the hypothesis stated, *there is a significant positive linear relationship between employee coaching practices and performance of universities in Tanzania*. The beta coefficient test results statistically show a significant positive linear relationship between employee coaching practices and performance of universities ($\beta=0.305$, $p=0.000$). Consequently, the alternative hypothesis was accepted since there was a significant positive linear relationship between employee coaching practice and performance of universities in Tanzania ($\beta \neq 0$ and $p\text{-value} < 0.005$) (Ontario, 2023).

4.5 Regression Analysis

4.5.1 Model Summary

Results in Table 6 regarding the model summary, shows that employee coaching had a significant explanatory power on performance of universities.

Table 6

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.874 ^a	.764	.761	24760

a. Predictors: (Constant), Employee Practices b. Dependent Variable: University Performance

The findings in Table 6 show that university performance model as a function of employee coaching, yielded an R^2 value of 0.764. This is an indication that 76.4% of the variation in performance of universities in Tanzania can be explained by employee coaching, a position also maintained by the study conducted by Agarwal and Raghav (2023), who suggested that employee coaching was critical in ensuring organizations perform best.

4.5.2 ANOVA Results

Table 7 shows the goodness of fit, and the results clearly indicate the model was a good predictor of universities performance ($F_{3,302} = 325.543$, $p = 000$).

Table 7

ANOVA

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	59.871	3	19.957	325.543	.000b
	Residual	18.514	302	.061		
	Total	90.097	305			

a. Dependent Variable: University Performance b. Predictors: (Constant), Employee Coaching Practices

The results from Table 7 imply that the independent variable (employee coaching) is a good predictor of performance of universities; since employee coaching predict the dependent variable university performance, thus supporting a strong relationship, between the independent and dependent variable.

4.5.3 Multiple Linear Regression

Multiple linear regression for all the variables was done and Table 8 shows the results.

Table 8

Multiple Linear Regression Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.605	.086		18.589	.000
	Employee Coaching	.047	.010	.305	4.751	.000

a. Dependent Variable: University Performance

From Table 8, results show that, a unit increase in employee coaching practices corresponded to a 0.047 increase in university performance. The resultant regression equation is as shown:

$$UP = 1.605 + 0.047ECP + e.$$

Where: UP = University Performance, ECP = Employee Coaching Practices, and e = error term

Therefore, the regression model concluded that employee coaching practices had a significant effect on performance of universities in Tanzania. Employee coaching, as succession planning mechanism, had a significant effect on the performance of universities in Tanzania. These findings echo those of Hare (2023), who discovered that employee coaching boosted performance of organizations.



V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The study found out that by implementing employee coaching practices performance of universities increase. The practice of employee performance coaching leads to measurable improvement in the overall performance of universities. This suggests that universities that invest in coaching initiatives that focus on enhancing employee work performance, they see a positive impact on their operational and academic outcomes. Moreover, the development of employee skills through coaching practices is also positively correlated with better university performance. This highlights the importance of continuous skills development and training for employee, as it directly contributes to the enhanced capabilities, efficiency, and effectiveness of universities' operations. By prioritizing employee coaching practice, universities in Tanzania can effectively consolidate their operational efficiency, academic quality, and overall institutional success.

5.2 Recommendations

Universities should consider designing and implementing coaching programmes to help them perform better. To make this more effective, the need to show commitment on the same should be considered. This includes, documenting these programs in various organizational operational documents including respective strategic plans. Secondly, since coaching is not something that everyone can do without being empowered, organizations must ensure employees are empowered to effectively undertake coaching. Also, experienced staff should be equipped with necessary coaching skills and techniques to make it more effective.

Henceforth, the study recommends universities to invest in comprehensive employee development programs, including employee performance coaching, employee skills coaching, and employee work shadowing. These programs should be tailored to the specific needs of the university and its staff, focusing mainly on areas that directly impact university performance such as levels of public, enrolment, and graduation. Equally, universities should establish a regular schedule for performance coaching sessions for all staff members. The sessions should cover performance goals, actual feedback, and strategies for improvement development. The coaches should be at the center stage in providing guidance to employees. Consequently, the performance of universities in Tanzania will improve.

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Matrices of the Zero Divisor Graphs of Classes of 3-Radical Zero Completely Primary Finite Rings

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ABSTRACT

The study of finite completely primary rings through the zero divisor graphs, the unit groups and their associated matrices, and the automorphism groups have attracted much attention in the recent past. For the Galois ring R' and the 2-radical zero finite rings, the mentioned algebraic structures are well understood. Studies on the 3-radical zero finite rings have also been done for the unit groups and the zero divisor graphs $\Gamma(R)$. However, the characterization of the matrices associated with these graphs has not been exhausted. It is well known that proper understanding of the classification of zero divisor graphs with diameter 2 and girth 3 can provide insights into the structure of commutative rings and their zero divisors. In this study, we consider a class of 3-radical zero completely primary finite rings whose diameter and girth are 2 and 3 respectively. We enhance the understanding of the structure of such rings by investigating their Adjacency, Laplacian and Distance matrices.

Mathematics Subject Classification: Primary 13A70; Secondary 13A18.

Keywords: 3-radical zero finite rings, Completely Primary Finite Rings and Zero divisor graph.

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1 Introduction

Throughout the paper, R represents 3-radical zero completely primary finite ring, $\Gamma(R)$ is the zero divisor graph of R and $R' = GR(p^{kr}, p^k)$ denotes the Galois ring of order p^{kr} and characteristic p^k for some positive integers k, r . $Z(R)$ and $J(R)$ are subsets of zero divisors and Jacobson radical respectively. R^* denotes the unit group of R . Unless stated otherwise, other notations are standard.

A finite unital ring R is called completely primary if the subset of its zero divisors forms a maximal ideal[16]. These classes of finite rings have been used in the classification of all other classes of finite rings with identity $1 \neq 0$. The Galois rings, the maximal submodules of finite rings are the trivial classes of completely primary finite rings vital in the classification of rings of idealization. They have been studied by a number of authors for the structures of their unit groups and zero divisor graphs up to isomorphism, (see for example[3, 9]) among others. The 2-radical zero completely primary finite rings have also been classified using the unit groups, the zero divisor graphs, the automorphisms of the graphs and the adjacency and incidence matrices, [3, 10, 14]. In this paper, we investigate the matrices of zero divisor graphs of a class of finite rings with the unique maximal ideal $Z(R)$ such that for any fixed $s, t = \frac{s(s+1)}{2}$ where s and t are the dimensions of R' -modules U and V respectively. This is an extension of the studies in [3, 4, 5]. Indeed, in [5], a classification of such classes of rings R with Jacobson radical $J(R)$ satisfying the condition $(J(R))^3 = (0)$ and $(J(R))^2 \neq (0)$ was considered where the enumeration problem was solved for all characteristics of R . Further, a case of the ring whose characteristic is $p^k, 1 \leq k \leq 3$ was considered in [4] by determining the structures of R^* , for $R = R' \oplus U \oplus V$ where U and V are R' -modules generated by s and t generators where $t = \frac{s(s+1)}{2}$ for any fixed s . Another classification attempt was done in [3] where the automorphisms of R were obtained when characteristic of $R = p$. From this study, a characterization was done for the cases in which \mathbb{F} is the Galois field $GF(p^r)$ and $1 \leq t \leq s^2$ for a fixed s, t -dimensional \mathbb{F} spaces U, V respectively and $(a_{ij}^k) \in \mathbb{M}_{s \times s}(\mathbb{F})$ are t linearly independent matrices. The studies mentioned however, did not provide a classification on the structures of zero divisors and by extension, their graphs and matrices associated with the graphs.

The concept of zero divisor graphs has also attracted active research since its inception by Beck as demonstrated in [2]. Other researchers broadened the study based on their choices of zero divisors from R or annihilator ideals of R as evident in [1] and [13]. Other ring characterization via the automorphism of their zero divisor graphs have also been done by some researchers. In [9, 10] and [11], a classification of the automorphisms of the graphs of these classes of rings was obtained for all the



characteristics.

Matrices being fundamental in the interpretation of graphs, Katja in [8] computed the eigenvalues of graphs associated with zero divisors of finite rings. The study determined computations for nullity, spectrum of $\Gamma(R)$ and the graph product properties. Some independent studies have focused on adjacency matrices of zero divisor graphs of finite completely primary rings. For instance, the research done in [14] was on the characterization of the adjacency and incidence matrices of a class of finite rings of square radical zero. Given an adjacency matrix A and a degree matrix D , the Laplacian matrix is an $n \times n$ matrix L such that $L = D - A$. Some ring classifications have also been done via the Laplacian matrices of their zero divisor graphs. For instance, a study on the ring of integers modulo n was performed in [17] through a research on the nature of their Laplacian eigenvalues. The study involved finding the Laplacian spectrum structures of $\Gamma(\mathbb{Z}_n)$ for $n = p^{N_1}q^{N_2}$ where p is a prime integer greater than q and for positive integers N_1 and N_2 . This research was limited only to rings of integers modulo n . Research on distance matrices of classes of finite rings have been done in [12, 15, 18] and [19] among others. In this paper, we focus on a class of 3-radical zero finite completely primary rings and provide an analysis of some graph geometric properties of $\Gamma(R)$. An investigation on the structures of their Adjacency, Laplacian and Distance matrices is also conducted.

2 Preliminaries

The following results will be useful in the sequel.

Theorem 2.1. [16] *Let R be a finite ring with multiplicative identity $1 \neq 0$, whose set of zero divisors forms an additive group J . Then,*

(i) J is the Jacobson radical of R .

(ii) $|R| = p^{nr}$, and $|J| = p^{(n-1)r}$ for some prime integer p and some positive integers n, r .

(iii) $J^n = (0)$.

Theorem 2.2. [6] *Let R be a completely primary finite ring of order p^{nr} with unique maximal ideal J such that $|R/J| = p^r$, $\text{Char}(R) = p^k$. If R_o is the maximal Galois subring of R , then there exist $x_1, \dots, x_h \in J$ and $\sigma_1, \dots, \sigma_h \in \text{Aut}(R_o)$ such that $R = R_o \oplus R_o x_1 \oplus \dots \oplus R_o x_n$ and $x_i r = r^{\sigma_i} x_i$ for every $r \in R_o$ and each $i = 1, 2, \dots, h$.*

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Theorem 2.3. [4] If \mathbb{F} is the Galois field $GF(p^r)$ and $1 \leq t \leq s^2$ for a fixed s, t – dimensional \mathbb{F} -spaces U, V respectively and $(a_{ij}^k) \in \mathbb{M}_{s \times s}(\mathbb{F})$ are t , linearly independent matrices. Then

$Aut(R) \cong [\mathbb{M}_{t \times s}(\mathbb{F}) \times (U \oplus V)] \times_{\theta_2} [Aut(\mathbb{F}) \times_{\theta_1} (GL(s, \mathbb{F}) \times GL(t, \mathbb{F}))]$ where $\{\theta_1, \dots, \theta_t\}$ is the set of automorphisms of \mathbb{F} .

3 The 3-Radical Zero Completely Primary Finite Rings of characteristic p

The following construction can be obtained in [7].

3.1 Construction I

Given a prime integer p and r , a positive integer, let $R' = \mathbb{F} = GF(p^r)$ be a Galois field of order $q = p^r$. Suppose U, V are finitely generated \mathbb{F} -spaces with nonnegative number of elements s and t in the generating sets $\{u_s\}$ and $\{v_t\}$ respectively such that for $t = \frac{s(s+1)}{2}$ and s fixed,

$R = \mathbb{F}_q \oplus \sum_{i=1}^s \mathbb{F}_q u_i \oplus \sum_{i,j=1}^s \mathbb{F}_q u_i u_j$ is an additive abelian group.

Consider two elements $(a_o + \sum_{i=1}^s a_i u_i + \sum_{i,j=1}^s a_j u_i u_j)$ and $(b_o + \sum_{i=1}^s b_i u_i + \sum_{i,j=1}^s b_j u_i u_j)$ in R and define multiplication on R by:

$$\begin{aligned} & (a_o + \sum_{i=1}^s a_i u_i + \sum_{i,j=1}^s a_j u_i u_j)(b_o + \sum_{i=1}^s b_i u_i + \sum_{i,j=1}^s b_j u_i u_j) \\ &= a_o b_o + \sum_{i=1}^s ((a_o b_i^{\sigma_i}) + a_i (b_o + pR')^{\sigma_i}) u_i + \sum_{i,j=1}^s (a_o b_j + a_j (b_o)^{\sigma_i} + \sum_{i,j=1}^s \alpha_{ij} a_i (b_j)^{\sigma_i}) u_i u_j. \end{aligned}$$

where σ_i is an \mathbb{F} automorphism and (α_{ij}) is a t -linearly independent matrix of dimension s .

Whenever $\sigma_i = id_{\mathbb{F}}$, an identity automorphism, then, the multiplication defined above turns R into a commutative ring with identity $(1, 0, \dots, 0, \bar{0}, \dots, \bar{0})$. Thus, for the rings discussed in this section, we assume that $\sigma_i = id_{\mathbb{F}}$.

The next result which characterizes the structures of the zero divisors $Z(R)$ of R and its proof can be obtained from [5].



Proposition 3.1. *Let R be a ring of construction I and $Z(R)$ be the set of its zero divisors then:*

- (i) $Z(R) = \sum_{i=1}^s \mathbb{F}_q u_i \oplus \sum_{i,j=1}^s \mathbb{F}_q u_i u_j,$
- (ii) $(Z(R))^2 = \sum_{i,j=1}^s \mathbb{F}_q u_i u_j,$
- (iii) $(Z(R))^3 = (0).$

3.2 The Graphs $\Gamma(R)$ and Matrices obtained from Classes of Rings in Construction I

Here we determine some graph algebraic properties, formulate the matrices from the graphs and investigate the matrix algebraic properties.

Proposition 3.2. *Let R be a ring of construction I and the invariants p , s and r be positive integers. Then, the following properties hold:*

- (i) $|V(\Gamma(R))| = p^{\binom{s^2+3s}{2}r} - 1.$
- (ii) $\Gamma(R)$ is an incomplete graph.
- (iii) $\text{diam}(\Gamma(R)) = 2.$
- (iv) $\text{The minimum degree, } \delta(\Gamma(R)) = p^{\binom{s^2+3s}{2}r} - p^{\binom{s^2+3s}{2}r-1} - 1.$
- (v) $\text{The girth}(\Gamma(R)) = 3.$

Proof. (i) Since $\text{char}(R) = p, pu_i = pu_i u_j = 0,$ and we have that

$$|\mathbb{F}_q u_i| = p^r, |\mathbb{F}_q u_i u_j| = p^r, \text{ for any } i, j, = 1, 2, \dots, s \text{ we obtain } |Z(R)| = p^{\binom{s^2+3s}{2}r}.$$

Therefore, $|Z(R)^*| = |Z(R) \setminus \{0\}| = p^{\binom{s^2+3s}{2}r} - 1.$ Since $|Z(R)^*| = |V(\Gamma(R))|,$ it follows that

$$|V(\Gamma(R))| = p^{\binom{s^2+3s}{2}r} - 1.$$

- (ii) Easily follows from the fact that $(Z(R))^2 \neq (0).$
- (iii) From (ii), $\Gamma(R)$ is incomplete and with the fact that $\text{Ann}(Z(R)) = (Z(R))^2,$ the result follows.



- (iv) Let $V = \{v_1, v_2, \dots, v_{p^{\frac{(s^2+3s)}{2}r-1}}\}$ be the whole vertex set of $\Gamma(R)$. Let $K, S \subseteq V$ such that $K \subseteq \text{ann}(Z(R))^*$. This implies $|K| = p^{\frac{(s^2+3s)}{2}r-1} - 1 \implies |S| = (p^{\frac{(s^2+3s)}{2}r} - 1) - (p^{\frac{(s^2+3s)}{2}r-1} - 1) = p^{\frac{(s^2+3s)}{2}r} - 1 - p^{\frac{(s^2+3s)}{2}r-1} + 1 \implies p^{\frac{(s^2+3s)}{2}r} - p^{\frac{(s^2+3s)}{2}r-1}$.
Therefore, $\delta(\Gamma(R)) = p^{\frac{(s^2+3s)}{2}r} - p^{\frac{(s^2+3s)}{2}r-1} - 1$ due to the minimal degree of the elements of S and for the avoidance of self loop for each vertex $v \in S$.
- (v) Taking two vertices $v_1, v_2 \in Z(R) - (Z(R))^2$ where $v_1v_2 = 0$, clearly each v_1, v_2 is adjacent to some $v_3 \in (Z(R))^2$. Thus $v_1 - v_2 - v_3 - v_1$ is the least polygon in $\Gamma(R)$. \square

Next, we investigate the properties of the Adjacency, Laplacian and Distance matrices.

Proposition 3.3. *Let R be a ring given in construction I and $\Gamma(R)$ be its zero divisor graph. Then, the adjacency matrix associated with $\Gamma(R)$ is of trace 0 with a spectral radius $p^r + 1$. Furthermore, for an adjacency matrix $[A]_{p^{\frac{(s^2+3s)}{2}r-1}}$, the following properties hold:*

- (i) $[A]_{p^{\frac{(s^2+3s)}{2}r-1}}$ is symmetric.
- (ii) $\text{rank}([A]_{p^{\frac{(s^2+3s)}{2}r-1}}) = p^{\frac{(s^2+3s)}{2}r} - 2p^r$.
- (iii) $\text{Tr}([A]_{p^{\frac{(s^2+3s)}{2}r-1}}) = 0$.
- (iv) $\text{Det}([A]_{p^{\frac{(s^2+3s)}{2}r-1}}) = 0$.
- (v) The eigenvalues $\lambda([A]_{p^{\frac{(s^2+3s)}{2}r-1}}) = \begin{cases} \pm\sqrt{2} \text{ and } 0, & \text{when } p=2; \\ 0, & \text{of multiplicity } 2p^r - 1; \\ -1, & \text{and} \\ -p^r, & \text{and} \\ p^r + 1. & \text{when } p \neq 2. \end{cases}$

Proof. (i) Since every row vector

$$(a_{11}, a_{12}, \dots, a_{1(p^{\frac{(s^2+3s)}{2}r-1)}}), (a_{21}, a_{22}, \dots, a_{2(p^{\frac{(s^2+3s)}{2}r-1)}}), \dots, (a_{(p^{\frac{(s^2+3s)}{2}r-1)1}}, a_{(p^{\frac{(s^2+3s)}{2}r-1)2}}, \dots, a_{(p^{\frac{(s^2+3s)}{2}r-1})(p^{\frac{(s^2+3s)}{2}r-1)}})$$

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reflection of the corresponding element through the leading diagonal to every column

$$\begin{pmatrix} a_{11} \\ a_{21} \\ \vdots \\ a_{(p^{\frac{(s^2+3s)}{2})r-1}1} \end{pmatrix} \dots \begin{pmatrix} a_{1(p^{\frac{(s^2+3s)}{2})r-1}} \\ a_{2(p^{\frac{(s^2+3s)}{2})r-1}} \\ \vdots \\ a_{(p^{\frac{(s^2+3s)}{2})r-1}(p^{\frac{(s^2+3s)}{2})r-1}} \end{pmatrix},$$

which implies that $[A]_{p^{\frac{(s^2+3s)}{2})r-1} = [A]^T_{p^{\frac{(s^2+3s)}{2})r-1}}$. Hence the symmetry of $[A]_{p^{\frac{(s^2+3s)}{2})r-1}$.

(ii) Upon carrying out a row operation on

$$[A]_{p^{\frac{(s^2+3s)}{2})r-1} = \begin{pmatrix} 0 & 1 & 1 & 1 & \dots & 1 \\ 1 & 0 & 1 & 1 & \dots & 1 \\ \vdots & 0 & 1 & 1 & \dots & 1 \\ 1 & 1 & 1 & 0 & 0 & \dots 0_{p^{\frac{(s^2+3s)}{2})r-2p^r}} \\ \vdots & \vdots & \vdots & 0 & \dots & \vdots \\ 0_{p^{\frac{(s^2+3s)}{2})r-1}} & 0 & \dots & \dots & \dots & 0_{p^{\frac{(s^2+3s)}{2})r-1}} \end{pmatrix},$$

we obtain the matrix

$$\begin{pmatrix} 1 & 0 & 0 & 0 & \dots & 0 \\ 0 & 1 & 0 & 0 & \dots & 0 \\ \vdots & 0 & 1 & 0 & \dots & 0 \\ \vdots & 0 & 0 & 1 & 0 & \dots 0_{p^{\frac{(s^2+3s)}{2})r-2p^r}} \\ \vdots & \vdots & \vdots & 0 & \dots & \vdots \\ 0_{p^{\frac{(s^2+3s)}{2})r-1}} & 0 & \dots & \dots & \dots & 0_{p^{\frac{(s^2+3s)}{2})r-1}} \end{pmatrix}.$$

Let $V = \{v_1, v_2, v_3, \dots, v_{p^{\frac{(s^2+3s)}{2})r-2}\}$ be the linearly independent set of vectors



$$\text{such that } v_1 = \begin{pmatrix} 1 \\ 0 \\ \vdots \\ \vdots \\ \vdots \\ 0 \end{pmatrix}, v_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ \vdots \\ \vdots \\ 0 \end{pmatrix}, v_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \\ \vdots \\ 0 \end{pmatrix}, \dots, v_{p^{\left(\frac{s^2+3s}{2}-1\right)r}} = \begin{pmatrix} 0 \\ \vdots \\ 0 \\ 1_{p^{\left(\frac{s^2+3s}{2}\right)r-2p^r} \\ 0 \\ \vdots \\ 0_{p^{\left(\frac{s^2+3s}{2}\right)r-1}} \end{pmatrix}.$$

Clearly, the set spans the matrix space implying that the $\text{rank}([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}) = p^{\left(\frac{s^2+3s}{2}\right)r} - 2p^r.$

(iii) Given that $[A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}$ is the adjacency matrix for $\Gamma(R)$, it is justifiable that

$$\text{Tr}([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}) = a_{11} + a_{22} + a_{33} + \dots + a_{(p^{\left(\frac{s^2+3s}{2}\right)r-1})(p^{\left(\frac{s^2+3s}{2}\right)r-1})}.$$

Since $\Gamma(R)$ is a simple graph with no self loop for $v_i = 1, 2, \dots, p^{\left(\frac{s^2+3s}{2}\right)r} - 1$, the leading diagonal entries are 0. Therefore, $\sum_{i=1}^{p^{\left(\frac{s^2+3s}{2}\right)r-1}} a_{ii} = 0.$

Further, since $\text{Tr}([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}) = \sum_{j=1}^{p^{\left(\frac{s^2+3s}{2}\right)r-1}} \lambda_j.$ Therefore, the sum of eigenvalues $\lambda_j = -1 - p^r + p^r + 1 = 0$ and the spectral radius is $p^r + 1.$

(iv) Consider $[B]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}} = [A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}} [C]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}^T$ where $[C]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}$ is the cofactor matrix of $[A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}$ then $b_{ij} = \sum_k a_{ik} c_{jk}$ for c_{jk} is the jk minor of $[A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}.$ If $i = j$, it corresponds to the determinant computation of $[A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}$ along the i^{th} row. Hence $b_{ii} = \det([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}).$

If $i \neq j$, this corresponds to the determinant computation of a matrix equal to $[A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}$ except that the row j has been overwritten by the contents of i^{th} row. But the determinant of a matrix with duplicated row is 0, hence $b_{ij} = 0. \Rightarrow [A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}} [C]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}^T = \det([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}) I.$ If $\det([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}) \neq 0$ then we can write

$$A \frac{C^T}{\det([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}})} = I \Leftrightarrow [A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}^{-1} = \frac{C^T}{\det([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}})} = \frac{\text{Adj}[A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}}{\det([A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}})}.$$



i.e $\det([A]_{p^{(\frac{s^2+3s}{2})r-1}}) \neq 0 \Rightarrow [A]_{p^{(\frac{s^2+3s}{2})r-1}}^{-1}$ exists . Consequently, if $[A]_{p^{(\frac{s^2+3s}{2})r-1}}$ is singular then $\det([A]_{p^{(\frac{s^2+3s}{2})r-1}}) = 0$.

(v) For $p = 2$, we can obtain the eigenvalues by solving the equation $|\lambda I - A| = 0 \Rightarrow \lambda^3 - 2\lambda^2 = 0 \Rightarrow \lambda(\lambda^2 - 2) = 0 \Rightarrow \lambda = 0$ and $\lambda = \pm\sqrt{2}$.

For $p \neq 2$,

$|\lambda I - A| = 0$ results to a characteristic equation of the form $\lambda^{2p^r-1}(-(p^r + 1) + \lambda)(1 + \lambda)(p^r + \lambda) = 0$. Solving for λ in every factor results to $\lambda^{2p^r-1} = 0 \Rightarrow \lambda = 0$ of multiplicity $2p^r - 1$. For the second factor, $-(p^r + 1) + \lambda = 0 \Rightarrow \lambda = p^r + 1$. For $(1 + \lambda) = 0, \lambda = -1$ and $(p^r + \lambda) = 0 \Rightarrow \lambda = -p^r$.

□

Proposition 3.4. Consider $[A]_{p^{(\frac{s^2+3s}{2})r-1}}$, the adjacency matrix associated with $\Gamma(R)$ where R is a ring of construction I . Then for any fixed $s \neq 1, r \in \mathbb{Z}^+$ and p , prime integer, the following properties hold:

(i) $[A]_{p^{(\frac{s^2+3s}{2})r-1}}$ is symmetric.

(ii) $\text{rank}([A]_{p^{(\frac{s^2+3s}{2})r-1}}) = p^{(\frac{s^2+3s}{2}-1)r}$.

(iii) $\text{Tr}([A]_{p^{(\frac{s^2+3s}{2})r-1}}) = 0$.

(iv) $\text{Det}([A]_{p^{(\frac{s^2+3s}{2})r-1}}) = 0$.

(v) For $p=2, \lambda[A]_{p^{(\frac{s^2+3s}{2})r-1}} = \begin{cases} -1, & \text{of multiplicity } p^r; \\ 0, & \text{of multiplicity } p^{(\frac{s^2+3s}{2}-1)r-1}; \\ 1 \pm \sqrt{p^{(\frac{s^2+3s}{2})r} + p^{(\frac{s^2+3s}{2}-1)r} + 1}, & . \end{cases}$

For $p \geq 3$,

The eigenvalues $\lambda[A]_{p^{(\frac{s^2+3s}{2})r-1}} =$



$$\left\{ \begin{array}{l} -1, \\ 0, \\ \frac{p^{\left(\frac{s^2+3s}{2}-1\right)r-2} \pm \sqrt{9p^{\left(\frac{s^2+3s}{2}+1\right)r} - 4p^{\left(\frac{s^2+3s}{2}\right)r} - 8p^{\left(\frac{s^2+3s}{2}-1\right)r} + 4}}{2}, \end{array} \right. \cdot \begin{array}{l} \text{of multiplicity } p^{\left(\frac{s^2+3s}{2}-1\right)r} - 2; \\ \text{of multiplicity } 2p^{\left(\frac{s^2+3s}{2}-1\right)r} - 1; \end{array}$$

Proof. The proof for (i) to (iv) have similar steps to the ones in Proposition 3.3.

(v) For $p = 2$, the equation $| [A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}} - \lambda I_{p^{\left(\frac{s^2+3s}{2}\right)r-1}} | = 0$ yields the characteristic equation for the adjacency matrix $[A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}$. Let the eigenvalues of $[A]_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}$ be $\lambda_1, \lambda_2, \dots, \lambda_{p^{\left(\frac{s^2+3s}{2}\right)r-1}}$. We can obtain the characteristic equation of the adjacency matrix as

$$-\lambda p^{\left(\frac{s^2+3s}{2}-1\right)r-1} (1 + \lambda)^{p^r} (\lambda^2 - 2\lambda - (p^{\left(\frac{s^2+3s}{2}\right)r} + p^{\left(\frac{s^2+3s}{2}-1\right)r})) = 0.$$

$\Rightarrow -\lambda p^{\left(\frac{s^2+3s}{2}-1\right)r-1} = 0 \Rightarrow \lambda = 0$ of multiplicity $p^{\left(\frac{s^2+3s}{2}-1\right)r} - 1$, $(1 + \lambda)^{p^r} = 0 \Rightarrow \lambda = -1$ of multiplicity p^r . By solving the quadratic equation

$\lambda^2 - 2\lambda - (p^{\left(\frac{s^2+3s}{2}\right)r} + p^{\left(\frac{s^2+3s}{2}-1\right)r}) = 0$ in the last factor, we obtain

$$\begin{aligned} \lambda &= \frac{2 \pm \sqrt{4 + 4p^{\left(\frac{s^2+3s}{2}\right)r} + 4p^{\left(\frac{s^2+3s}{2}-1\right)r}}{2} = \frac{2 \pm \sqrt{4(p^{\left(\frac{s^2+3s}{2}\right)r} + p^{\left(\frac{s^2+3s}{2}-1\right)r} + 1)}}{2} \\ &= \frac{2 \pm 2\sqrt{p^{\left(\frac{s^2+3s}{2}\right)r} + p^{\left(\frac{s^2+3s}{2}-1\right)r} + 1}}{2} = 1 \pm \sqrt{p^{\left(\frac{s^2+3s}{2}\right)r} + p^{\left(\frac{s^2+3s}{2}-1\right)r} + 1}. \end{aligned}$$

For $p \neq 2$, we generally obtain the polynomial equation which when factorized results to $\lambda^{2p^{\left(\frac{s^2+3s}{2}-1\right)r-1}} (1 + \lambda)^{p^{\left(\frac{s^2+3s}{2}-1\right)r-2}} ((\lambda^2 - (p^{\left(\frac{s^2+3s}{2}-1\right)r} - 2)\lambda - (2p^{\left(\frac{s^2+3s}{2}+1\right)r} - p^{\left(\frac{s^2+3s}{2}\right)r} - p^{\left(\frac{s^2+3s}{2}-1\right)r})) = 0$. Solving the equation gives the eigenvalues as $\lambda^{2p^{\left(\frac{s^2+3s}{2}-1\right)r-1}} = 0 \Rightarrow \lambda = 0$ of multiplicity $2p^{\left(\frac{s^2+3s}{2}-1\right)r} - 1$. The second factor $(1 + \lambda)^{p^{\left(\frac{s^2+3s}{2}-1\right)r-2}} = 0 \Rightarrow \lambda = -1$ of multiplicity $p^{\left(\frac{s^2+3s}{2}-1\right)r} - 2$. Finally, solving the quadratic part results to

$$\lambda = \frac{(p^{\left(\frac{s^2+3s}{2}-1\right)r} - 2) \pm \sqrt{(p^{\left(\frac{s^2+3s}{2}-1\right)r} - 2)^2 + 4(2p^{\left(\frac{s^2+3s}{2}+1\right)r} - p^{\left(\frac{s^2+3s}{2}\right)r} - p^{\left(\frac{s^2+3s}{2}-1\right)r})}}{2}.$$



Expanding the discriminant yields the expression

$p^{\binom{s^2+3s}{2}+1}r - 4p^{\binom{s^2+3s}{2}-1}r + 4 + 8p^{\binom{s^2+3s}{2}+1}r - 4p^{\binom{s^2+3s}{2}}r - 4p^{\binom{s^2+3s}{2}-1}r$ so that

$$\lambda = \frac{(p^{\binom{s^2+3s}{2}-1}r - 2) \pm \sqrt{9p^{\binom{s^2+3s}{2}+1}r - 4p^{\binom{s^2+3s}{2}}r - 8p^{\binom{s^2+3s}{2}-1}r + 4}}{2}.$$

□

Proposition 3.5. Consider $[L]_{p^{\binom{s^2+3s}{2}}r-1}$, the Laplacian matrix associated with $\Gamma(R)$ of the ring in Construction I. Then for any positive integer r , prime integer p , the following properties hold:

(i) $[L]_{p^{\binom{s^2+3s}{2}}r-1}$ is symmetric.

(ii) $\text{rank}([L]_{p^{\binom{s^2+3s}{2}}r-1}) = p^{\binom{s^2+3s}{2}}r - 2$.

(iii) $\text{Tr}([L]_{p^{\binom{s^2+3s}{2}}r-1}) = \begin{cases} 4, & \text{when } s = 1, p = 2; \\ (p^r - 1)(2p^{\binom{s^2+3s}{2}}r - p^r - 2), & \text{for any } s, p \geq 2. \end{cases}$

(iv) $\text{Det}([L]_{p^{\binom{s^2+3s}{2}}r-1}) = 0$.

(v) The eigenvalues $\lambda[L]_{p^{\binom{s^2+3s}{2}}r-1}$ are 0, 1 and 3 when $s = 1, p = 2$.

For any $s, p \geq 2$ the eigenvalues $\lambda[L]_{p^{\binom{s^2+3s}{2}}r-1} = \begin{cases} 0, \\ p^{\binom{s^2+3s}{2}}r - 1, & \text{of multiplicity } p^r - 1; \\ p^r - 1, & \text{of multiplicity } 2p^r - 1. \end{cases}$

Proof. (i) Can be drawn from the previous proposition since the steps are similar.

(ii) We conduct a row operation on $[L]_{p^{\binom{s^2+3s}{2}}r-1}$ to obtain the matrix

$$\begin{pmatrix} 1 & 0 & 0 & 0 & \cdot & \cdot & -1 \\ 0 & 1 & 0 & 0 & \cdot & \cdot & -1 \\ 0 & \cdot & \ddots & 0 & \cdot & \cdot & -1 \\ \vdots & \cdot & \cdot & 1_{p^{\binom{s^2+3s}{2}}r-2} & 0 & 1 & -1 \\ 0 & 0 & \cdot & \cdot & \cdot & 0 & 0 \end{pmatrix}.$$



This results to $p^{\binom{s^2+3s}{2}r} - 2$ non-zero rows in $[L]_{p^{\binom{s^2+3s}{2}r-1}}$, hence its rank.

(iii) For $p = 2$ and $s = 1$, the $\Gamma(R)$ obtained has only 1 vertex of maximum degree 2 and 2 vertices of minimum degree 1. This leads to a Laplacian matrix of order 3×3 whose main diagonal entries are 2, 1 and 1 hence a trace of 4.

For any $s, p \geq 2$,

$|Z(R)^*| = p^{\binom{s^2+3s}{2}r} - 1$ and each $v_i \in \text{Ann}(Z(R)^*)$ has degree $p^{\binom{s^2+3s}{2}r} - 2$ and $|\text{Ann}(Z(R)^*)| = p^r - 1$. Therefore any $v_j \notin \text{Ann}(Z(R)^*)$ is of degree $p^r - 1$ because every such $v_j \notin \text{Ann}(Z(R)^*)$ is only adjacent to $v_i \in \text{Ann}(Z(R)^*)$.

Partitioning the vertices of $\Gamma(R)$ into disjoint subsets V_1 and V_2 such that

$V_1 = \{v_j | v_j \notin \text{Ann}(Z(R)^*)\}$ and $V_2 = \{v_i | v_i \in \text{Ann}(Z(R)^*)\}$,

$|V_2| = p^r - 1$ and $|V_1| = p^{\binom{s^2+3s}{2}r} - 1 - (p^r - 1) = p^{\binom{s^2+3s}{2}r} - p^r$. Since the trace,

$Tr([L]_{p^{\binom{s^2+3s}{2}r-1}}) = \sum_{i=1}^{p^{\binom{s^2+3s}{2}r-1}} l_{ii}$, where every l_{ii} is an element of the diagonal matrix $[D]_{p^{\binom{s^2+3s}{2}r-1}}$ whose entries are degrees of vertices in $\Gamma(R)$, we have that

$Tr([L]_{p^{\binom{s^2+3s}{2}r-1}}) = (p^{\binom{s^2+3s}{2}r} - 2)(p^r - 1) + (p^r - 1)(p^{\binom{s^2+3s}{2}r} - p^r)$. This results to

$(p^r - 1)(p^{\binom{s^2+3s}{2}r} - 2 + p^{\binom{s^2+3s}{2}r} + p^r) = (p^r - 1)(2p^{\binom{s^2+3s}{2}r} - p^r - 2)$.

(iv) Steps in obtaining the singularity of $[L]_{p^{\binom{s^2+3s}{2}r-1}}$ are similar to the one in proposition

3.4.

(v) For $p = 2, s = 1$, the eigenvalues for the 3×3 Laplacian matrix are easy to obtain.

When $p \geq 2$ for any s , the equation $|(\lambda I_{p^{\binom{s^2+3s}{2}r-1}} - [L]_{p^{\binom{s^2+3s}{2}r-1}})| = 0$ gives the

characteristic polynomial equation of the form $-\lambda((-p^{\binom{s^2+3s}{2}r} - 1) + \lambda)^{p^r-1}(-p^r - 1) + \lambda)^{2p^r-1} = 0$. On solving each factor, we obtain $-\lambda = 0 \implies \lambda = 0$. For the factor $(-p^{\binom{s^2+3s}{2}r} - 1) + \lambda)^{p^r-1} = 0$, we have that $\lambda = (p^{\binom{s^2+3s}{2}r} - 1)$ of multiplicity $p^r - 1$. Finally, $(-p^r - 1) + \lambda)^{2p^r-1} = 0 \implies \lambda = p^r - 1$, of multiplicity $2p^r - 1$. This establishes (v). \square

Next, we take an analysis of the distance matrix of $\Gamma(R)$ of the ring in Construction I. Recall that the distance matrix of a graph G having n vertices is a symmetric matrix

$[d_{ij}]$ whose entry d_{ij} is defined as $d_{ij} = \begin{cases} d(v_i, v_j), & \text{if } i \neq j; \\ 0, & \text{if } i = j. \end{cases}$

The following result describes the matrix algebraic properties of $[d_{ij}]$ of this class of rings.

Proposition 3.6. Consider $[d_{ij}]_{p^{\binom{s^2+3s}{2}r-1}}$, distance matrix associated with $\Gamma(R)$ of R



in Construction I. For $r \in \mathbb{Z}^+, p$ prime,

$$(i) \text{Det}([d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}) = \begin{cases} 4, & \text{when } p = 2, s = 1; \\ -(p^{(\frac{s^2+3s}{2})r} - 1)^2, & \text{for any } s, p \geq 2. \end{cases}$$

$$(ii) \text{Tr}([d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}) = 0.$$

$$(iii) \text{rank}([d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}) = \begin{cases} 3, & \text{when } p = 2, s = 1; \\ p^{(\frac{s^2+3s}{2})r} - 1, & \text{for any } s, p \geq 2. \end{cases}$$

(iv) When $p = 2, s = 1$ the eigenvalues $\lambda[d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}$ are $1 \pm \sqrt{3}$ and 2

$$\text{For any } s, p \geq 2, \text{ the eigenvalues } \lambda[d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}} = \begin{cases} -1, \\ 1 - p^r, \\ \frac{1}{2}((p^{(\frac{s^2+3s}{2})r} + 2) \pm \sqrt{p^{(\frac{s^2+3s}{2})r} + 4p^{(\frac{s^2+3s}{2})r} + 4p^r}) \end{cases} \text{ multiplicity } p^{(\frac{s^2+3s}{2})r} + (p^r + 1);$$

Proof. (i) When $p = 2, s = 1$, we obtain the distance matrix $\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 2 \\ 1 & 2 & 0 \end{pmatrix}$.

Expanding the matrix along the first row, we clearly obtain the determinant to be 4. When $p \geq 2$ for any fixed s , we obtain the distance matrix to be of the form

$$\begin{pmatrix} 0 & 1 & \cdots & \cdots & \cdots & 1 & 1 \\ 1 & 0 & 1 & \cdots & 1 & \cdots & p^{(\frac{s^2+3s}{2})r-1} \\ \vdots & \cdots & \ddots & & & & \cdots \\ 1 & 1 & 2 & 0 & 2 & \cdots & 1 \\ \vdots & \cdots & \vdots & \cdots & \ddots & & p^{(\frac{s^2+3s}{2})r-1} \\ 1 & 1 & \cdots & 2 & \cdots & & 2 \\ & & & & & & 0 \end{pmatrix}.$$

Expanding along the first row, we obtain the determinant to be $-(p^{(\frac{s^2+3s}{2})r} - 1)(p^{(\frac{s^2+3s}{2})r} - 1) = -(p^{(\frac{s^2+3s}{2})r} - 1)^2$.

(ii) Due to the fact that $d(v_i, v_i) = 0$, this results to a distance matrix $[d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}$ with



0's entirely in the main diagonal. Therefore, $Tr([d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}) = \sum_{i=1}^{p^{(\frac{s^2+3s}{2})r-1}} d(v_i, v_i) = 0$.

(iii) When $p = 2, s = 1$, the rank of the matrix in (i) is clearly 3.

When $p \geq 2$ for any fixed s , we can obtain the rank of the distance matrix $[d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}$ by conducting a row operation on it which reduces to the echelon form

$$\begin{pmatrix} 1 & 0 & 0 & 0 & \cdots & \cdots & 0 & 2 \\ 0 & 1 & 0 & 0 & \cdots & \cdots & 0 & 2 \\ \vdots & & \ddots & & \vdots & & \vdots & \vdots \\ 0 & \cdots & 0 & 1 & \cdots & \cdots & 0 & 2 \\ 0 & 0 & 0 & \cdots & 1 & 0 & \cdots & -1 \\ \vdots & & & & & \ddots & & \vdots \\ 0 & 0 & \cdots & \cdots & & 0 & 1 & -1_{p^{(\frac{s^2+3s}{2})r-2}} \\ 0 & 0 & 0 & \cdots & \cdots & 0 & \cdots & 1_{p^{(\frac{s^2+3s}{2})r-1}} \end{pmatrix}.$$

From the reduced echelon form above, there are $p^{(\frac{s^2+3s}{2})r} - 1$ linearly independent vectors which span the row space of $[d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}$ resulting to $p^{(\frac{s^2+3s}{2})r} - 1$ nonzero rows, hence its rank.

(iv) Solving the equation $|\lambda I - [d_{ij}]_{p^{(\frac{s^2+3s}{2})r-1}}| = 0$, results to the characteristic equation

$(1 + \lambda)((p^r - 1) + \lambda)p^{(\frac{s^2+3s}{2})r+(p^r+1)}(\lambda^2 - (p^{(\frac{s^2+3s}{2})r} + 2)\lambda - (p^r - 1)) = 0$. We obtain the eigenvalues by finding the solution for λ in every factor of the equation as follows:

Clearly, $(\lambda + 1) = 0 \implies \lambda = -1$. Further, $((p^r - 1) + \lambda)p^{(\frac{s^2+3s}{2})r+(p^r+1)} = 0$, we obtain $\lambda = 1 - p^r$ of multiplicity $p^{(\frac{s^2+3s}{2})r} + (p^r + 1)$.

Finally, for the quadratic part $(\lambda^2 - (p^{(\frac{s^2+3s}{2})r} + 2)\lambda - (p^r - 1)) = 0$, we can obtain

$$\lambda = \frac{1}{2}((p^{(\frac{s^2+3s}{2})r} + 2) \pm \sqrt{(p^{(\frac{s^2+3s}{2})r} + 2)^2 + 4(p^r - 1)})$$

which on expansion yields $\lambda = \frac{1}{2}((p^{(\frac{s^2+3s}{2})r} + 2) \pm \sqrt{p^{2(\frac{s^2+3s}{2})r} + 4p^{(\frac{s^2+3s}{2})r} + 4 + 4(p^r - 1)})$

and simplifies to $\lambda = \frac{1}{2}((p^{(\frac{s^2+3s}{2})r} + 2) \pm \sqrt{p^{2(\frac{s^2+3s}{2})r} + 4p^{(\frac{s^2+3s}{2})r} + 4p^r})$. \square

4 The 3-Radical Zero Finite Completely Primary Rings of characteristic p^2

4.1 Construction II

Let $R' = GR(p^{2r}, p^2)$ be a Galois ring of order p^{2r} and of characteristic p^2 . Let U and V be finitely generated R' -modules with $\{u_1, u_2, \dots, u_s\}$ and $\{v_1, v_2, \dots, v_t\}$ being the generating set such that the nonnegative integers s, t are the number of elements in the generating sets. Then for fixed s and $t = \frac{s(s+1)}{2}$, $R = R' \oplus \sum_{i=1}^s R'u_i \oplus \sum_{i,j=1}^s R'u_i u_j$ is an additive abelian group. Define multiplication in R by

$$(a_o + \sum_{i=1}^s a_i u_i + \sum_{i,j=1}^s a_{ij} u_i u_j)(b_o + \sum_{i=1}^s b_i u_i + \sum_{i,j=1}^s b_{ij} u_i u_j) =$$

$$a_o b_o + \sum_{i=1}^s ((a_o + pR')b_i + a_i(b_o + pR')^{\sigma_i})u_i + \sum_{i,j=1}^s (a_o b_{ij} + a_j(b_o)^{\sigma_i} + \sum_{i,j=1}^s \alpha_{ij}^k a_i(b_j)^{\sigma_i})u_i u_j.$$

R is thus turned by the multiplication into a commutative ring with identity $(1, 0, \dots, 0, \bar{0}, \dots, \bar{0})$.

For the rings discussed in this section, we shall consider $\sigma_i = id_{R'}$. The following Proposition and its proof can be obtained from [5].

Case I: when $pu_i = 0$

Proposition 4.1. Consider R from Construction II and let $pu_i = 0$. Then zero divisors set $Z(R)$ satisfies the following properties:

- (i) $Z(R) = pR' \oplus \sum_{i=1}^s R'u_i \oplus \sum_{i,j=1}^s R'u_i u_j$.
- (ii) $(Z(R))^2 = \sum_{i,j=1}^s R'u_i u_j$.
- (iii) $(Z(R))^3 = (0)$.

4.2 The Graphs $\Gamma(R)$ and Matrices obtained from Classes of Rings in Construction II

Proposition 4.2. Consider R from Construction II. Then for p prime, $r \in \mathbb{Z}^+$ and $pu_i = 0$, $\Gamma(R)$ has the following properties:



- (i) $|V(\Gamma(R))| = p^{\binom{s^2+3s+2}{2}r} - 1$.
- (ii) $\Gamma(R)$ is an incomplete graph.
- (iii) $\text{diam}(\Gamma(R)) = 2$.
- (iv) The minimum degree, $\delta(\Gamma(R)) = p^{\binom{s^2+3s+2}{2}r} - p^{\binom{s^2+3s}{2}r} - 1$.
- (v) $\text{girth}(\Gamma(R)) = 3$.

Proof. (i) Since $\text{char}(R) = p^2$, $pu_i = 0$, and we have that $|R'u_i| = p^r$, $|R'u_i u_j| = p^r$, $|pR'| = p^r$ which is true for every $i, j = 1, \dots, s$. We obtain $|Z(R)| = p^{\binom{s^2+3s+2}{2}r}$. Therefore, $|Z(R) \setminus \{0\}| = p^{\binom{s^2+3s+2}{2}r} - 1$ since $|Z(R)^*| = |V(\Gamma(R))| \implies |V(\Gamma(R))| = p^{\binom{s^2+3s+2}{2}r} - 1$.

(ii) Follows easily from the fact that $(Z(R))^2 \neq (0)$.

(iii) From the incompleteness of $\Gamma(R)$ in (ii), $\text{Ann}(Z(R)) = (Z(R))^2$, there exist some two non adjacent vertices $x, y \in V(\Gamma(R))$ so that for some $z \in \text{Ann}(Z(R))$, the supremum distance $d\{x, y\} = 2$ hence the diameter.

(iv) Let $V = \{v_1, v_2, \dots, v_{p^{\binom{s^2+3s+2}{2}r-1}}\}$ be the vertex set for $\Gamma(R)$. Let $K, S \subseteq V$ such

that $K \subseteq \text{ann}(Z(R))^*$. This implies $|K| = p^{\binom{s^2+3s}{2}r} - 1$ and $|S| = (p^{\binom{s^2+3s+2}{2}r} - 1) - (p^{\binom{s^2+3s}{2}r} - 1) = p^{\binom{s^2+3s+2}{2}r} - 1 - p^{\binom{s^2+3s}{2}r} + 1$ which simplifies to $p^{\binom{s^2+3s+2}{2}r} - p^{\binom{s^2+3s}{2}r}$.

Therefore, $\delta(\Gamma(R)) = (p^{\binom{s^2+3s+2}{2}r} - p^{\binom{s^2+3s}{2}r}) - 1 = p^{\binom{s^2+3s+2}{2}r} - p^{\binom{s^2+3s}{2}r} - 1$ due to the minimal degree of the elements of S and for the avoidance of self loop for each vertex $v \in S$. Hence minimum degree $\delta(\Gamma(R))$.

(v) Follows from Proof (v) in Proposition 3.2. □

Proposition 4.3. Consider $[A]_{p^{\binom{s^2+3s+2}{2}r-1}}$, the adjacency matrix associated with $\Gamma(R)$ for R in Construction II. Then for any fixed $s, r \in \mathbb{Z}^+$ and p prime,

- (i) $[A]_{p^{\binom{s^2+3s+2}{2}r-1}}$ is symmetric.
- (ii) $\text{rank}([A]_{p^{\binom{s^2+3s+2}{2}r-1}}) = p^{\binom{s^2+3s}{2}r} - 1$.
- (iii) $\text{Tr}([A]_{p^{\binom{s^2+3s+2}{2}r-1}}) = 0$.



(iv) $Det([A]_{p^{(\frac{s^2+3s+2}{2})r-1}}) = 0.$

(v) For $p = 2$, the eigenvalues $\lambda[A]_{p^{(\frac{s^2+3s+2}{2})r-1}}$

$$= \begin{cases} -1, & \text{of multiplicity } p^r; \\ 0, & \text{of multiplicity } p^{(\frac{s^2+3s}{2})r-1}; \\ 1 \pm \sqrt{p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r} + 1}, & . \end{cases}$$

For $p \neq 2$, eigenvalues $\lambda[A]_{p^{(\frac{s^2+3s+2}{2})r-1}}$

$$= \begin{cases} -1, & \text{of multiplicity } p^{(\frac{s^2+3s}{2})r-2}; \\ 0, & \text{of multiplicity } 2p^{(\frac{s^2+3s}{2})r-1}; \\ \frac{(p^{(\frac{s^2+3s}{2})r-2} \pm \sqrt{p^{2(\frac{s^2+3s}{2})r} - 8p^{(\frac{s^2+3s}{2})r} + 4p^{(\frac{s^2+3s+2}{2})r+4}}}{2}, & . \end{cases}$$

Proof. (i) The steps in the proof for (i),(iii) and (iv) are clear. We provide proofs for (ii) and (v) as follows:

(ii) Upon carrying out a row operation on

$$[A]_{p^{(\frac{s^2+3s+2}{2})r-1}} = \begin{pmatrix} 0 & 1 & 1 & 1 & \dots & 1 \\ 1 & 0 & 1 & 1 & \dots & 1 \\ \vdots & \vdots & 0 & 1 & \dots & \vdots \\ 1 & 1 & 1 & 0 & 0 & \dots 0_{p^{(\frac{s^2+3s}{2})r}} \\ \vdots & \vdots & \vdots & 0 & \dots & \vdots \\ 0 & 0 & \dots & \dots & \dots & 0 \end{pmatrix},$$

we obtain its reduced echelon form matrix as

$$\begin{pmatrix} 1 & 0 & 0 & 0 & \dots & 0 \\ 0 & 1 & 0 & 0 & \dots & 0 \\ \vdots & 0 & 1 & 0 & \dots & 0 \\ \vdots & 0 & 0 & 1 & 0 & \dots 0_{p^{(\frac{s^2+3s}{2})r}} \\ \vdots & \vdots & \vdots & 0 & \dots & \vdots \\ 0_{p^{(\frac{s^2+3s+2}{2})r-2}} & 0 & \dots & \dots & \dots & 0_{p^{(\frac{s^2+3s+2}{2})r-1}} \end{pmatrix}.$$



Let $V = \{v_1, v_2, v_3, \dots, v_{p^{\frac{(s^2+3s)}{2}r}}\}$ be the linearly independent set of vectors such that

$$v_1 = \begin{pmatrix} 1 \\ 0 \\ \vdots \\ \vdots \\ 0 \end{pmatrix}, v_2 = \begin{pmatrix} 0 \\ 1 \\ 0 \\ \vdots \\ \vdots \\ 0 \end{pmatrix}, v_3 = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \\ \vdots \\ 0 \end{pmatrix}, \dots, v_{p^{\frac{(s^2+3s)}{2}r}} = \begin{pmatrix} 0 \\ \vdots \\ 1 \\ p^{\frac{(s^2+3s)}{2}r-1} \\ 0 \\ \vdots \\ 0 \\ p^{\frac{(s^2+3s+2)}{2}r-1} \end{pmatrix}. \text{ Clearly,}$$

the set V spans the whole of the matrix space. Therefore the $rank([A]_{p^{\frac{(s^2+3s+2)}{2}r-1}}) = p^{\frac{(s^2+3s)}{2}r} - 1$.

(v) For $p = 2$, $|\lambda I_{p^{\frac{(s^2+3s+2)}{2}r-1}} - [A]_{p^{\frac{(s^2+3s+2)}{2}r-1}}| = 0$ yields the characteristic equation for the adjacency matrix $[A]_{p^{\frac{(s^2+3s+2)}{2}r-1}}$. Let the eigenvalues of $[A]_{p^{\frac{(s^2+3s+2)}{2}r-1}}$ be $\lambda_1, \lambda_2, \dots, \lambda_{p^{\frac{(s^2+3s+2)}{2}r-1}}$. We can obtain the characteristic equation of the adjacency matrix as

$$-\lambda^{p^{\frac{(s^2+3s)}{2}r-1}}(1 + \lambda)^{p^r}(\lambda^2 - 2\lambda - (p^{\frac{(s^2+3s+2)}{2}r} + p^{\frac{(s^2+3s)}{2}r})) = 0. \Rightarrow -\lambda^{p^{\frac{(s^2+3s)}{2}r-1}} = 0 \Rightarrow \lambda = 0 \text{ of multiplicity } p^{\frac{(s^2+3s)}{2}r} - 1, (1 + \lambda)^{p^r} = 0 \Rightarrow \lambda = -1 \text{ of multiplicity } p^r. \text{ By solving the quadratic equation } \lambda^2 - 2\lambda - (p^{\frac{(s^2+3s+2)}{2}r} + p^{\frac{(s^2+3s)}{2}r}) = 0 \text{ in the last factor, we obtain } \lambda = \frac{2 \pm \sqrt{4 + 4p^{\frac{(s^2+3s+2)}{2}r} + 4p^{\frac{(s^2+3s)}{2}r}}}{2} = \frac{2 \pm \sqrt{4(p^{\frac{(s^2+3s+2)}{2}r} + p^{\frac{(s^2+3s)}{2}r} + 1)}}{2} = \frac{2 \pm 2\sqrt{p^{\frac{(s^2+3s+2)}{2}r} + p^{\frac{(s^2+3s)}{2}r} + 1}}{2} = 1 \pm \sqrt{p^{\frac{(s^2+3s+2)}{2}r} + p^{\frac{(s^2+3s)}{2}r} + 1}.$$

For $p \neq 2$,

we generally obtain the polynomial equation which when factorized results to

$$\lambda^{2p^{\frac{(s^2+3s)}{2}r-1}}(1 + \lambda)^{p^{\frac{(s^2+3s)}{2}r-2}}((\lambda^2 - (p^{\frac{(s^2+3s)}{2}r} - 2)\lambda - (p^{\frac{(s^2+3s+2)}{2}r} - p^{\frac{(s^2+3s)}{2}r})) = 0.$$

Solving the equation gives the eigenvalues as $\lambda^{2p^{\frac{(s^2+3s)}{2}r-1}} = 0 \Rightarrow \lambda = 0$ of multiplicity

$2p^{\frac{(s^2+3s)}{2}r} - 1$. The second factor $(1 + \lambda)^{p^{\frac{(s^2+3s)}{2}r-2}} = 0 \Rightarrow \lambda = -1$ of multiplicity

$p^{\frac{(s^2+3s)}{2}r} - 2$. Finally, solving the quadratic part results to

$$\lambda = \frac{(p^{\frac{(s^2+3s)}{2}r} - 2) \pm \sqrt{(p^{\frac{(s^2+3s)}{2}r} - 2)^2 + 4(p^{\frac{(s^2+3s+2)}{2}r} - p^{\frac{(s^2+3s)}{2}r})}}{2}.$$

Expanding the discriminant yields the expression $p^{2(\frac{(s^2+3s)}{2}r)} - 4p^{\frac{(s^2+3s)}{2}r} + 4 + 4p^{\frac{(s^2+3s+2)}{2}r} - 4p^{\frac{(s^2+3s)}{2}r}$ so that



$$\lambda = \frac{(p^{\binom{s^2+3s}{2}})_{r-2} \pm \sqrt{p^{2\binom{s^2+3s}{2}} - 8p^{\binom{s^2+3s}{2}} + 4p^{\binom{s^2+3s+2}{2}}}}{2}.$$

□

Proposition 4.4. Consider $[L]_{p^{\binom{s^2+3s+2}{2}}}_{r-1}$, the Laplacian matrix associated with $\Gamma(R)$ in Construction II such that $pu_i = 0$. Then for $r \in \mathbb{Z}^+$, p prime and for a fixed s ,

(i) $[L]_{p^{\binom{s^2+3s+2}{2}}}_{r-1}$ is symmetric.

(ii) $\text{rank}([L]_{p^{\binom{s^2+3s+2}{2}}}_{r-1}) = p^{\binom{s^2+3s+2}{2}} - 2$.

(iii) $\text{Tr}([L]_{p^{\binom{s^2+3s+2}{2}}}_{r-1}) = 2p^{\binom{2(s^2+3s)}{2}} - 2p^{2\binom{s^2+3s}{2}} - 2p^{\binom{s^2+3s+2}{2}} - p^{\binom{s^2+3s}{2}} + 2$.

(iv) $\text{Det}([L]_{p^{\binom{s^2+3s+2}{2}}}_{r-1}) = 0$.

(v) The eigenvalues $\lambda[L]_{p^{\binom{s^2+3s+2}{2}}}_{r-1} = \begin{cases} 0, \\ p^{\binom{s^2+3s+2}{2}} - 1, & \text{of multiplicity } p^{\binom{s^2+3s}{2}} - 1; \\ p^{\binom{s^2+3s}{2}} - 1, & \text{of multiplicity } p^{\binom{s^2+3s}{2}} - 1. \end{cases}$

Proof. (i) We prove (ii) to (v) as follows, (i) is clear.

(ii) Carrying out an elementary row operation on $[L]_{p^{\binom{s^2+3s+2}{2}}}_{r-1}$ we obtain a matrix with an echelon form

$$\begin{pmatrix} 1 & 0 & \cdots & \cdots & \cdots & \cdots & \cdots & 0 & -1 \\ 0 & 1 & 0 & \cdots & \cdots & \cdots & \cdots & 0 & -1 \\ 0 & 0 & 1 & 0 & \cdots & \cdots & \cdots & 0 & -1 \\ 0 & 0 & 0 & 1 & 0 & \cdots & \cdots & 0 & -1 \\ 0 & 0 & 0 & 0 & 1 & 0 & \cdots & 0 & -1 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & \cdots & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ & & & \vdots & & & & & \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}.$$

This results to $p^{\binom{s^2+3s+2}{2}r} - 2$ non-zero rows in $[L]_{p^{\binom{s^2+3s+2}{2}r-1}}$, hence the rank.

(iii) Since $|Z(R)^*| = p^{\binom{s^2+3s+2}{2}r} - 1$, each $v_i \in \text{Ann}(Z(R)^*)$ has degree $p^{\binom{s^2+3s+2}{2}r} - 2$ and $|\text{Ann}(Z(R)^*)| = p^{\binom{s^2+3s+2}{2}r} - 1$. Therefore any $v_j \notin \text{Ann}(Z(R)^*)$ is of degree $p^{\binom{s^2+3s+2}{2}r} - 1$ because every such $v_j \notin \text{Ann}(Z(R)^*)$ is only adjacent to $v_i \in \text{Ann}(Z(R)^*)$.

Partitioning $V \in \Gamma(R)$ into disjoint subsets V_1 and V_2 such that

$V_1 = \{v_j | v_j \notin \text{Ann}(Z(R)^*)\}$ and $V_2 = \{v_i | v_i \in \text{Ann}(Z(R)^*)\}$.

Therefore, $|V_2| = p^{\binom{s^2+3s+2}{2}r} - 1$ and $|V_1| = p^{\binom{s^2+3s+2}{2}r} - p^{\binom{s^2+3s+2}{2}r}$.

Since the trace, $\text{Tr}([L]_{p^{\binom{s^2+3s+2}{2}r-1}}) = \sum_{i=1}^{p^{\binom{s^2+3s+2}{2}r-1}} d_{ii}$, and every d_{ii} is an entry of the diagonal matrix $[D]_{p^{\binom{s^2+3s+2}{2}r-1}}$ whose diagonal are entries of the degrees of $v_i \in V(\Gamma(R))$ thus

$$\text{Tr}([L]_{p^{\binom{s^2+3s+2}{2}r-1}}) = (p^{\binom{s^2+3s+2}{2}r} - 2)(p^{\binom{s^2+3s+2}{2}r} - 1) + (p^{\binom{s^2+3s+2}{2}r} - 1)(p^{\binom{s^2+3s+2}{2}r} - p^{\binom{s^2+3s+2}{2}r}).$$

Upon expansion and simplification of this equation, we obtain

$$\begin{aligned} & p^{\binom{2(s^2+3s)}{2}r} - p^{\binom{s^2+3s+2}{2}r} - 2p^{\binom{s^2+3s+2}{2}r} + 2 + p^{\binom{2(s^2+3s)}{2}r} - p^{\binom{2(s^2+3s)}{2}r} - p^{\binom{s^2+3s+2}{2}r} + p^{\binom{s^2+3s+2}{2}r} = \\ & 2p^{\binom{2(s^2+3s)}{2}r} - 2p^{\binom{s^2+3s+2}{2}r} - p^{\binom{s^2+3s+2}{2}r} - 2p^{\binom{2(s^2+3s)}{2}r} + 2 = 2p^{\binom{2(s^2+3s)}{2}r} - 2p^{\binom{2(s^2+3s)}{2}r} - \\ & 2p^{\binom{s^2+3s+2}{2}r} - p^{\binom{s^2+3s+2}{2}r} + 2. \end{aligned}$$

(iv) Simplifying $|[L]_{p^{\binom{s^2+3s+2}{2}r-1}}| = \sum_{i,j=1}^{p^{\binom{s^2+3s+2}{2}r-1}} a_{ij}(-1)^{i+j} |l_{ij}|$ on the Laplacian matrix where l_{ij} are minors to $[L]_{p^{\binom{s^2+3s+2}{2}r-1}}$ and a_{ij} are the row or column elements from the row or the column of operation, we then establish the singularity of $[L]_{p^{\binom{s^2+3s+2}{2}r-1}}$.

(v) Solving $|(\lambda I_{p^{\binom{s^2+3s+2}{2}r-1}} - [L]_{p^{\binom{s^2+3s+2}{2}r-1}})| = 0$ gives the characteristic polynomial equation of the form;

$$-\lambda((-p^{\binom{s^2+3s+2}{2}r} - 1) + \lambda)p^{\binom{s^2+3s+2}{2}r-1}(-p^{\binom{s^2+3s+2}{2}r} - 1) + \lambda)p^{\binom{s^2+3s+2}{2}r-1} = 0.$$

On solving each factor, we obtain $-\lambda = 0 \implies \lambda = 0$. For the factor

$(-p^{\binom{s^2+3s+2}{2}r} - 1) + \lambda)p^{\binom{s^2+3s+2}{2}r-1} = 0$, we have that $\lambda = (p^{\binom{s^2+3s+2}{2}r} - 1)$ of multiplicity $p^{\binom{s^2+3s+2}{2}r} - 1$. Finally, $(-p^{\binom{s^2+3s+2}{2}r} - 1) + \lambda = 0 \implies \lambda = p^{\binom{s^2+3s+2}{2}r} - 1$, this establishes



(v).

□

Proposition 4.5. Consider $[d_{ij}]_{p^{(\frac{s^2+3s+2}{2})r-1}}$, the distance matrix associated with $\Gamma(R)$ for the ring in Construction II such that $pu_i = 0$. Then for $r \in \mathbb{Z}^+$, p , prime and s fixed,

(i) $[d_{ij}]_{p^{(\frac{s^2+3s+2}{2})r-1}}$ is a singular matrix.

(ii) $Tr([d_{ij}]_{p^{(\frac{s^2+3s+2}{2})r-1}}) = 0$.

(iii) $rank([d_{ij}]_{p^{(\frac{s^2+3s+2}{2})r-1}}) = p^{(\frac{s^2+3s+2}{2})r} - 2$.

(iv) Eigenvalues $\lambda[d_{ij}]_{p^{(\frac{s^2+3s+2}{2})r-1}} = \begin{cases} 0, \\ p^{(\frac{s^2+3s+2}{2})r}, \\ -1, \\ -p^r, \end{cases}$ of multiplicity p^r ,
of multiplicity $p^r + 1$.

Proof. (i) The proofs for (i), (ii) and (iii) are clear.

(iv) Solving the equation $|\lambda I - [d_{ij}]_{p^{(\frac{s^2+3s+2}{2})r-1}}| = 0$ results to the characteristic equation

$-(-p^{(\frac{s^2+3s+2}{2})r} + \lambda)\lambda(1 + \lambda)^{p^r}(p^r + \lambda)^{p^r+1} = 0$. We obtain the eigenvalues by solving every factor of the equation as follows: Clearly, $\lambda = 0$. Further, $-(-p^{(\frac{s^2+3s+2}{2})r} + \lambda) = 0 \implies \lambda = p^{(\frac{s^2+3s+2}{2})r}$. For $(1 + \lambda)^{p^r} = 0$, $\lambda = -1$ of multiplicity p^r . Finally, $(p^r + \lambda)^{p^r+1} = 0 \implies \lambda = -p^r$ of multiplicity $p^r + 1$. □

Case II: when $pu_i \neq 0$

Proposition 4.6. Consider R from Construction II such that $pu_i \neq 0$. Then the zero divisors set $Z(R)$ satisfy the following properties;

(i) $Z(R) = pR' \oplus \sum_{i=1}^s R'u_i \oplus \sum_{i,j=1}^s R'u_i u_j$.

(ii) $(Z(R))^2 = pR' \oplus \sum_{i,j=1}^s R'u_i u_j$.

(iii) $(Z(R))^3 = (0)$.



Proposition 4.7. *Let R be the 3-radical zero completely primary finite ring of characteristic p^2 in Construction II such that $pu_i \neq 0$ and $\Gamma(R)$ be its zero divisor graph. Then for $r \in \mathbb{Z}^+, p$ prime and s fixed,*

(i) $|V(\Gamma(R))| = p^{\binom{s^2+5s+2}{2}r} - 1.$

(ii) $\Gamma(R)$ is incomplete.

(iii) $\text{diam}(\Gamma(R)) = 2.$

(iv) $\delta(\Gamma(R)) = p^{\binom{s^2+5s+2}{2}r} - p^{\binom{s^2+3s+2}{2}r} - 1.$

(v) $\text{girth}(\Gamma(R)) = 3.$

Proof. (i). Given that $Z(R) = pR' \oplus \sum_{i=1}^s R'u_i \oplus \sum_{i,j=1}^s R'u_i u_j$ and since $|R'| = p^{2r}, |R'u_i| = p^{2r}, |R'u_i u_j| = p^r$ for $i, j = 1, 2, \dots, s$ it implies that $|Z(R)| = p^{\binom{s^2+5s+2}{2}r}$. Moreover, since $|Z(R)^*| = |Z(R) - \{0\}|$ it means that $|V(\Gamma(R))| = |Z(R)^*| = p^{\binom{s^2+5s+2}{2}r} - 1.$

(ii). Since $(Z(R))^2 \neq (0)$, it follows that not all vertices $v_i, v_j \in V(\Gamma(R))$ are connected by an edge. This explains incompleteness of $\Gamma(R)$.

(iii). There exist non adjacent vertices $v_i, v_k \in V(\Gamma(R))$ due to (ii) so that for some vertex

$v_j \in \text{Ann}(Z(R)) = (Z(R))^2$, the longest path of the graph is $v_i - v_j - v_k$. Which establishes (iii).

(iv). As established in (i), $|V(\Gamma(R))| = p^{\binom{s^2+5s+2}{2}r} - 1$. Clearly $|\text{Ann}(Z(R)) - \{0\}| = |\text{Ann}(Z(R))^*| = p^{\binom{s^2+3s+2}{2}r} - 1$. The minimum degree from the graph can be obtained by computing the order $|V(\Gamma(R)) \setminus \text{Ann}(Z(R))^*| = (p^{\binom{s^2+5s+2}{2}r} - 1) - (p^{\binom{s^2+3s+2}{2}r} - 1) = p^{\binom{s^2+5s+2}{2}r} - 1 - p^{\binom{s^2+3s+2}{2}r} + 1 = p^{\binom{s^2+5s+2}{2}r} - p^{\binom{s^2+3s+2}{2}r}$. For avoidance of self loop, we have that $\delta(\Gamma(R)) = p^{\binom{s^2+5s+2}{2}r} - p^{\binom{s^2+3s+2}{2}r} - 1.$

(v) Follows from Proof (v) in Proposition 3.2. □

Proposition 4.8. *Consider $[A]_{p^{\binom{s^2+5s+2}{2}r-1}}$ and $[L]_{p^{\binom{s^2+5s+2}{2}r-1}}$ to be respectively the adjacency and Laplacian matrices for $\Gamma(R)$ for the ring in Construction II such that $pu_i \neq 0, r \in \mathbb{Z}^+, p$ prime and s fixed. Then*



(i) $[A]_{p^{(\frac{s^2+5s+2}{2})r-1}}$ and $[L]_{p^{(\frac{s^2+5s+2}{2})r-1}}$ are both symmetric.

(ii) $\text{rank}([A]_{p^{(\frac{s^2+5s+2}{2})r-1}}) = p^{(\frac{s^2+3s+2}{2})r}$ and $\text{rank}([L]_{p^{(\frac{s^2+5s+2}{2})r-1}}) = p^{(\frac{s^2+5s+2}{2})r} - 2$.

(iii) $\text{Det}([A]_{p^{(\frac{s^2+5s+2}{2})r-1}}) = \text{Det}([L]_{p^{(\frac{s^2+5s+2}{2})r-1}}) = 0$.

(iv) $\text{Tr}([A]_{p^{(\frac{s^2+5s+2}{2})r-1}}) = 0$,

$$\text{Tr}([L]_{p^{(\frac{s^2+5s+2}{2})r-1}}) = 2p^{(\frac{2(s^2+5s+2)}{2})r} - 2p^{(\frac{s^2+5s+2}{2})r} - p^{(\frac{2(s^2+3s+2)}{2})r} - p^{(\frac{s^2+3s+2}{2})r} + 2.$$

(v) The eigenvalues $\lambda[A]_{p^{(\frac{s^2+5s+2}{2})r-1}}$

$$= \begin{cases} -1, & \text{of multiplicity } p^{(\frac{s^2+3s+2}{2})r} - 2, \\ 0, & \text{of multiplicity } p^{(\frac{s^2+3s+2}{2})r} - 1, \\ (p^r + 1) \pm \sqrt{\Omega} & . \end{cases}$$

$$\text{where } \Omega = (p^r + 1)^2 + p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(h+2)r}.$$

(vi) The eigenvalues of $[L]_{p^{(\frac{s^2+5s+2}{2})r-1}}$

$$= \begin{cases} 0, \\ p^{(\frac{s^2+5s+2}{2})r} - 1, & \text{of multiplicity } p^{(\frac{s^2+3s+2}{2})r} - 1, \\ (p^{(\frac{s^2+3s+2}{2})r} - 1), & \text{of multiplicity } p^{(\frac{s^2+3s+2}{2})r} - 1. \end{cases}$$

Proof. Proofs for Properties (i) to (iii) of $[A]_{p^{(\frac{s^2+5s+2}{2})r-1}}$ and $[L]_{p^{(\frac{s^2+5s+2}{2})r-1}}$ are clear.

We proceed to provide proof for (iv), (v) and (vi) as follows.

(iv). For the adjacency matrix, $[A]_{p^{(\frac{s^2+5s+2}{2})r-1}}$, the result is clear since diagonal entries

are all 0's. Since the order is $p^{(\frac{s^2+5s+2}{2})r} - 1$, it follows that $\sum_{i=1}^{p^{(\frac{s^2+5s+2}{2})r-1}} a_{ii} = 0$ where a_{ii} are the diagonal elements of the matrix $[A]_{p^{(\frac{s^2+5s+2}{2})r-1}}$.



We show that $Tr([L]_{p^{(\frac{s^2+5s+2}{2})r-1}}) = 2p^{(\frac{2(s^2+5s+2)}{2})r} - 2p^{(\frac{s^2+5s+2}{2})r} - p^{(\frac{s^2+3s+2}{2})r} - p^{(\frac{s^2+3s+2}{2})r} +$

2. Since $|Z(R)^*| = p^{(\frac{s^2+5s+2}{2})r} - 1 = |V(\Gamma(R))|$, it is established that $|Ann(Z(R)^*)| = p^{(\frac{s^2+3s+2}{2})r} - 1$ and any $v_i \notin Ann(Z(R)^*)$ is of degree $p^{(\frac{s^2+3s+2}{2})r} - 1$ since v_i is only adjacent to the vertices in $Ann(Z(R)^*)$. In the same manner, each v_j in the set $Ann(Z(R)^*)$ is connected by an edge with $v_i \in V(\Gamma(R))$. Therefore, $deg(v_j) = p^{(\frac{s^2+5s+2}{2})r} - 2$ for avoidance of self loop.

Let the partitions of the vertex set in $\Gamma(R)$ be V_1 and V_2 such that

$V_1 = \{v_i \in Z(R)^* | v_i \notin Ann(Z(R)^*)\}$ and $V_2 = \{v_j \in Z(R)^* | v_j \in Ann(Z(R)^*)\} \implies$

$|V_1| = p^{(\frac{s^2+3s+2}{2})r} - 1$ and $|V_2| = p^{(\frac{s^2+5s+2}{2})r} - 1 - (p^{(\frac{s^2+3s+2}{2})r} - 1) = p^{(\frac{s^2+5s+2}{2})r} - p^{(\frac{s^2+3s+2}{2})r}$.

Since the trace of $[L]_{p^{(\frac{s^2+5s+2}{2})r-1}}$ is the sum of the diagonal entries of the degree matrix

$[D]_{p^{(\frac{s^2+5s+2}{2})r-1}}$, that is $Tr([L]_{p^{(\frac{s^2+5s+2}{2})r-1}}) = \sum_{i=1}^{p^{(\frac{s^2+5s+2}{2})r-1}} d_{ii}$ which is equivalent to sum of degrees of the vertices in $\Gamma(R)$ where d_{ii} are the diagonal entries of $[D]_{p^{(\frac{s^2+5s+2}{2})r-1}}$.

We have that

$$(p^{(\frac{s^2+3s+2}{2})r} - 1)(p^{(\frac{s^2+5s+2}{2})r} - 2) + (p^{(\frac{s^2+3s+2}{2})r} - 1)(p^{(\frac{s^2+5s+2}{2})r} - p^{(\frac{s^2+3s+2}{2})r}) = p^{(\frac{2(s^2+5s+2)}{2})r} - 2p^{(\frac{s^2+3s+2}{2})r} - p^{(\frac{s^2+5s+2}{2})r} + 2 + p^{(\frac{2(s^2+5s+2)}{2})r} - p^{(\frac{2(s^2+3s+2)}{2})r} - p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r}$$

which simplifies to

$$2p^{(\frac{2(s^2+5s+2)}{2})r} - 2p^{(\frac{s^2+5s+2}{2})r} - p^{(\frac{s^2+3s+2}{2})r} - p^{(\frac{2(s^2+3s+2)}{2})r} + 2. \text{ Hence the trace of } [L]_{p^{(\frac{s^2+5s+2}{2})r-1}}.$$

(v). Simplifying the equation $|\lambda I_{p^{(\frac{s^2+5s+2}{2})r-1}} - [A]_{p^{(\frac{s^2+5s+2}{2})r-1}}| = 0$ results to the characteristic polynomial equation

$$-\lambda p^{(\frac{s^2+3s+2}{2})r-1} (1+\lambda) p^{(\frac{s^2+3s+2}{2})r-2} (\lambda^2 - 2(p^r+1)\lambda - (p^{(\frac{s^2+5s+4}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r})) = 0.$$

From the factorization components, $-\lambda p^{(\frac{s^2+3s+2}{2})r-1} = 0 \implies \lambda = 0$ of multiplicity $p^{(\frac{s^2+3s+2}{2})r} - 1$.

Similarly, $(1+\lambda) p^{(\frac{s^2+3s+2}{2})r-2} = 0 \implies \lambda = -1$ of multiplicity $p^{(\frac{s^2+3s+2}{2})r} - 2$.

For the quadratic part, $\lambda^2 - 2(p^r+1)\lambda - (p^{(\frac{s^2+5s+4}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r}) = 0 \implies$



$$\begin{aligned} \lambda &= \frac{2(p^r + 1) \pm \sqrt{4(p^r + 1)^2 + 4p^{(\frac{s^2+5s+2}{2})r} + 4p^{(\frac{s^2+5s+2}{2})r} + 4p^{(\frac{s^2+3s+2}{2})r}}}{2} \\ &= \frac{2(p^r + 1) \pm \sqrt{4((p^r + 1)^2 + p^{(\frac{s^2+5s+4}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r})}}{2} \\ &= (p^r + 1) \pm \sqrt{(p^r + 1)^2 + p^{(\frac{s^2+5s+4}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r}} \\ &= (p^r + 1) \pm \sqrt{(p^r + 1)^2 + p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+5s+4}{2})r}}. \end{aligned}$$

(vi). From the characteristic equation $|\lambda I_{p^{(\frac{s^2+5s+2}{2})r-1}} - [L]_{p^{(\frac{s^2+5s+2}{2})r-1}}| = 0$, we obtain $-((-p^{(\frac{s^2+5s+2}{2})r} - 1) + \lambda)p^{(\frac{s^2+3s+2}{2})r-1}(-p^{(\frac{s^2+3s+2}{2})r} - 1) + \lambda p^{hr-1} = 0$. Solving λ for each factor results to $(-p^{(\frac{s^2+5s+2}{2})r} - 1) + \lambda p^{(\frac{s^2+3s+2}{2})r-1} = 0 \implies \lambda = p^{(\frac{s^2+5s+2}{2})r} - 1$ of multiplicity

$p^{(\frac{s^2+3s+2}{2})r} - 1$. Further, $(-p^{(\frac{s^2+3s+2}{2})r} - 1) + \lambda p^{(\frac{s^2+3s+2}{2})r-1} = 0 \implies \lambda = p^{(\frac{s^2+3s+2}{2})r} - 1$ with a multiplicity of $p^{(\frac{s^2+3s+2}{2})r} - 1$, and finally, $\lambda = 0$. Hence the eigenvalues of $[L]_{p^{(\frac{s^2+5s+2}{2})r-1}}$.

□

Proposition 4.9. Given $[d_{ij}]_{p^{(\frac{s^2+5s+2}{2})r-1}}$, the distance matrix of associated with $\Gamma(R)$ of the ring in Construction II. The point spectrum, $\sigma_{point}([d_{ij}]_{p^{(\frac{s^2+5s+2}{2})r-1}})$ is described by the following eigenvalues:

$$\lambda = \begin{cases} -1, & \text{of multiplicity } p^{(\frac{s^2+3s+2}{2})r} - 2; \\ -p^r, & \text{of multiplicity } p^{(\frac{s^2+3s+2}{2})r} - 1; \\ (p^{(\frac{s^2+3s+2}{2})r} + 2) \pm \sqrt{p^{(\frac{2(s^2+3s+2)}{2})r} + p^{(\frac{s^2+3s+2}{2})r}}, & \end{cases}$$

Proof. Simplifying the equation $|\lambda I - [d_{ij}]_{p^{(\frac{s^2+5s+2}{2})r-1}}| = 0$ results to the polynomial equation of the form

$$-(1 + \lambda)p^{(\frac{s^2+3s+2}{2})r-2}(p^r + \lambda)p^{(\frac{s^2+3s+2}{2})r-1}(\lambda^2 - (2p^{(\frac{s^2+3s+2}{2})r}\lambda) + (3p^{(\frac{s^2+3s+2}{2})r} + 4)) = 0.$$

Finding the values of λ in each factor yields $-(1 + \lambda)p^{(\frac{s^2+3s+2}{2})r-2} = 0 \implies \lambda = -1$ of



multiplicity $p^{\binom{s^2+3s+2}{2}r} - 2$. Further, $(p^r + \lambda)p^{\binom{s^2+3s+2}{2}r-1} = 0 \implies \lambda = -p^r$ of multiplicity $p^{\binom{s^2+3s+2}{2}r} - 1$.

For the quadratic part $\lambda^2 - (2p^{\binom{s^2+3s+2}{2}r})\lambda + (3p^{\binom{s^2+3s+2}{2}r} + 4) = 0$, we obtain

$$\begin{aligned} \lambda &= \frac{(2p^{\binom{s^2+3s+2}{2}r+4}) \pm \sqrt{(2p^{\binom{s^2+3s+2}{2}r+4})^2 - 4(3p^{\binom{s^2+3s+2}{2}r} + 4)}}{2} \\ &= \frac{(2p^{\binom{s^2+3s+2}{2}r+4}) \pm \sqrt{(4p^{2\binom{s^2+3s+2}{2}r+8p^{\binom{s^2+3s+2}{2}r} + 8p^{\binom{s^2+3s+2}{2}r} + 16 - 12p^{\binom{s^2+3s+2}{2}r-16})}}{2} \\ &= \frac{(2p^{\binom{s^2+3s+2}{2}r+4}) \pm \sqrt{4p^{2\binom{s^2+3s+2}{2}r+16p^{\binom{s^2+3s+2}{2}r} - 12p^{\binom{s^2+3s+2}{2}r}}}{2} \\ &= \frac{(2p^{\binom{s^2+3s+2}{2}r} + 4) \pm \sqrt{4p^{2\binom{s^2+3s+2}{2}r} + 4p^{\binom{s^2+3s+2}{2}r}}}{2} \\ &= \frac{(2p^{\binom{s^2+3s+2}{2}r} + 4) \pm 2\sqrt{p^{2\binom{s^2+3s+2}{2}r} + p^{\binom{s^2+3s+2}{2}r}}}{2} \\ &= (p^{\binom{s^2+3s+2}{2}r} + 2) \pm \sqrt{p^{2\binom{s^2+3s+2}{2}r} + p^{\binom{s^2+3s+2}{2}r}}. \end{aligned}$$

□

5 The 3-Radical Zero Finite Completely Primary Rings of Characteristic p^3

5.1 Construction III

Let $R' = GR(p^{3r}, p^3)$ be a Galois ring of order p^{3r} and characteristic p^3 . Let U and V be finitely generated R' -modules with the generating sets $\{u_1, u_2, \dots, u_s\}$ and $\{v_1, v_2, \dots, v_t\}$ respectively such that s and t are the number of elements in the generating sets. Suppose $t = \frac{s(s+1)}{2}$ for a fixed s , $R = R' \oplus \sum_{i=1}^s R'u_i \oplus \sum_{i,j=1}^s R'u_i u_j$ is an additive abelian group. Define multiplication on R by

$$(x_o + \sum_{i=1}^s x_i u_i + \sum_{i,j=1}^s x_j u_i u_j)(y_o + \sum_{i=1}^s y_i u_i + \sum_{i,j=1}^s y_j u_i u_j) =$$



$$x_0 y_0 + \sum_{i=1}^s ((x_0 + pR')y_i + x_i(y_0 + pR')^{\sigma_i})u_i + \sum_{i,j=1}^s (x_0 y_j + x_j(y_0)^{\sigma_i}) + \sum_{i,j=1}^s a_{ij} x_i (y_j)^{\sigma_i} u_i u_j.$$

The multiplication given turns R into a commutative ring with identity $(1, 0, \dots, 0, \bar{0}, \dots, \bar{0})$ if $\sigma_i = id_{\mathbb{F}}$. From this multiplication, the set $Z(R)$ of zero divisors satisfy the following properties;

- (i) $Z(R) = pR' \oplus \sum_{i=1}^s R'u_i + \sum_{i,j=1}^s R'u_i u_j,$
- (ii) $(Z(R))^2 = p^2 R' \oplus \sum_{i,j=1}^s R'u_i u_j,$
- (iii) $(Z(R))^3 = (0).$

For the rings considered in this section, $\sigma_i = id_{\mathbb{F}}$.

5.2 The Graphs $\Gamma(R)$ and Matrices from Classes of Rings in Construction III

Proposition 5.1. *Given R , the ring of Construction III and $\Gamma(R)$ be the associated zero divisor graph. Then for any prime integer $p, r \in \mathbb{Z}^+$ and s -fixed.*

(i) $|V(\Gamma(R))| = p^{\binom{s^2+5s+4}{2}r} - 1.$

(ii) $\Delta(\Gamma(R)) = p^{\binom{s^2+5s+4}{2}r} - 2$ and $\delta(\Gamma(R)) = p^{\binom{s^2+5s}{2}r}.$

(iii) $\Gamma(R)$ is incomplete.

(iv) $\text{diam}(\Gamma(R)) = 2.$

(v) $\text{girth}(\Gamma(R)) = 3.$

Proof. (i) Since $\text{char}(R) = p^3$, $|R'| = p^{3r}$ and $|pR'| = p^{2r}$. Consider $pu_i = 0$ for $i = 1, 2, \dots, s$ and $|R'u_i u_j| = p^r, i, j = 1, 2, \dots, s$ we have that $|Z(R)| = p^{\binom{s^2+5s+4}{2}r}$ and $|Z(R) \setminus \{0\}| =$

$$|(Z(R))^*| = |V(\Gamma(R))| = p^{\binom{s^2+5s+4}{2}r} - 1.$$

(ii) Let $\gamma_1, \gamma_2, \dots, \gamma_r \in R'$ with $\gamma_1 = 1$ such that $\bar{\gamma}_1, \dots, \bar{\gamma}_r \in R'$ forms a basis for R' over

its prime subfield R'/pR' . From the multiplication defined on R , $Ann(Z(R)) = \{p^2r_0 + \sum_{i=1}^s a_i\gamma_i u_i + \sum_{i=1}^s b_i\gamma_i u_i u_j | a_i, b_i \in R', a_i + b_i \cong 0(mod p)\}$. With the fact that $|V(\Gamma(R))| = p^{\binom{s^2+5s+4}{2}r} - 1$, any vertex $v_i \in Ann(Z(R))^*$ is of degree $p^{\binom{s^2+5s+4}{2}r} - 2$ due to avoidance of self loop. Hence the maximum degree $\Delta(\Gamma(R))$. Partitioning $V(\Gamma(R))$ into disjoint subsets V_1 and V_2 such that $V_1 = \{v_i | v_i \in Ann(Z(R))^*\}$ and $V_2 = \{v_j | v_j \notin Ann(Z(R))^*\}$, $|V_1| = p^{\binom{s^2+5s}{2}r}$. This implies that the vertices of minimum degree are only adjacent to $v_i \in Ann(Z(R))^*$ and since $|V_1| = p^{\binom{s^2+5s}{2}r}$, $\delta(\Gamma(R)) = p^{\binom{s^2+5s}{2}r}$.

(iii) to (v) are clear. □

The results in the sequel describe the algebraic properties of the matrices associated with $\Gamma(R)$ of the ring in Construction III.

Proposition 5.2. *Given $[A]_{p^{\binom{s^2+5s+4}{2}r-1}}$ and $[L]_{p^{\binom{s^2+5s+4}{2}r-1}}$, the adjacency and Laplacian matrices of $\Gamma(R)$ respectively for the ring in Construction III. Then for a prime integer $p, r \in \mathbb{Z}^+$ and s fixed,*

(i) $Det([A]_{p^{\binom{s^2+5s+4}{2}r-1}}) = Det([L]_{p^{\binom{s^2+5s+4}{2}r-1}}) = 0.$

(ii) $rank([A]_{p^{\binom{s^2+5s+4}{2}r-1}}) = p^{\binom{s^2+3s+2}{2}r} + 2$ and $rank([L]_{p^{\binom{s^2+5s+4}{2}r-1}}) = p^{\binom{s^2+5s+2}{2}r} + p^{\binom{s^2+3s+2}{2}r} + 1.$

(iii) *Eigenvalues* $\lambda[A]_{p^{\binom{s^2+5s+4}{2}r-1}} =$

$$\begin{cases} 0, & \text{of multiplicity } p^{\binom{s^2+5s+2}{2}r} + p^r + 1; \\ -1, & \text{of multiplicity } p^{\binom{s^2+3s+2}{2}r} - 2; \\ -p^{\binom{s^2+3s+2}{2}r}, & \text{of multiplicity } p^r; \\ p^{\binom{s^2+3s+2}{2}r} + p^r + 1 \pm \rho. \end{cases}$$

Where

$$\rho = \sqrt{(p^{\binom{s^2+3s+2}{2}r} + p^r + 1)^2 - (p^{\binom{s^2+5s+4}{2}r} + p^{\binom{s^2+5s+2}{2}r} + p^{\binom{s^2+3s+2}{2}r})}$$

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(iv) Eigenvalues $\lambda[L]_{p^{(\frac{s^2+5s+4}{2})r-1}} =$

$$\begin{cases} 0, & \text{of multiplicity } p^{(\frac{s^2+3s+2}{2})r} - 2; \\ 1, & \text{of multiplicity } p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s}{2})r} + 1; \\ 1 - p^{(\frac{s^2+3s+2}{2})r}, & \text{of multiplicity } p^r; \\ p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r} \pm \epsilon. & \end{cases}$$

Where

$$\epsilon = \sqrt{(p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r})^2 - (p^{(\frac{s^2+5s+4}{2})r} + 2p^{(\frac{s^2+5s+2}{2})r} + 2p^{(\frac{s^2+3s+2}{2})r} - 1)}.$$

Proof. We provide proofs for (iii) and (iv) since the steps for proofs in (i) and (ii) are clear.

(iii) Solving the determinant $|\lambda I - [A]_{p^{(\frac{s^2+5s+4}{2})r-1}}| = 0$, we obtain the characteristic polynomial equation of the form

$$-\lambda(p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s}{2})r+1})(1 + \lambda)p^{(\frac{s^2+3s+2}{2})r-2}(p^{(\frac{s^2+3s+2}{2})r} + \lambda)p^r(\lambda^2 - 2(p^{(\frac{s^2+3s+2}{2})r} + p^r + 1)\lambda + (p^{(\frac{s^2+5s+4}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r})) = 0.$$

Finding the value of λ from each factor in the above equation results to

$$-\lambda p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s}{2})r+1} = 0 \implies \lambda = 0 \text{ of multiplicity } p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s}{2})r} + 1.$$

$$(1 + \lambda)p^{(\frac{s^2+3s+2}{2})r-2} = 0 \implies \lambda = -1 \text{ of multiplicity } p^{(\frac{s^2+3s+2}{2})r} - 2 \text{ and the factor}$$

$$(p^{(\frac{s^2+3s+2}{2})r} + \lambda)p^r = 0 \implies \lambda = -p^{(\frac{s^2+3s+2}{2})r} \text{ of multiplicity } p^r.$$

The quadratic part $\lambda^2 - 2(p^{(\frac{s^2+3s+2}{2})r} + p^r + 1)\lambda + (p^{(\frac{s^2+5s+4}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r}) = 0$ can be solved as

$$\lambda = \frac{2(p^{(\frac{s^2+3s+2}{2})r} + p^r + 1) \pm \sqrt{4(p^{(\frac{s^2+3s+2}{2})r} + p^r + 1)^2 - 4(p^{(\frac{s^2+5s+4}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r})}}{2}.$$

$$= \frac{2(p^{(\frac{s^2+3s+2}{2})r} + p^r + 1) \pm \sqrt{4((p^{(\frac{s^2+3s+2}{2})r} + p^r + 1)^2 - (p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r}))}}{2}.$$

Simplifying this equation yields



$$\lambda = (p^{(\frac{s^2+3s+2}{2})r} + p^r + 1) \pm \sqrt{(p^{(\frac{s^2+3s+2}{2})r} + p^r + 1)^2 - (p^{(\frac{s^2+5s+4}{2})r} + p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s+2}{2})r})}$$

(iv) Similarly, we can provide proof for eigenvalues of $[L]_{p^{(\frac{s^2+5s+4}{2})r-1}}$ by solving the equation $|\lambda I - [L]_{p^{(\frac{s^2+5s+4}{2})r-1}}| = 0$ which results to the polynomial equation

$$-((-1 + \lambda)p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s}{2})r+1} \lambda p^{(\frac{s^2+3s+2}{2})r-2} ((p^{(\frac{s^2+3s+2}{2})r} - 1) + \lambda))^p (\lambda^2 - 2(p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r}) \lambda + (p^{(\frac{s^2+5s+4}{2})r} + 2p^{(\frac{s^2+5s+2}{2})r} + 2p^{(\frac{s^2+3s+2}{2})r} - 1)) = 0.$$

Solving the equation leads to $(-1 + \lambda)p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s}{2})r+1} = 0 \implies \lambda = 1$ of multiplicity

$p^{(\frac{s^2+5s+2}{2})r} + p^{(\frac{s^2+3s}{2})r+1}$, $\lambda p^{(\frac{s^2+3s+2}{2})r-2} = 0 \implies \lambda = 0$ of algebraic multiplicity $p^{(\frac{s^2+3s+2}{2})r-2}$.

2. Similarly, $((p^{(\frac{s^2+3s+2}{2})r} - 1) + \lambda)^{p^r} = 0 \implies \lambda = 1 - p^{(\frac{s^2+3s+2}{2})r}$ of multiplicity p^r . The quadratic part

$\lambda^2 - 2(p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r}) \lambda + (p^{(\frac{s^2+5s+4}{2})r} + 2p^{(\frac{s^2+5s+2}{2})r} + 2p^{(\frac{s^2+3s+2}{2})r} - 1) = 0$ can be solved as follows;

$$\begin{aligned} \lambda &= \frac{2(p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r}) \pm \sqrt{4(p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r})^2 - 4(p^{(\frac{s^2+5s+4}{2})r} + 2p^{(\frac{s^2+5s+2}{2})r} + 2p^{(\frac{s^2+3s+2}{2})r} - 1)}}{2} \\ &= \frac{2(p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r}) \pm \sqrt{(p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r})^2 - (p^{(\frac{s^2+5s+4}{2})r} + 2p^{(\frac{s^2+5s+2}{2})r} + 2p^{(\frac{s^2+3s+2}{2})r} - 1)}}{2} \\ &= (p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r}) \pm \epsilon. \end{aligned}$$

where $\epsilon = \sqrt{(p^{(\frac{s^2+3s+2}{2})r} + p^{(\frac{s^2+3s}{2})r})^2 - (p^{(\frac{s^2+5s+4}{2})r} + 2p^{(\frac{s^2+5s+2}{2})r} + 2p^{(\frac{s^2+3s+2}{2})r} - 1)}$. □

6 Conclusion

This research has succeeded in representing the zero divisor graphs $\Gamma(R)$ from classes of 3-radical zero completely primary finite rings using the Adjacency, Laplacian and Distance Matrices which have been analyzed for some of their algebraic properties.



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Effect of Procurement Planning on Organizational Performance Within the Public Sector: A Case of Ruhengeri Referral Hospital in Musanze District, Rwanda

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ABSTRACT

Public entities in Rwanda spend a significant amount of money on procurement. This is the process of acquiring goods, works, or services from a vendor. The general objective of this study was to assess the effect of procurement planning on organizational performance within the public sector. Specifically, the study assessed the effect of needs assessments in procurement planning on performance of Ruhengeri referral hospital, analyze the effect of quality specification in procurement planning on performance of Ruhengeri referral hospital, examine the effect of cost estimation in procurement planning on performance of Ruhengeri referral hospital and assess the effect of terms of payment in procurement planning on performance of Ruhengeri referral hospital. Research was guided by Resource Based viewpoint theory and Transaction Cost Economics theory. Descriptive research design was adopted in this research. This study has taken 106 populations who have direct works related to procurement planning functions from Ruhengeri referral hospital and reporting health centers (42 working at Ruhengeri referral hospital main location and 64 from 12 health centers under management of Ruhengeri referral hospital). The researcher has determined that due to the small population size, a census inquiry method employed instead of sampling. This study used both primary and secondary data, and each has its specific instruments for collection including questionnaire, documentary and interview. Here the researcher tends to interpret frequency, percentages, mean, and standard deviation, as results of Statistical Package for Social Scientists (SPSS) version 20 while content analysis used to analyze qualitative data. The Model Summary provides valuable observations into the effect of independent variables Terms of payment in procurement planning, Needs identification in procurement planning, Quality specification in procurement planning, Cost estimation in procurement planning on the dependent variable, organization performance. The findings revealed the coefficient of determination (R Square), which is 0.652, demonstrates that 65.2% of the variance in organizational performance of Ruhengeri Referral Hospital explained Terms of payment in procurement planning, Needs identification in procurement planning, Quality specification in procurement planning, Cost estimation in procurement planning. The results indicate the coefficient of needs identification in procurement planning (β : 0.399, p : 0.000), it shows the significant effect of needs assessments in procurement planning on organizational performance of Ruhengeri referral hospital. The results indicate the coefficient of quality specification in procurement planning (β : 0.387, p : 0.001), it shows the significant effect of quality specification in procurement planning on organizational performance of Ruhengeri referral hospital. The results indicate the coefficient of cost estimation in procurement planning (β : 0.152, p : 0.022), it shows the significant effect of cost estimation in procurement planning on organizational performance of Ruhengeri referral hospital. The results indicate the coefficient of terms of payment in procurement planning (β : 0.237, p : 0.021), it shows the significant effect of terms of payment in procurement planning on organizational performance of Ruhengeri referral hospital. It is recommended that Ruhengeri Referral Hospital continues to strengthen its needs assessment process by involving a wider range of stakeholders.

Keywords: Procurement planning, needs assessments, Quality specification, Cost estimation, Terms of payment, Organizational performance

I. INTRODUCTION

Planning in procurement is a key function in ascertaining effectiveness especially in the public sector organizations across the globe. According to Uyarra and Flanagan (2020) efficient procurement planning promotes operational efficiency in addition to contributing substantially to organizational performance. In recent decades, emphasis on the value of procurement planning within the public sector has been increasing. This is accelerated by demands for transparency, accountability, and value for money in the domain of public expenditure. Globally, numerous studies have depicted the benefits of procurement planning in boosting organizational performance. As an illustration, a number of surveys in developed nations has demonstrated that effective procurement planning contributes to cost savings, improved service delivery, and increased stakeholder fulfillment (Higiro, 2018).

Pauline (2018) noted that despite the existences of these research offering important insights, it is paramount to acknowledge the unique constraints and contexts faced by public sector organizations in Africa. In Africa, there is presence of an intricate and diverse setting featuring diverse levels of economic development encompassing political



stability, and institutional capacity. In this regard, procurement planning is mostly affected by a myriad of elements, such as regulatory frameworks, governance models as well as cultural practices. In essence, Kiusya (2018) posited that effects of procurement planning on organizational performance in African nations may differ considerably from that in other economies. Notwithstanding the expanding acknowledgement of the value of procurement planning in African nations, there exists a gap in empirical research that specifically evaluates its influence on organizational performance within the public sector. Existing research mainly encompasses particular domains of procurement e.g. procurement guidelines compliance or adoption of procurement technology, instead of the wider concept of procurement planning and its effect on organizational performance.

Public entities in Rwanda spend a significant amount of money on procurement. This is the process of acquiring goods, works, or services from a vendor. Included in these tasks are the sourcing of goods, their storage and distribution, and the management of the connections between suppliers and internal clients. Organizations and government agencies utilize procurement planning to organize their buying for a certain time frame. This is done as part of preparing a budget. Every year, businesses need to set aside money to pay employees and cover operational costs. The first thing you need to do when developing a procurement strategy is this. Inaccuracies in the procurement strategy had a ripple effect on performance, preventing maximum value from being realized. Procurement strategy is complete after the procedure for contractually appointing suppliers has been outlined (Farrington, 2016).

Planning an organization-wide or individual project procurement follows the same steps. You should start by listing what you need to buy, then explain how you want to obtain it, and lastly plot out when you expect to get it. Effectiveness and efficiency are the two most important measures of an institution's success. The term efficiency refers to the rate at which inputs are translated into outputs, whereas effectiveness refers to the rate at which the system produces the intended outputs. According to Rwanda's procurement laws, all government agencies must publish an annual procurement plan detailing their goals for the next year. The purchasing organization should provide adequate budget allocation and shall observe rules controlling budget execution throughout the procurement, planning process, and production of the bidding papers. The Procurement Unit is in charge of putting up the Procuring Entity's yearly procurement strategy based on input from the many divisions, teams, and initiatives that make up the organization (Mumo, 2022).

1.1 Statement of the Problem

The procurement of goods and services in Rwanda poses numerous challenges for government departments. Despite the presence of a well-defined purchase strategy, it has been observed that certain purchasing organizations do not consistently adhere to it. The potential impact of purchasing organizations lacking the capacity to develop thorough technical specifications and comprehensive terms of reference could potentially hinder their ability to procure products and services of superior quality. Despite the existence of reference pricing on the Rwanda Public Procurement Authority (RPPA) website, it has been observed that certain procurement bodies continue to draft tender papers without prior conducting a comprehensive market research study. The reports highlight several key indicators of an acquisition process that is in need of improvement. These indicators include poor paperwork, a lengthy record-keeping operation, and improper filling practices. These factors collectively suggest that there is a lot of room for enhancement within the acquisition process (Rwanda Public Procurement Authority, 2021).

The Ruhengeri Referral Hospital encounters various challenges, such as inefficiencies in the timely delivery of goods and services, deficiencies in the execution of procurement procedures, and adherence to regulations across multiple hospital departments, ultimately resulting in unexpected expenses for the public. The minimization of losses incurred in procurement spending is hindered by the inadequate implementation of procurement practices. Some organizations have been observed to exhibit an inability to adhere to designated delivery timelines, despite being granted the tender to provide medicinal supplies and office furniture. This non-compliance can be attributed to delays in payment from MINECOFIN and MINISANTE, thereby preventing the fulfillment of procurement procedures and subsequent adherence to specified requirements. It has been observed that there is an ongoing concern about delayed invoicing, primarily attributed to the RSSB (Rwanda Social Security Board). This persistent problem has had a negative effect on the overall performance of Ruhengeri Referral Hospital (Ruhengeri Referral Hospital, 2022).

Many studies were conducted on procurement strategies and process roles on organizational performance, but few studies conducted on the effect of procurement planning toward organization performance, among these also few conducted specific on public sector and no specific study was conducted to investigate the real causes of these irregularities in procurement planning at Ruhengeri Referral Hospital. Thus, this study intends to assess the effect of procurement planning on organizational performance within the public sector, a case of Ruhengeri referral hospital, in Musanze District, Rwanda.



1.2 Research Objectives

- i. To assess the effect of needs assessments in procurement planning on organizational performance of Ruhengeri referral hospital.
- ii. To analyze the effect of quality specification in procurement planning on organizational performance of Ruhengeri referral hospital.
- iii. To examine the effect of cost estimation in procurement planning on organizational performance of Ruhengeri referral hospital.
- iv. To assess the effect of terms of payment in procurement planning on organizational performance of Ruhengeri referral hospital.

1.3 Research Hypotheses

The study was guided by the following null hypotheses;

- H₀₁** There is no significant effect of needs assessment in procurement planning on organizational performance of Ruhengeri referral hospital.
- H₀₂** There is no significant effect of quality specification in procurement planning on organizational performance of Ruhengeri referral hospital.
- H₀₃** There is no significant effect of cost estimation in procurement planning on organizational performance of Ruhengeri referral hospital.
- H₀₄** There is no significant effect of terms of payment in procurement planning on organizational performance of Ruhengeri referral hospital.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study has adopted two theories theory which are Resource Based viewpoint theory and Transaction Cost Economics theory. The resource-based viewpoint theory is important as procurement relay on required resources which needed by organization to ensure better functions toward improved performance. The modern theory is referred to the extent to which organizations follow the modern technology and science to reach its performance. Thus, modernization is a common characteristic of 21st century, which is adopted by all types of organizations in the world.

2.1.1 Resource Based Viewpoint Theory

According to Resource Based Viewpoint Theory (RBV), an organization's success is largely dependent on the resources at its disposal. When the firm puts its strengths to use, it may gain a competitive edge that might last for years. The purpose of RBV in procurement planning is to justify the priority that the organization places on the procurement process and the essential functions of the period in question so that it can fulfill its obligations and accomplish its objectives. The foundation of outsourcing is a company's need to compensate for a deficiency in-house by contracting with an external supplier of valuable, rare, unique, and well-organized resources and competencies. In outsourcing context, the success of a firm or its failure in the economy is influenced by various elements. In the words of Brammer (2022) the ability of a firm to adopt strategies such as innovation, consistent improvement in addition to preserving its connection with external elements is paramount in maintaining its competitive edge.

Presently, this study emphasizes on elucidating corporate strategy through the lens of resource-based view (RBV) theory. French (2019) highlighted that a company's strategy describes the correlation between its external environment with its internal capacities and resources. In this regard, a firm is obligated to undergo restructuring, embrace modern technology and invest in resourceful human capital to align with this new economic setting. As such RBV technique is concerned with a company's internal settings for instance assets and strengths as a way of enhancing its competitiveness. The RBV method explains how businesses gain and maintain a competitive edge by accumulating and using resources effectively (Ahmed, 2019).

A company is a collection of growth-inducing resources and practices. An organization's competitive edge originates in its better resources, according to the resource-based view. Planning for acquisitions is the sole place where a company's strategy may be articulated in relation to its available resources (Kipkorir, 2018). Only 'valued, uncommon, imperfectly imitable, and non-substitutable' resources, as defined by the RBV, may provide a company with a lasting competitive advantage. A company's ability to accumulate greater profits via product differentiation rests on the premise that it has distinctive sets of resources and related competencies that are difficult for rivals to replicate. Specialized assets guarantee financial success, broaden commercial prospects, and boost company efficiency. Plant and equipment are examples of physical resources; administrative and technical personnel are examples of human resources; and knowledge and experience are examples of organizational resources.



To have a competitive edge, you need more than only rare or special assets. The capacity to deploy such resources is something that may be acquired and established via procurement planning. Brammer (2022) defines a capacity as a collection of competencies owned by an individual or group that permits use of an asset to achieve a competitive advantage. While resources are necessary to build capabilities, such capabilities are what ultimately give a company a leg up in the marketplace. Scholars in the field of strategic management are still interested in the correlation between an organization's resources and competencies and its competitive advantage. The strategy's focus is on gaining a competitive edge by making the most of the company's resources and strengths. Strategic practitioners must address resource-related concerns. Sustained competitive advantage occurs when one firm's operations consistently outperform those of its rivals due to the superior use of the firm's resources, whether through greater cost efficiency or greater originality (Higiroy, 2021).

In the context of procurement planning and organizational performance in the public sector, the RBV perspective suggests that effective procurement planning is a source of valuable resources (e.g., cost-effective supply chains, skilled personnel) that contribute to improved organizational performance.

2.1.2 Transaction Cost Economics theory

Transaction Cost Economics (TCE) is a theory developed by Ronald H. Coase, an economist and Nobel laureate, in his seminal paper titled "The Nature of the Firm," published in 1937. Coase's work on TCE fundamentally changed the way economists and scholars in related fields thought about the organization of economic activities within firms and markets (Miguel, 2021).

Transaction cost economics is understood as alternative modes of organizing transactions (governance structures such as markets, hybrids, firms, and bureaus) that minimize transaction costs. Transaction cost theory posits that the optimum organizational structure is one that achieves economic efficiency by minimizing the costs of exchange. The theory suggests that each type of transaction produces coordination costs of monitoring, controlling, and managing transactions (Gianfaldoni, 2021).

In the context of procurement planning and organizational performance in the public sector, TCE provided understandings into the make-or-buy decision and the choice of governance mechanisms.

2.2 Empirical Review

Empirical review involves the systematic examination and analysis of existing empirical studies, research articles that have been conducted by other researchers on a specific topic.

2.2.1 Needs Assessments in Procurement Planning

According to a study by Kipler and Keitany (2018), the effectiveness of the company's suppliers is now crucial to its survival. Many companies and academics have looked into the question of what factors impact supplier performance, both favorably and adversely. However, the procurement processes in underdeveloped nations like Kenya have been the subject of relatively little research. Weak legislative framework and lack of expertise among public procurement practitioners have been hallmarks of Kenya's public procurement system. The research strategy used in this study was explanatory. A total of 119 suitable vendors were selected as the sample size. Self-administered questionnaires and interview schedule instructions were utilized to compile the data for this study's census of the suppliers. Descriptive statistics were used for data analysis. According to the data collected, planning has several benefits, including improved efficiency, lower costs, higher quality, more efficient use of resources, faster decision making, and more creative solutions to problems. Suppliers' effectiveness in providing services is improved when procurement planning is used.

Ahmed (2019) research was to find out how strategic procurement planning affected the procurement results of state-owned companies in Mombasa County, Kenya. The research set out to examine the relationships between the processes of determining what help is needed, how that help is prioritized, how much help is needed, and how it is procured. The study utilized a descriptive design, and the sample was drawn using a stratified random sampling process to ensure it was really representative of the community at large. Specifically, 204 individuals were picked out of 34 state enterprises in Mombasa County, including both middle and senior level staff. At the 95% confidence level, the sample size of 135 indicated statistical significance. Primary data was collected by questionnaires sent to the various divisions, such as procurement, finance, human resources and administration, operations, engineering, and legal. The relationship between the dependent and independent variables was determined by descriptive analysis using SPSS version 24. To assess the strength of the link between independent and dependent variable, both multivariate regression analysis and Pearson correlation coefficient (r) were adopted. Frequency tables, Percentages and a central tendency table were utilized to present quantitative analysis of the study outcomes. In the County of Mombasa, Kenya, government companies were observed to benefit significantly as a result of pointing out their requirements during procurement. It



was determined that the procurement performance of state companies in Mombasa County, Kenya, was significantly impacted by the procurement budget cost and projections. At the end, study summarized that suppliers had to avail adequate resources in order to instruct their technical personnel if they desired to supply high-quality products. Similarly, the research noted that adequate and consistent enforcement of assessment audit procedures by state bodies in Kenya, was a clear indication that they dealt with expert personnel and traders.

2.2.2 Quality Specification in Procurement Planning

Higiro (2021) carried out research in Kicukiro District, Rwanda to assess how Strategic Procurement Planning boosted state agencies effectiveness. As such, procurement strategy needs to be established by a state body before bids are awarded in Rwanda. Errors and inconsistencies during procurement certainly brings a ripple effect regarding success, blocking maximum benefit from being achieved. In this regard, current research purpose was to assess procurement planning and its impact on the performance of the public sector in Kicukiro District region in Rwanda. The study used an explanatory research approach, and the sample size was 258 full-time workers. One of the most important indicators of improving public institution performance was found to be the timely and accurate assessment of requirements. The results strongly support the researcher's conclusion that the efficiency of public entities may be improved via the use of recognizing needs and tendering procedures. The research suggests that in order to boost Kicukiro District's performance, tendering techniques should be prepared by identifying demands, constructing a tendering procedure, estimating the budget, and including the user unit.

Uyarra and Flanagan (2020) assessed public procurement, innovation and industrial policy: Rationales, roles, capabilities and implementation. The study takes a single case study approach, our case being the progressive institutionalization of PPI as an element of regional innovation policy in Galicia over time. In its 2009 strategic plan, the Health Service of Galicia (SERGAS), serving 95% of the Galician population and representing more than 40% of the regional government budget, indicated that the financial crisis would have direct consequences on its performance, and that innovation in new healthcare processes and new partnerships would be needed if the region was to respond to the needs. There is an argument that innovation policy should steer economic transformation in socially desirable directions.

2.2.3 Cost Estimation in Procurement Planning

Lagoze (2016) conducted research to determine the impact of procurement packaging on value of money for a sample of Ghanaian manufacturing firms. A total of 346 participants, including both technical and supervisory employees, were surveyed using a descriptive survey approach. Regression analysis was utilized to determine that procurement packing had a meaningful impact on value of money. The study found that value for money is significantly affected when procurement needs are clustered together within a procurement category for the purpose of acquiring them under a single contract, but not when procurement needs are broken up into multiple lots.

Research done by Naibor and Morongry (2018), examined the contribution of procurement process on the performance of public institutions. The study used secondary data and was qualitative in nature. The study established strategies to reduce cost and via involvement in strategic supplier choice process and procedure. The study demonstrated that supplier assessment and identification, even follow up refers to an instrument that gives the procuring organ the capacity to know the right supplier to achieve their expected target. These findings are relevant to this study as they suggest that the procurement process plays a crucial role in ensuring the access to quality products and services, which in turn can influence the financial performance of public institutions.

2.2.4 Terms of Payment in Procurement Planning

Research conducted by Erick (2017) the function of procurement is essential to every business. It allows all parties involved to get together and talk about procurement goals and needs. Organizational performance at Moi Teaching and Referral Hospital in Eldoret, Kenya was examined to determine the impact of tendering processes. Case study research was used to gather data for this investigation. There were 3,600 total responders with a sample size of 384. Multiple sampling strategies, including stratified and plain random, were used. The most common method of collecting information was via questionnaires. Based on the data, it was determined that e-tendering is positively associated with company success (P.0001). The degree of correlation was high. The results of the investigation showed that performance was unrelated to tendering. In order to improve performance, the research suggests strongly enforcing procurement laws that favor tendering.

Kiusya (2018) investigated the impact of procurement procedures on the operational performance of manufacturing enterprises located in Mombasa County. The research aimed to ascertain the e-procurement methods used by manufacturing businesses in Mombasa County and to analyze the impact of these practices on the operational performance of said enterprises in the same county. The research approach used in this study was a cross-sectional



descriptive survey. The target population consisted of 41 manufacturing enterprises located in Mombasa County. The research used primary data that was collected using a standardized questionnaire. The findings of the study on e-procurement practices and operational performance indicate that e-procurement procedures were responsible for 79.8% of the variability seen in the total operational performance of manufacturing enterprises located in Mombasa. Significantly, the findings of the study demonstrated a favorable and substantial impact of e-tendering and e-payment on operational performance. Based on the aforementioned data, it can be concluded that the appropriate implementation of e-procurement processes has a generally favorable and statistically significant impact on the operational performance of manufacturing companies. The research primarily discovered that the impact of e-tendering and e-payment on the operational performance of manufacturing enterprises was both favorable and statistically significant. Hence, based on the findings of this research, it is advised that manufacturing businesses increasingly use e-tendering and e-payment methods due to their significant and favorable impact on the operational performance of such organizations.

III. METHODOLOGY

3.1 Research Design

The researcher conducted descriptive research design. Descriptive survey research use surveys to collect information on a variety of issues, quantitative and qualitative approach used for data collected with questionnaire and correlational studies research design examined at the links that exist between variables under the study.

3.2 Study Population and Sample Size

The population is defined as the total collection of elements about which wish to make a sum. This study has taken 106 populations who have direct works related to procurement planning functions from Ruhengeri referral hospital and reporting health centers (42 working at Ruhengeri referral hospital main location and 64 from 12 health centers under management of Ruhengeri referral hospital) and the total population is 106 populations.

Therefore, the researcher has chosen to employ a census inquiry approach instead of sampling because the population they are studying is relatively small in size. In this approach, the researcher intends to gather data from every single individual or unit within that population, rather than picking a smaller subgroup through sampling. By taking this approach, the researcher aims to achieve a precise and all-encompassing grasp of the entire group in the study.

3.3 Data Collection Instruments

Data Collection Instruments are tools or techniques used to gather information and data for research purposes. In this study, questionnaires were used to gather primary data. Ruhengeri referral hospital and reporting health centers served as the primary sources. Textbooks, journals, publications, and websites that discuss the subject served as secondary data sources. Questionnaires contained some study-related questions that were the same for everyone in order to collect data.

3.4 Data Analysis Method

Data analysis involves reducing the accumulated data to a manageable size, developing summaries, researching patterns and applying statistical techniques, while data preparation includes editing, coding and data entry. Data coding involves assigning numbers or other symbols to responses. Data entry converts information gathered by secondary or primary methods into a medium for visualization and manipulation. Version 22.0 of the Statistical Package for Social Science (SPSS) was used as a tool to analyze the data.

IV. FINDINGS & DISCUSSIONS

4.1 Response Rate

This chapter focuses on the analysis of the data gathered from 106 Ruhengeri referral hospital and reporting health centers workers. The data are presented in tables and then analyzed. Table 1 below shows that the response rate was 85%. This was realized through the premise that the response received was considered to be adequate.

Table 1

Response Rate

Responses	Number of questionnaires	Response Rate
Returned questionnaires	90	85%
Unreturned questionnaires	16	15%
Total	106	100%



4.2 The Effect of Needs Assessments in Procurement Planning on Organizational Performance of Ruhengeri Referral Hospital

The first objective of the study was to evaluate the effect of needs assessments in procurement planning on organizational performance of Ruhengeri referral hospital. The results are summarized in Table 2, which includes frequencies, percentages, mean, and standard deviation.

Table 2

The Effect of Needs Assessments in Procurement Planning on Organizational Performance of Ruhengeri Referral Hospital.

Statement	SD		D		N		A		SA		Mean	Std. Dev.
	fi	%	fi	%	fi	%	fi	%	fi	%		
The procurement planning process at Ruhengeri referral hospital adequately identifies the organization's needs.	6	5.7	4	3.8	6	5.7	42	39.6	48	45.3	4.15	1.08
The needs assessment in procurement planning is conducted in a systematic and structured manner at Ruhengeri referral hospital.	3	2.8	3	2.8	10	9.4	48	45.3	42	39.6	4.16	0.92
The input from relevant stakeholders is considered in the needs assessment stage of procurement planning.	4	3.8	7	6.6	7	6.6	46	43.4	42	39.6	4.08	1.03
The identified needs in procurement planning align with the overall goals and objectives of Ruhengeri referral hospital.	4	3.8	4	3.8	7	6.6	63	59.4	28	26.4	4.01	0.91
The needs assessment in procurement planning helps in identifying potential gaps and shortcomings in the hospital's resources.	6	5.7	8	7.5	17	16.0	39	36.8	36	34.0	3.86	1.14
Ruhengeri referral hospital takes into account the urgency and priority of different needs during procurement planning.	5	4.7	7	6.6	6	5.7	53	50.0	35	33.0	4.00	1.04
Overall											4.04	1.02

The data from Table 2 provides observations into the impact of needs assessments in procurement planning on the organizational performance of Ruhengeri Referral Hospital. This examination reveals that the hospital's procurement planning process effectively identifies organizational needs, with 5.7% strongly disagreeing, 3.8% disagreeing, 5.7% being neutral, 39.6% agreeing, and 45.3% strongly agreeing in the first statement. Outcomes revealed a mean rating for this argument to be 4.15. Similarly, a standard deviation of 1.08 revealed a high mean with corresponding diverse responses.

In regards to the second sentence, emphasizing on systematic and modeled requirements assessments, a mean rating (4.16) is revealed. Also, a standard deviation (0.92) is depicted, demonstrating an elevated mean with less divergent opinions. The third statement highlights the consideration of input from relevant stakeholders during needs assessment, with a mean rating of 4.08 and a standard deviation of 1.03, reflecting a high mean with heterogeneous responses. The alignment of identified needs with hospital goals, as indicated in the fourth statement, is reflected in the ratings of 3.8% strongly disagreeing, 3.8% disagreeing, 6.6% being neutral, 59.4% agreeing, and 26.4% strongly agreeing. The mean rating is 4.01 with a standard deviation of 0.91, representing a high mean with less heterogeneous responses. Moving on to the fifth statement, which addresses the identification of potential gaps, a mean rating of 3.86 with a standard deviation of 1.14 is observed, indicating a high mean with heterogeneous responses.

Finally, the sixth statement confirms the hospital's consideration of urgency and priority, with 4.7% strongly disagreeing, 6.6% disagreeing, 5.7% being neutral, 50.0% agreeing, and 33.0% strongly agreeing. A mean of 4.00 in addition to a standard deviation of 1.04 illustrates enhanced mean with heterogeneous answers. Aggregate mean for the entire statements in Table 4.5 above is 4.04. The calculated standard deviation is 1.02. Both data and interpretations offer beneficial insights concerning impacts of needs assessments particularly on the organizational performance of Ruhengeri Referral Hospital.

Research outcomes concur with Higiho (2021) analysis he performed in Rwanda which demonstrated the crucial function of strategic procurement planning in boosting efficiency of state bodies. This takes place while pointing out needs, creating procedures in tendering and budget approximation. This is aided by procurement planning which substantially impacts performance of the organization. Conclusions of this current study are relevant in all sectors,



stressing the benefit of both needs assessment and strategic procurement planning in maximizing allocation of resources, effectiveness in operations, and its entire performance.

4.3 Impact of Quality Specification in Procurement Planning on Ruhengeri Referral Hospital Organizational Performance

The second research goal was to examine the influence of quality specification in procurement planning on Ruhengeri Referral Hospital organizational performance. Table 3 below depicts the research outcomes, which presents observations through utilization of frequencies, percentages, mean values, and standard deviations.

Table 3

Impact of Quality Specification in Procurement Planning on Ruhengeri Referral Hospital Organizational Performance

Statement	SD		D		N		A		SA		Mean	Std. Dev.
	fi	%	fi	%	fi	%	fi	%	fi	%		
The quality specification in procurement planning of Ruhengeri referral hospital.	4	3.8	8	7.5	14	13.2	41	38.7	39	36.8	4.01	1.11
Ruhengeri referral hospital considers international quality standards when defining procurement specifications.	9	8.5	11	10.4	7	6.6	45	42.5	34	32.1	3.94	1.03
The quality requirements in procurement planning focus on achieving optimal performance and safety of goods/services.	12	11.3	5	4.7	11	10.4	48	45.3	30	28.3	3.62	1.25
Quality specifications are adequately communicated to potential suppliers during the procurement process.	8	7.5	13	12.3	9	8.5	42	39.6	34	32.1	3.79	0.86
Ruhengeri referral hospital ensures that quality specifications do not create unnecessary barriers to competition among suppliers.	2	1.9	12	11.3	8	7.5	57	53.8	27	25.5	3.83	0.88
The hospital's procurement team regularly monitors and enforces adherence to quality standards during the procurement process.	3	2.8	7	6.6	8	7.5	68	64.2	20	18.9	4.03	0.90
Overall											3.87	1.00

Table 3 above illustrates findings on the impact of quality specification in Ruhengeri Referral Hospital procurement planning on its organizational performance. Research outcomes depict that the hospital focuses on quality in its procurement procedures. Regarding the opening statement, 3.8% of the respondents strongly disagree, while only 7.5% disagree. Findings also revealed that 13.2% were neutral and 38.7% agreed to the statement. 36.8% of the participants strongly agreed with the statement that quality specifications hold a central function. Collectively, it accumulated a mean rating of 4.01, demonstrating a high mean. At the same time, a standard deviation of 1.11 alludes to heterogeneous perceptions. Similarly, the second statement, which focuses on Ruhengeri Referral Hospital's consideration of international quality standards, yields a mean rating of 3.94 with a standard deviation of 1.03, indicating a high mean alongside heterogeneous responses.

The third statement, centered on quality requirements for optimal performance and safety, generates a mean rating of 3.62 with a standard deviation of 1.25, also representing a high mean and heterogeneous responses. Moving on to the fourth statement, which concerns transparent communication of quality specifications to potential suppliers, 7.5% strongly disagree, 12.3% disagree, 8.5% are neutral, 39.6% agree, and 32.1% strongly agree, resulting in a mean rating of 3.79 and a standard deviation of 0.86, indicating a high mean and heterogeneous responses. The fifth statement indicates the hospital's commitment to fair competition by ensuring quality specifications don't create barriers, with 1.9% strongly disagreeing, 11.3% disagreeing, 7.5% being neutral, 53.8% agreeing, and 25.5% strongly agreeing. This results in a mean rating of 3.83 and a standard deviation of 0.88, reflecting a high mean and heterogeneous responses.

Lastly, the sixth statement validates the hospital's vigilance in maintaining quality standards, where 2.8% strongly disagree, 6.6% disagree, 7.5% are neutral, 64.2% agree, and 18.9% strongly agree. It gave a mean value of 4.03 in addition to a standard deviation of 0.90. This denoted to increased mean and divergent opinions. Total mean value for the quality specification arguments is 3.87, together with a standard deviation of 1.00. Research outcomes demonstrated dedication of the hospital to quality specification. It also availed an in-depth comprehension of the manner in which it affects organizational performance of Ruhengeri Referral Hospital.



Results from this research conform with Monczka et al. (2019) who posited that quality specifications possess core function in procurement procedures. From this study, specifications illustrate clearly that specific quality characteristics and standards of performance expected from realized products and services. Encompassing this form of criteria results in procurement processes being impartial. It aids in determining and selecting suppliers, ascertaining conformity to expected levels of quality.

4.4 Impacts of Cost Estimation in Procurement Planning on Ruhengeri Referral Hospital Organizational Performance

The third research aim emphasized on assessing the influence of cost estimation in procurement planning on Ruhengeri Referral Hospital organizational performance. Outcomes are illustrated in Table 4 below, presenting findings into the issue through utilization of frequencies, percentages, mean values, and standard deviations.

Table 4
Cost Estimation Impact In Procurement Planning On Ruhengeri Referral Hospital Organizational Performance

Statement	SD		D		N		A		SA		Mean	Std. Dev.
	fi	%	fi	%	fi	%	fi	%	fi	%		
The cost estimation process in procurement planning is accurate and based on reliable data at Ruhengeri referral hospital.	4	3.8	11	10.4	7	6.6	42	39.6	42	39.6	3.97	1.07
Ruhengeri referral hospital considers both direct and indirect costs in the procurement cost estimation.	3	2.8	10	9.4	11	10.4	48	45.3	34	32.1	3.79	1.24
Cost estimates in procurement planning are realistic and align with the prevailing market rates.	9	8.5	14	13.2	13	12.3	42	39.6	28	26.4	3.75	1.24
The hospital conducts a thorough analysis of cost variations and fluctuations when estimating procurement expenses.	3	2.8	6	5.7	16	15.1	66	62.3	15	14.2	3.76	1.24
The procurement team seeks cost-saving opportunities without compromising the quality of goods/services.	3	2.8	8	7.5	9	8.5	70	66.0	16	15.1	3.90	0.98
Ruhengeri referral hospital ensures transparency and accountability in cost estimation during the procurement process	2	1.9	6	5.7	11	10.4	55	51.9	32	30.2	3.90	0.88
Overall											3.85	1.11

Table 4 above depicts outcomes on influence of cost estimation in Ruhengeri Referral Hospital procurement planning on its organizational performance. Study outcomes demonstrates that the hospital is committed to precise and cost-efficient estimation procedures. Regarding the first sentence, only 3.8% participants strongly disagree, with the statement. Moreover, 10.4% of the respondents disagreed, while 6.6% were neutral concerning the argument. At the same time, 39.6% agreed with the statement while 39.6% strongly agreed that procedures in cost estimation are precise and reliable. This outcome of results showed a mean value of 3.97, revealing a high mean. Standard deviation of 1.07 is an indication of diverse opinions, demonstrating different perceptions. Likewise, the hospital stressed on conforming estimates of costs with real rates in the market is evident. Concerning the second argument, only a partly 2.8% who strongly disagreed, while 9.4% participants disagreed. Additionally, 10.4% responded neutral, and majority with 45.3% agreed. From the findings, 32.1% strongly agreed. The outcomes revealed a mean value of 3.79, indicating a big mean. Standard deviation of 1.24 illustrates divergent answers, highlighting different perceptions.

Concerning the third argument, which was on hospital's emphasis's on prioritizing accurate cost estimation for both direct and indirect costs, only 8.5% who strongly disagreed, 13.2% disagreeing, 12.3% being neutral, 39.6% agreeing, and 26.4% strongly agreeing, the mean rating is 3.75, suggesting a high mean. The standard deviation of 1.24 indicates heterogeneous responses. The hospital's diligence in analyzing cost variations is evident in the fourth statement, where 2.8% strongly disagree, 5.7% disagree, 15.1% are neutral, 62.3% agree, and 14.2% strongly agree. The mean rating of 3.76 represents a high mean, and the standard deviation of 1.24 indicates heterogeneous responses. The fifth statement emphasizes the hospital's pursuit of cost-saving opportunities without compromising quality. With 2.8% strongly disagreeing, 7.5% disagreeing, 8.5% being neutral, 66.0% agreeing, and 15.1% strongly agreeing, the mean rating is 3.90, reflecting a high mean. The standard deviation of 0.98 suggests somewhat heterogeneous responses.

The sixth statement indicates the hospital's commitment to transparency and accountability in cost estimation. Where 1.9% strongly disagree, 5.7% disagree, 10.4% are neutral, 51.9% agree, and 30.2% strongly agree, the mean



rating is 3.90, indicating a high mean. The standard deviation of 0.88 reflects heterogeneous responses. The combined mean rating for all cost estimation statements is 3.85, with a standard deviation of 1.11. This indicates that respondents generally perceive the hospital's cost estimation practices positively, although opinions are somewhat diverse. The hospital's dedication to accurate cost estimation practices is evident, and these practices likely contribute to the hospital's overall organizational performance.

As outlined in a study authored by Choudhury and Shankar (2019), proficient cost estimation within a procurement plan entails precisely evaluating overall expenses linked to procurement operations, covering direct and indirect costs as well as cost influencers. Embracing proficient cost estimations bolsters institutions such as Ruhengeri Referral Hospital to boost allocation of resources, control expenditures, and form well-informed choices regarding procurement strategies and preferences of suppliers. This in the end leads to improvement of the hospital's performance.

4.5 Impact of Terms of Payment in Procurement Planning on Ruhengeri Referral Hospital Organizational Performance

Regarding the fourth research goal, on determining the impact of terms of payment in procurement planning on organizational performance of Ruhengeri Referral Hospital, outcomes are depicted in Table 5 below. It presents research findings of this argument through use of frequencies, percentages, mean values, and standard deviations.

Table 5
Influence of Payment Terms in Procurement Planning on Ruhengeri Referral Hospital Organizational Performance.

Statement	SD		D		N		A		SA		Mean	Std. Dev.
	fi	%	fi	%	fi	%	fi	%	fi	%		
The payment terms offered in procurement planning are fair and reasonable for suppliers at Ruhengeri referral hospital.	0	0.0	1	.9	1	.9	48	45.3	56	52.8	4.50	0.57
Ruhengeri referral hospital negotiates payment terms that align with the financial capacity and cash flow requirements of the hospital.	4	3.8	4	3.8	3	2.8	50	47.2	45	42.5	4.21	0.95
The hospital's payment terms consider the risks and uncertainties that suppliers may face during the contract period.	0	0.0	0	0.0	1	0.9	28	26.4	77	72.6	4.72	0.47
Payment terms are communicated clearly to suppliers, leaving no room for ambiguity or misunderstanding.	1	.9	0	0.0	0	0.0	76	71.7	29	27.4	4.25	0.55
Ruhengeri referral hospital processes payments to suppliers in a timely manner as per the agreed terms.	5	4.7	2	1.9	6	5.7	71	67.0	22	20.8	3.97	0.88
The hospital considers incentivizing early delivery or completion through favorable payment terms.	1	0.9	0	0.0	1	0.9	60	56.6	44	41.5	4.38	0.61
Overall											4.34	0.67

Table 5 above depicts research outcomes on the impact of terms of payment in procurement planning on Ruhengeri Referral Hospital organizational performance. This analysis illuminates the hospital's strategies in structuring payment terms for suppliers. In the first statement, where 0.9% strongly disagree, 0.9% disagree, 45.3% are neutral, 52.8% agree, and 0.9% strongly agree, a mean rating of 4.50 is achieved, signifying a high mean. The standard deviation of 0.57 suggests heterogeneous responses, highlighting diverse viewpoints. This indicates a predominant positive perception of the fairness and reasonableness of payment terms. Similarly, the hospital's approach to negotiating payment terms is evident in the second statement. With 3.8% strongly disagree, 3.8% disagree, 2.8% are neutral, 47.2% agree, and 42.5% strongly agree, the mean rating is 4.21, indicating a high mean. The standard deviation of 0.95 suggests heterogeneous responses. This reflects varying opinions regarding the effectiveness of payment term alignment with financial capacity.

The hospital's consideration of suppliers' risks and uncertainties is highlighted in the third statement. Where 0.9% strongly disagree, 26.4% disagree, 0.9% are neutral, 47.2% agree, and 24.5% strongly agree, the mean rating is 4.72, signifying a high mean. The standard deviation of 0.47 indicates heterogeneous responses. This distribution suggests that a significant majority of respondents view the hospital's practice of factoring suppliers' challenges into payment terms positively. Payment terms communication is emphasized in the fourth statement. With 0.9% strongly disagreeing, 71.7% agree, and 27.4% strongly agree, the mean rating is 4.25, representing a high mean. The standard deviation of 0.55 suggests heterogeneous responses. This indicates a prevalent positive perspective on the clarity of payment terms communication.



The hospital's adherence to timely payments is addressed in the fifth statement. Where 4.7% strongly disagree, 1.9% disagree, 5.7% are neutral, 67.0% agree, and 20.8% strongly agree, the mean rating is 3.97, indicating a high mean. The standard deviation of 0.88 reflects heterogeneous responses. This suggests varying opinions on the hospital's adherence to timely payment practices. Lastly, the hospital's approach to incentivizing early delivery or completion through payment terms is emphasized in the sixth statement. Where 0.9% strongly disagree, 0.9% disagree, 56.6% are neutral, 41.5% agree, and 41.5% strongly agree, the mean rating is 4.38, reflecting a high mean. The standard deviation of 0.61 suggests heterogeneous responses. This distribution indicates that while a significant portion of respondents have a neutral stance, a meaningful number view the hospital's strategy to encourage timely performance through favorable payment terms positively.

The combined mean rating for all payment terms statements is 4.34, with a standard deviation of 0.67. This indicates that respondents generally perceive the hospital's payment terms practices positively, with a relatively lower degree of diversity in opinions. The hospital's dedication to structuring fair, aligned, and transparent payment terms is evident, contributing to its overall organizational performance.

Aligned with Handfield *et al.* (2019), the results highlight the notable effect of payment terms within Ruhengeri Referral Hospital's procurement plan on its overall performance. As shown in Table 4.8, the hospital's dedication to fair and reasonable payment terms significantly impacts supplier relationships. Negotiating terms that match financial capabilities improves cash flow management, reduces risks, and fosters transparent collaborations. This supports the idea that clear payment terms build trust, enhance partnerships, and contribute to the hospital's comprehensive performance.

4.6 Organizational Performance of Ruhengeri Referral Hospital

This section presents findings on the dependent variable namely organizational performance of Ruhengeri Referral Hospital.

Table 6

Descriptive Statistics on Organizational Performance of Ruhengeri Referral Hospital

	SD		D		N		A		SA		Mean	Std. Dev.
	fi	%	fi	%	fi	%	fi	%	fi	%		
The hospital consistently meets its objectives and goals, as stated in its performance indicators.	4	3.8	8	7.5	12	11.3	27	25.5	27	25.5	3.88	1.00
Ruhengeri referral hospital provides services of high quality and standards.	6	5.7	9	8.5	9	8.5	59	55.7	23	21.7	3.79	1.06
The hospital efficiently utilizes its resources to deliver healthcare services and meet patient needs.	4	3.8	4	3.8	6	5.7	69	65.1	23	21.7	3.97	0.88
The performance of Ruhengeri referral hospital positively impacts the community it serves.	1	.9	5	4.7	4	3.8	80	75.5	16	15.1	3.99	0.68
The hospital demonstrates continuous improvement and innovation in its services and operations.	5	4.7	2	1.9	4	3.8	47	44.3	48	45.3	4.24	0.97
Ruhengeri referral hospital effectively addresses and resolves challenges to maintain its performance standards.	3	2.8	1	.9	6	5.7	54	50.9	42	39.6	4.24	0.83
Overall											4.02	0.90

The data in Table 6 above depicts on the organizational performance of Ruhengeri Referral Hospital. This analysis shows the hospital's dedication to excellence across various dimensions. In the first statement, 3.8% strongly disagree, 7.5% disagree, 11.3% are neutral, 25.5% agree, and 25.5% strongly agree that the hospital consistently meets its objectives, resulting in a mean of 3.88 an indicator of a high mean. The standard deviation of 1.00 denotes heterogeneous responses, reflecting varied viewpoints. Similarly, the hospital's commitment to high-quality services is evident. The second statement reveals that 5.7% strongly disagree, 8.5% disagree, 8.5% are neutral, 55.7% agree, and 21.7% strongly agree, resulting in a mean of 3.79 an indicator of a high mean. The standard deviation of 1.06 signifies heterogeneous responses, indicating diverse opinions.

Efficient resource utilization for patient care is highlighted in the third statement. With 3.8% strongly disagreeing, 3.8% disagreeing, 5.7% neutral, 65.1% agreeing, and 21.7% strongly agreeing, the mean is 3.97 an indicator of a high mean. The standard deviation of 0.88 suggests heterogeneous responses. The positive impact on the community is emphasized in the fourth statement. With .9% strongly disagreeing, 4.7% disagreeing, 3.8% neutral, 75.5% agreeing,



and 15.1% strongly agreeing, the mean is 3.99 an indicator of a high mean. The standard deviation of 0.68 indicates heterogeneous responses.

The fifth statement indicates the hospital's commitment to continuous improvement. Responses 4.7% strongly disagree, 1.9% disagreeing, 3.8% neutral, 44.3% agree, and 45.3% strongly agreeing yield a mean of 4.24 an indicator of a high mean. The standard deviation of 0.97 suggests heterogeneous responses. Lastly, the hospital's ability to address challenges is evident in the sixth statement. Responses 2.8% strongly disagree, .9% disagreeing, 5.7% neutral, 50.9% agree, and 39.6% strongly agreeing result in a mean of 4.24 an indicator of a high mean. The standard deviation of 0.83 conveys heterogeneous responses.

The findings align with Kipkorir (2018) view that organizational performance is essential for sustained success. In the context of Ruhengeri Referral Hospital, the influence of procurement planning on performance aligns with the acknowledged importance of effective performance management. Much like research indicates, the focus on organizational performance indicates the understanding that well-thought-out procurement planning aids in attaining goals, improving communication, and yielding favorable results.

The combined mean rating for all organizational performance statements is 4.02, with a standard deviation of 0.90. This suggests that respondents generally perceive the hospital's performance positively, with varied opinions. The hospital's commitment to excellence and continuous improvement is evident, contributing to its overall organizational performance.

Table 7

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.807 ^a	.652	.638	.39251

a. Predictors: (Constant), Terms of payment in procurement planning, Needs identification in procurement planning, Quality specification in procurement planning, Cost estimation in procurement planning

The Model Summary presented in Table 7 provides valuable observations into the effect of independent variables Terms of payment in procurement planning, Needs identification in procurement planning, Quality specification in procurement planning, Cost estimation in procurement planning and the dependent variable on organization performance. The multiple correlation coefficient (R), which is 0.807, indicates a strong positive effect of the combined independent variables on organization performance. This value suggests that the selected procurement planning factors collectively have a significant influence on the hospital's overall performance. The coefficient of determination (R Square), which is 0.652, demonstrates that approximately 65.2% of the variance in organization performance can be explained by the included independent variables in the model. This meaningful value suggests a meaningful level of predictability and influence that the selected procurement planning factors have on organizational performance. Study outcomes conform with Fransman (2021) underlining on the critical benefit of a well-articulated tactic in procurement in maximizing organizational performance. The scholars underscored on the value of a relevant strategy which is in agreement with the strong favorable impact demonstrated by the multiple coefficients. Outcomes of Model Summary denotes the effect of strategic procurement planning in forming the overall success of the hospital.

Table 8

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.137	4	7.284	47.282	.000 ^b
	Residual	15.560	101	.154		
	Total	44.697	105			

a. Dependent Variable: Organizational Performance

b. Predictors: (Constant), Payment terms in procurement planning, Identification needs in procurement planning, Quality specification in procurement planning, Estimation of cost in procurement planning

Outcomes of ANOVA findings depicted in Table 8 above offer valuable illustrations into the statistical significance of the regression model. The F-value (47.282) demonstrates a substantial variation among dependent variable (Organizational Performance) means. This is pegged on the overall impact of the independent variables which are terms of payment in procurement planning, Needs identification in procurement planning, Quality specification in procurement planning, and Cost estimation in procurement planning. As such, associated level of significance (Sig.), depicted as .000, is much less than 0.05 which is the conventional threshold. This denotes that the regression model is significant statistically. It means that at least one of the independent elements has a substantial effect on the dependent



variable. This further underlines the benefit of these aforementioned factors in procurement planning in influencing performance of the organization.

Research outcomes agree with Oyedokun et al. (2021) underlining that a good-modeled procurement planning tactic encompassing the initiation of procedures in procurement, choosing appropriate kinds of contract, specification of conditions of delivery, formulation of supplier performance evaluation methods, and appropriate facets considerably leads to improvement of organizational performance. By means of meticulous planning in procurement, entailing anticipation of goods and services requirements prior to, a business entity can ascertain timely and efficient delivery. All this favorably influences entire operational efficiency and effectiveness.

Table 9

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.598	.222		2.694	.008
	Needs identification in procurement planning	.399	.082	.417	4.885	.000
	Quality specification in procurement planning	.387	.117	.389	3.323	.001
	Cost estimation in procurement planning	.152	.123	.153	1.235	.022
	Terms of payment in procurement planning	.237	.101	.238	2.348	.021

a. Dependent Variable: Organizational Performance

The coefficient measured effect size using the following regression equation: $Y=b_0+b_1x_1+b_2x_2+b_3x_3+b_4x_4+e$:

Where: Y= Organizational Performance,

b_0 = Constant;

X_1 = Needs identification in procurement planning

X_2 = Quality specification in procurement planning

X_3 = Cost estimation in procurement planning

X_4 = Terms of payment in procurement planning

The Constant term with an unstandardized coefficient of 0.598 indicates that when all the other predictor variables (such as Needs identification in procurement planning, Quality specification in procurement planning, Cost estimation in procurement planning, and Terms of payment in procurement planning) are at zero, the estimated value of Organizational Performance is 0.598. An unstandardized coefficient of 0.399 for Needs identification in procurement planning indicates that, on average, a one-unit increase in the Needs identification predictor is associated with a 0.399-unit increase in the Organizational Performance variable. Moreover, the very low significance value of 0.000 suggests that the observed effect is highly unlikely to have occurred by chance.

The coefficient of 0.387 for Quality specification in procurement planning signifies that, on average, a one-unit increase in the Quality specification predictor is associated with a 0.387 -unit increase in the Organizational Performance variable. The extremely low significance value of 0.001 indicates the high improbability of the observed effect being attributed to chance.

The coefficient of 0.152 for Cost estimation in procurement planning indicates that, on average, a one-unit increase in the Cost estimation predictor corresponds to a 0.152-unit increase in the Organizational Performance variable. The significance value of 0.022 suggests that this observed effect is statistically significant. A coefficient of 0.237 for Terms of payment in procurement planning implies that, on average, a one-unit increase in the Terms of payment predictor is linked to a 0.237-unit increase in the Organizational Performance variable. The significance value of 0.021 indicates that this relationship is statistically significant. Study outcomes are in agreement with Handfield et al. (2019) who underscored benefits of strategic needs assessment, quality standards, financial considerations, and well-articulated terms of payment. These dynamics demonstrates how effective planning in procurement endorses Handfield et al. opinion and intricately forms the performance landscape of the hospital.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

Research intended to evaluate the impact of procurement planning on organizational performance of Ruhengeri Referral Hospital. The sample size entailed 106 participants who represented different units of the hospital. Interviews and questionnaires were adopted in gathering data. A mix of both qualitative and quantitative data analysis



methodologies was utilized. The study evaluated assessment needs, specification of quality, cost estimation, and terms of payment. Research outcomes decisively rejected the null hypotheses, offering concise evidence that these procurement planning domains significantly impact the performance of the hospital. Needs assessment precisely pointed out requirements, quality specification made sure of sticking to standards, and estimation of costs informed allocation of resources. Transparent and clear terms of payment boosted supplier relationships. After in depth analysis of data gathered, research outcomes strongly reject the null hypotheses. Research provides beneficial considerations on how strategic procurement planning results in optimization of resources, conforming with goals in addition to organizational effectiveness. In this regard, Ruhengeri Referral Hospital can embrace these outcomes to promote competitiveness, management of resources, and enhanced quality healthcare. This study strongly establishes the crucial link between planning for procurement and performance. This demonstrates their important function in realizing success of the organization.

5.2 Recommendations

Recommendations are that Ruhengeri Referral Hospital should proceed to bolster its needs assessment procedures by engaging a broad range of stakeholders. This can encompass frontline healthcare staff, patients, and heads of departments. Staff in management positions should participate actively with concerned departments to consistently review and update quality specifications. Consistent quality assessment of standards would narrow possible gaps between theoretical specifications and practical enforcement and implementation.

The unit under procurement ought to concentrate on refining its cost estimation approaches by leveraging advanced cost analysis instruments and involving with financial experts. This methodology would help narrow possible gaps between estimated and actual costs, boosting accuracy of allocation of resources and avoiding deviations in budget estimates. Ultimately, research recommends that Ruhengeri Referral Hospital's management and procurement staff unit work in partnership to ascertain concise and transparent communication of terms of payment to all suppliers.

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Effect of Beneficiary Participation on Project Performance: A Case of an HIV Peer Education Project in Gicumbi District, Rwanda

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ABSTRACT

The HIV/AIDS pandemic remains a significant global health challenge, particularly in Sub-Saharan Africa, where the prevalence rates are among the highest in the world. This study investigated the impact of beneficiary participation on the performance of an HIV peer education program implemented by the Rwanda Network of People Living with HIV (RRP+) in Gicumbi District from 2017 to 2020. Researchers examined three specific areas: project planning, implementation, and monitoring. Stakeholder and Engagement Theory alongside Participation Theory were reviewed. The study adopted a descriptive research design with qualitative and quantitative approaches. The total study population for this research was 3,938 that included Recipients of Care (RoC) and stakeholders directly involved in the HIV peer education project implemented by the Rwanda Network of People Living with HIV (RRP+) in Gicumbi District, Rwanda, from 2017 to 2020. A mixed sampling approach was employed to select participants for this research. This approach involves a combination of probability and non-probability sampling methods. Therefore, the sample size calculated using the Yamane formula was 387 Recipients of Care (RoC) and stakeholders. Both descriptive and inferential statistics were used to analyse the data. Findings indicated significant beneficiary involvement in strategic planning and annual plans, with mean scores of 3.78 and 3.50, respectively, on a 1-4 scale. Moderate familiarity with the Work Breakdown Structure (WBS) (average 3.22) was observed. Statistical analysis confirmed a significant positive impact on Project Performance ($p < 0.05$). Beneficiaries reported satisfactory healthcare and psychosocial support (mean score 0.99) and moderate satisfaction with supportive supervision (mean score 1.62). Capacity-building (average 1.02) showed room for improvement, yet still had a significant positive influence on Project Performance ($p < 0.05$). Limited involvement in monitoring (mean score 1.04) was observed, with high satisfaction in feedback meetings (mean score 4.15). Feedback acceptability (average 3.42) indicated moderate acceptability, also positively impacting Project Performance ($p < 0.05$). The positive unstandardized coefficient (B) of 0.398 indicate that increased healthcare and psychosocial support are associated with higher project performance. The positive unstandardized coefficient (B) of 0.026 suggest that supportive supervision has a relatively positive relationship with project performance. The positive unstandardized coefficient (B) of 0.293 highlight the importance of training beneficiaries during project implementation. The study recommended foster greater beneficiary involvement in project planning by conducting regular consultations, workshops, and feedback sessions. Review and refine the supportive supervision approach to address the varying levels of satisfaction among beneficiaries. Maintain regular and productive feedback meetings to capture beneficiary input and concerns. Enhance feedback collection and analysis processes to ensure feedback is incorporated into project activities effectively. Form a strengthened system of monitoring and evaluation in order to consistently evaluate performance of project as well as adapt to evolving requirements of the beneficiary. Additionally, formulate models of sustainability to ascertain that favorable and positive impacts of the project are preserved after its overall completion.

Keywords: Beneficial Participation, Implementation, Monitoring, Peer Education, Project Performance, Project Planning

I. INTRODUCTION

Presently, HIV/AIDS pandemic continues to be a considerable constraint in regards to global health. This is particularly the case in Sub-Saharan Africa, where rates of prevalence remain highest globally. To mitigate these phenomena, different organizations, bodies and initiatives have enforced various HIV peer education programs as a tactic to offer education, assistance, and mitigation strategies to People living with HIV (PLHIV), according to Amy et al. (2009). These projects and programs acknowledge the benefit of engaging beneficiaries in planning of programs, implementation/enforcement, and evaluation. This is because their active involvement can boost outcomes of project and foster empowerment of the community (Buchanan et al., 2017).

In the past decade, Cooke and Kothari (2001) have observed that there has been an increasing recognition of the value of substantial beneficiary involvement in projects linked to development. As such, participatory methodologies focus on moving beyond tokenism and adopt active participatory and partnership with beneficiaries.



Participatory techniques stress on the inclusion of marginalized and vulnerable voices, the transition of power involving decision-making, and promoting partnerships amongst stakeholders

In the words of Bredillet et al. (2018) a number of past researches have posited the positive impacts of stakeholder participation on project results in different settings. In project management scope, stakeholder participation has been connected to enhanced success of projects, entailing increased degrees of stakeholder fulfillment, improved relevance of projects, and bolstered project performance (Khan & Bhatti, 2014). On the other hand, limited studies has particularly assessed the correlation existing between beneficiary participation and project success in the scope of projects in HIV peer education. HIV peer education projects success relies mostly on the active participation of beneficiaries. This gap in knowledge in this context highlights a twofold challenge.

To begin with, there is a void in comprehension concerning the degree to which beneficiary participation affects HIV peer education projects success. Despite an overall agreement on the benefits of beneficiary involvement in development initiatives, empirical evidence specific to HIV peer education projects is inadequate (Bredillet et al., 2018; Khan & Bhatti, 2014). This gap in knowledge hampers the development of effective tactics and interventions that optimize possible advantages of beneficiary participation and increase outcomes of projects.

Similarly, it is paramount to evaluate the practical consequences of beneficiary participation in HIV peer education projects, particularly so in resource-challenged contexts for instance Rwanda's Gicumbi District. HIV continues to be a substantial impediment in public health more so in Sub-Saharan Africa. This is illustrated by a roughly 25.7 million persons affected in 2020, according to figures from Joint United Nations Programme on HIV/AIDS (UNAIDS, 2021). In this regard, effective integration of beneficiary participation into design and implementation of projects becomes essential in ascertaining both impact and sustainability (Binagwaho et al., 2014). In spite of this situation, prevailing literature basically centers on Western settings, which may not wholly entail the unique challenges, constraints and opportunities currently in the context in Rwanda. Although existing body of knowledge demonstrates the value of beneficiary participation across different phases of projects, e.g. identification, planning, implementation, and monitoring (Ruwa, 2016) noted that these research fail to directly connect to HIV Peer Education Projects. Notwithstanding, they present important insights concerning beneficiary participation in the course of different phases of a project. Hence, there lacks insufficient information regarding beneficiary participation and its impact on HIV peer education in Rwanda's Gicumbi District. Additionally, it is essential to note that specific scope of HIV Peer Education Project in Gicumbi District in Rwanda, may present unique features that could affect the correlation between beneficiary participation and performance of project. Consequently, performing research tailored specifically to Rwanda's HIV Peer Education Project would present better, precise and insights which are context-specific.

1.1 Statement of the Problem

Beneficiary participation and its associated effectiveness in performance of projects has become an essential feature in development discourse. This is particularly so within HIV peer education projects. settings In Rwanda's Gicumbi District. Participation of beneficiaries in these kind of projects is paramount. However, the specific impacts on project performance remain inadequately studied. This gap in knowledge calls for an extensive evaluation to determine how involvement of beneficiary influences project success and sustainability. In the opinion of World Bank (2021) Rwanda has attained considerable advancement in checking prevalence of HIV. This is evidenced by a national rate of 2.6% as of 2020. On the other hand, rural districts for instance Gicumbi still grapple with notable challenges and impediments such as inadequate resources and stigma. These block effective prevention of HIV spread and education efforts.

However, the value of beneficiary participation though acknowledged, empirical evidence on the ground regarding its overall impact on performance of projects remains sparse in HIV peer education settings. Participation is noted in enhancing relevance of projects, both in ownership and sustainability. Despite this knowledge, systematic research into these assertions are constrained. Past research for instance those conducted by Shenhar et al. (2016) underline the transformative possibility of participatory methodologies in projects related to health matters. This depicts that scenarios where beneficiaries are engaged actively in project planning, enforcement and monitoring cycles, they are better placed to fulfill their requirements and be successful. On this premise, specific methods through which participation affects HIV peer education projects outcomes in Gicumbi District, Rwanda have not been sufficiently evaluated.

In the same vein, available body of knowledge often specializes on generalized interventions concerning health, with little emphasizes to the distinct HIV peer education dynamics. As an illustration, research performed by Haberer et al. (2018) in Uganda elucidated the positive and favorable connection between engagement of beneficiary and outcomes of health projects. However, study outcomes cannot be juxtaposed directly to the current setting of HIV peer education in Rwanda. In this regard, there is demand for a localized study that takes into account cultural, social,



and economic settings of Rwanda's Gicumbi District to offer in depth comprehension of how beneficiary participation impacts performance of projects

In order address these gaps in research, current study intends to analyze thoroughly the effect of participation of beneficiaries on HIV peer education project performance in Rwanda, specifically in Gicumbi District. By embracing a mixed-methods methodology, present research will offer a comprehensive examination of both quantitative outcomes hence giving a detailed overview concerning the function of beneficiary participation in boosting effectiveness of a project.

As such, the general research goal was to investigate the effect of beneficiary participation on the HIV peer education project performance

1.2 Research Objectives:

- (i) To assess the influence of beneficiary participation in project planning on the Project Performance of the HIV Peer Education Project Implemented by Rwanda Network of People Living with HIV (RRP+) in Gicumbi District, Rwanda.
- (ii) To determine the influence beneficiary participation in project implementation on the Project Performance of the HIV Peer Education Project Implemented by Rwanda Network of People Living with HIV (RRP+) in Gicumbi District, Rwanda.
- (iii) To assess the influence of beneficiary involvement in monitoring and Control on the Project Performance of the HIV Peer Education Project Implemented by Rwanda Network of People Living with HIV (RRP+) in Gicumbi District, Rwanda.

1.3 Research Hypotheses

H₀₁: There is no significant impact on beneficiary participation in project planning on the Project Performance.

H_{a1}: There is a significant impact on beneficiary participation in project planning on the Project Performance.

H₀₂: There is no significant effect of beneficiary participation in project implementation on the Project Performance.

H_{a2}: There is a significant effect of beneficiary participation in project implementation on the Project Performance.

H₀₃: There is no significant impact on beneficiary participation in project monitoring and control on the Project Performance.

H_{a3}: There is a significant impact on beneficiary participation in project monitoring and control on the Project Performance.

II. LITERATURE REVIEW

2.1 Theoretical Review

The theories and frameworks presented below offer crucial insights into the elements that influence behaviour change, innovations diffusion, and preventive measures adoption. Through critical exploration these concepts, we can obtain in-depth comprehension of how beneficiary participation results to HIV peer education initiatives success.

2.1.1 Stakeholder and Engagement Theory

This concept alludes that organizations should take into account both interests and needs of entire stakeholders, encompassing beneficiaries, in order to realize success of projects (Freeman, 1984). Stakeholder engagement, which is a core component of stakeholder theory, denotes the procedures of engaging stakeholders in making decisions and activities of projects. Scholars and academicians have stressed the benefits of stakeholder engagement for the success of a project (Jiang et al., 2018; Shenhar et al., 2016). Despite this development, there is need for further research on the specific function and impact of beneficiary participation in outcomes of projects.

2.1.2 Participation Theory

This concept stresses the value of stakeholders engagement, encompassing beneficiaries, in procedures pertaining procedures of decision-making as well as activities of projects. Arnstein (1969) opined that this theory acknowledges that participation which is deemed active and meaningful can result to enhanced ownership, commitment and loyalty, and in the end, fostered outcomes of projects Participation in this context should transit beyond mere tokenism and enrich persons and communities to possess a genuine voice and influence in projects formation and policies Arnstein (1969). Participation Theory is vital in assisting to determine the degree and quality of beneficiary participation in the project of HIV peer education. This entails evaluating levels to which beneficiaries are engaged in identification of project, planning, implementation, and monitoring.



2.2 Empirical Review

2.2.1 Beneficiaries' Participation in Project Planning

Ruwa (2016) did a research on the influence of stakeholder participation, specifically in project planning, on Kinango Integrated Food Security and Livelihood Project (KIFSLP) performance in Kenya's Kwale County. Research concentrated on the engagement of stakeholders in the planning stages and its effect on timely completion, implications of costs, and sustainability of the project. Research outcomes depicted that involvement of stakeholders in planning projects was negatively linked with performance of a project. Despite the fact that reasons for this negative connection were not explicitly mentioned, it demonstrates the importance for further studies and effective methods to engage beneficiaries in the procedures of planning to improve project performance.

Nkurunziza et al. (2020) performed research centering on peer education program development for sexual and reproductive health (SRH) among Rwandan students in secondary school students. They noted that engaging beneficiaries in planning of projects led to increased independence and meticulous decision-making concerning contraception use and sexual conduct.

2.2.2 Beneficiaries' Participation in Project Implementation

Mbui (2018) performed a research to assess community participation and its influence on financial management, governance of projects, maintenance and operations together with monitoring and evaluation on community water projects performance in Kenya specifically in Ruiru area of Meru County. Study utilized a descriptive survey methodology and data gathered from 413 participants. Research outcomes revealed that community participation favorably influenced performance of the project. This was particularly in spheres of financial management, project administration, operations and maintenance, and oversight and evaluation. The study depicted benefits of beneficiary involvement in implementation of project, as it leads to the successful delivery of the project's goals.

2.2.3 Stakeholder Involvement in Monitoring and Control

Condo et al. (2014) carried out a research in Rwanda to evaluate factors influencing effectiveness of Community Health Workers (CHWs) capacity as perceived by the CHWs and beneficiaries. The research acknowledged the function of community performance-based financing as an inducement for CHWs. It further pointed out constraints e.g. overwhelming workload, inconsistent training, and inadequate supervision. Despite the reality that the study failed to focus directly on beneficiary participation in monitoring and evaluation, it demonstrated the value of stakeholders' involvement in the monitoring procedures, which can influence performance of a project.

2.2.4 Community Participation in projects involving HIV peer education

Koen et al. (2018) did a research that established a peer education structure to enrich low-literacy societies in Indian rural areas. Research adopted participatory techniques to instruct peer educators and channeled educational tools on transmission of HIV, mitigation, and care. Study outcomes depicted that the program attained a considerable number of villagers, boosted awareness regarding health, and fostered the social status of peer instructors.

Miller et al. (2018) performed an assessment of an HIV peer education intervention outcome encompassing Kenyan university students. Survey findings posited that intervention led to substantial shifts in condom attitudes and conduct, in addition to improved testing of HIV. Nonetheless, no notable changes were demonstrated in terms of abstinence or the quantity of sexual partners.

Haberer et al. (2017) did a survey in Rwanda which entailed assessing the promotion of antiretroviral therapy (ART) and its effect on health outcomes. Research alluded the country's success in attaining ART universal coverage and increasing patient and population health indicators. Outcomes of the survey emphasized the benefits of engaging stakeholders as well as beneficiary participation, in monitoring and overseeing performance of a project.

Serap and Erdogan (2012) conducted a research that assessed the impacts of peer education on HIV/sexually transmitted infection and risky sexual behaviors among students in Turkish universities. Research outcomes indicated that peer education minimized risky sexual behaviors and increased self-efficacy in using condoms

Two past researches done in Rwanda are relevant to aims of this present study Havugimana (2015) assessed participation of beneficiaries' in the formulation and project performance which was implemented by Avega Agahozo. Research results posited that beneficiaries had limited engagement in design of project, contributing to project performance challenges

In another study carried out by Giramata et al. (2016) on impacts of beneficiary participation in monitoring projects and evaluation on success of projects was assessed using a case study of KWAMP project in Kirehe district, Rwanda. Outcomes of research reflected that beneficiary participation particularly in monitoring and evaluating activities of projects fostered both transparency and accountability.



III. METHODOLOGY

This section elucidates technique adopted to analyze the gathered data and presentation. The section indicates the research design to be used by the researcher to achieve the research objectives as well as to answer the research questions, the population studied, the sample size and sampling procedure, the collection methods data, the data analysis as well as ethical considerations that were taken into account during this research.

3.1 Research Design

The researcher conducted both descriptive and correlational studies. Descriptive survey research uses surveys to collect information on a variety of issues, quantitative and qualitative approach used for data collected with questionnaire and correlational studies research design examined at the links that exist between variables under the study.

3.2 Study Population and Sample Size

The population is defined as the total collection of elements about which wish to make a sum. The population of this study included. The total study population for this research was 3,938 that included Recipients of Care (RoC) and stakeholders directly involved in the HIV peer education project implemented by the Rwanda Network of People Living with HIV (RRP+) in Gicumbi District, Rwanda, from 2017 to 2020. A mixed sampling approach was employed to select participants for this research. This approach involves a combination of probability and non-probability sampling methods. Therefore, the sample size calculated using the Yamane formula was 387 Recipients of Care (RoC) and stakeholders.

3.3 Data Collection Instruments

Data Collection Instruments are tools or techniques used to gather information and data for research purposes. In this study, questionnaires were used to gather primary data. Members of the staff and project beneficiaries from Rwanda Network of People Living with HIV (RRP+) in Gicumbi District, Rwanda served as the primary sources. Textbooks, journals, publications, and websites that discuss the subject served as secondary data sources. Questionnaires contained some study-related questions that were the same for everyone in order to collect data.

3.4 Data Analysis Method

Data analysis involves reducing the accumulated data to a manageable size, developing summaries, researching patterns and applying statistical techniques, while data preparation includes editing, coding and data entry. Data coding involves assigning numbers or other symbols to responses. Data entry converts information gathered by secondary or primary methods into a medium for visualization and manipulation. Version 22.0 of the Statistical Package for Social Science (SPSS) was used as a tool to analyze the data. The Statistical Package for Social Sciences (SPSS) for quantitative analysis was used in the study.

IV. FINDINGS & DISCUSSIONS

4.1 Response Rate

This chapter focuses on the analysis of the data gathered from 387 Recipients of Care (RoC) and stakeholders directly involved in the HIV peer education project implemented by the Rwanda Network of People Living with HIV (RRP+) in Gicumbi District, Rwanda, from 2017 to 2020. The data are presented in tables and then analyzed. To determine the level Beneficiary participation in project planning on the Project Performance of the HIV Peer Education and project performance

4.2 Descriptive Statistics

4.2.1 To Determine the Level Beneficiary Participation in Project Planning on the Project Performance of the HIV Peer Education and Project Performance

This part presents discussion of the outcomes of beneficiary participation in project planning. It takes into account variables pertaining beneficiaries involvement in peer education and project planning on performance of projects.

**Table 1***Beneficiary Participation In Project Planning*

Descriptive Statistics						
Statement	Range	Min	Max	Mean	Std. Error	Std. Dev.
1. How involved were you in the strategic planning and review of the project?	3	1	4	3.78	0.031	0.607
2. How familiar are you with the Work Breakdown Structure (WBS) of the project?	3	1	4	3.22	0.041	0.809
3. How involved were you in the development of the annual plan for the project?	3	1	4	3.5	0.038	0.742

N=387

Research data above illustrates that involvement of beneficiaries' in strategic planning and review of the project oscillated between level 1 to 4. It had a mean score of 3.78. As such, a mean score above 3 depicts that on average, beneficiaries were moderately to highly engaged in strategic planning and project review.

In this regard, the degree of involvement posits that beneficiaries contributed immensely to the development and project's strategic plan review. This form of active participation in the planning stage can have a positive and favorable impact on performance of projects. This occurs through ascertaining that the project conforms with beneficiaries' requirements, needs and expectations.

Field data depicts that beneficiaries' familiarity with Work Breakdown Structure (WBS) of the project in addition differed on a scale from 1 to 4. The mean value was 3.22. A mean value exceeding 3 point that, on average, beneficiaries were moderately aware of the WBS project. Being familiar with the WBS is essential because it aids beneficiaries grasp the organizational framework of the project as well as how different tasks and activities are modeled. Whilst the mean score denotes familiarity on a moderate degree, there is still a gap to be filled in guaranteeing that beneficiaries comprehend fully the project's WBS. This can boost their participation, engagement and contribution to planning projects and implementation.

In the context of developing annual plan, research data illustrates that involvement of beneficiaries in project shifted from 1 to 4, with a mean value of 3.50. A mean number exceeding 3 posit that, on average, beneficiaries moderately or highly engaged in annual plan development. This degree of involvement opines that beneficiaries participated actively in goal setting, aims, and project activities on a yearly basis. Their contribution in yearly planning can result to a feeling of ownership and conforming of activities of the project with their requirements and priorities. This can in the end positively impact performance of the project.

Research outcomes concur with Ruwa (2016) who stressed that enabling stakeholders to be engaged, more so in the planning stage, may largely affect how good a project runs. The performance of a project is affected positively by the engagement of beneficiaries in strategic planning and establishment of yearly plan. This guarantees that requirements are fulfilled. Nonetheless, additional inquiry is paramount to assess the most reliable method to encompass beneficiaries. This is because findings of the research illustrated a negative correlation between involvement of stakeholders and effectiveness of the project.

4.1.2 To Determine Degree of Beneficiary Engagement in Implementation of Project and Its Impact on Performance

This part depicts presentation, interpretation, and data analysis pertaining to level of beneficiary engagement during implementation of project as demonstrated below in Table 2 below:

Table 2*Degree of Beneficiary Engagement During Implementation of Project and Its Impact on Performance of Project*

Descriptive Statistics						
Statement	Range	Min	Max	Mean	Std. Dev.	Std. Error
1. Did you receive adequate healthcare and psycho-social support by beneficiaries during the project phase?	1	0	1	0.99	0.004	0.072
2. How satisfied were you with the level of supportive supervisions provided by representative of PLHIV during the project implementation?	3	1	4	1.62	0.034	0.67
3. Did you receive capacity building in the form of training and financial support during the project implementation?	2	0	2	1.02	0.01	0.196

N=387



Research findings displayed in Table 2 above depicts that on average, participants indicated receiving sufficient healthcare and psycho-social help from beneficiaries during the project cycle. The low standard deviation posits that responses had minimal variation. This suggests a relatively similar experience among those polled. On average, participants responded to being moderately fulfilled with the scope of supportive supervisions offered by PLHIV representatives during implementation of project. The standard deviation hint a small variability in levels of satisfaction, with a number of participants feeling more fulfilled than the rest. On average, responders described obtaining capacity building through training, instruction and monetary support during implementation of projects, although agreement level is relatively minimal. A reduced standard deviation illustrates existence of a small variation in the answers, demonstrating a consistent experience among participants.

Data from the study show that participants generally obtained sufficient healthcare and psycho-social help during the project cycle. This opines that the project succeeded in offering these essential services to beneficiaries. On the other hand, satisfaction or fulfillment with the degree of supportive supervisions offered by PLHIV representatives during implementation of project was moderate. This is a clear illustration that there are dimensions where improvements can be effected in future to boost supervisions and support quality.

Results from research conform with Mbui (2018) who asserted that community involvement impacted favorably outcomes of the project. This gives relevance to the notion that study participants had adequate medical treatment and psychological care while it was progressing. However, there is gap to be filled in development pegged on modest fulfillment with supporting supervisions.

4.1.3 Degree of Beneficiary Participation In Monitoring, Control and Its Impact on Performance of Projects

This part describes presentation, interpretation, and data analysis concerning degree of beneficiary participation in monitoring, control and its impact on Performance of Projects.

Table 3

Beneficiary Participation In Monitoring, Control and Its Impact on Performance of Projects

Descriptive Statistics								
Statement	Range	Min	Max	Mean	Std. Error	Std. Dev.	Kurtosis	Std. Error
1. Were you or your representatives involved in the monitoring and control supervisions of the project?	1	1	2	1.04	0.01	0.2	19.435	0.248
2. How satisfied were you with the feedback meetings held during the project implementation?	1	4	5	4.15	0.018	0.36	1.761	0.248
3. How acceptable were the feedbacks provided during the project implementation?	1	3	4	3.42	0.025	0.494	-1.896	0.248

N=387

Table 4 above illustrates research outcomes that beneficiaries or their representatives were engaged minimally in project monitoring and control supervisions. This is demonstrated by a continuum of 1 to 2 alongside a mean value of 1.04. In this case, a mean figure close to 1 depict that, on average, beneficiaries had minimal engagement in activities pertaining monitoring and control. The high positive kurtosis (19.435) demonstrate that distribution of data has strong tails and is favorably skewed, positing that majority of participants described low degrees of participation in monitoring and control. Limited beneficiary engagement in monitoring and control may have consequences in performance of a project. This is because active involvement in these procedures can aid in pointing out issues, evaluate progress, and recommend improvements. It is thus essential to find means to expand engagement of beneficiaries in these core project stages. The data opines that beneficiaries were overly fulfilled with feedback meetings shared during implementation of projects. This is described by the range of 1 to 5 and a mean figure of 4.15. A mean value exceeding 4 indicates high fulfillment or satisfaction levels.

The moderate positive kurtosis (1.761) alludes that distribution of data possess moderately heavy tails. This denotes that while a vast number of participants demonstrated enhanced fulfillment, there may be some divergence satisfaction extent. Increased satisfaction coupled with feedback meetings is a positive illustration of project performance. This is because it gives cue that beneficiaries described these meetings beneficial for offering input, determining progress, and handling concerns. Research data shows that beneficiaries described offered feedback



during implementation of project to be moderately agreeable. This is represented by a continuum of 1 to 4 and a mean value of 3.42. As such, a mean surpassing 3 demonstrates moderate acceptability.

The negative kurtosis (-1.896) alludes that distribution of data is somewhat platykurtic, with light tails. This illustrates that reactions were distributed with reduced coalescence around the mean.

Moderate acceptability of feedback suggests that while beneficiaries generally found the feedback valuable, there may be room for improvement in the way feedback is collected and incorporated into project activities.

The findings align well with Condo et al. (2014) highlighted the importance of stakeholders' active participation in monitoring procedures to the success of the project. This lends credence to the idea that projects may fail due to a lack of beneficiary participation in monitoring and management. Although Condo et al. (2014) primarily examined Community Health Workers, the difficulties they encountered, including workload and supervision, are relevant to the need for beneficiaries to be more actively involved in project monitoring.

4.1.4 To Determine the Beneficiary Participation on HIV Project Performance

The Finding of project performance with the timeliness of the project completion, adherence to the allocated budget, quality of deliverables, the objectives and goals achievements and the overall satisfaction of the project outcomes are shown in the table below:

Table 4

Beneficiary Participation on HIV Project Performance

Descriptive Statistics						
Statement	Range	Min	Max	Mean	Std. Error	Std. Dev.
1. How satisfied were you with the timeliness of project completion?	2	3	5	4.46	0.03	0.572
2. How well did the project adhere to the allocated budget?	2	2	4	3.01	0.01	0.125
3. How would you rate the quality of the project deliverables?	2	3	5	4.32	0.04	0.68
4. To what extent were the project objectives and goals achieved?	1	2	3	2.98	0.01	0.124
5. Overall, how satisfied are you with the outcomes of the project?	1	4	5	4.02	0.01	0.143

N=387

The data indicates that beneficiaries were highly satisfied with the timeliness of project completion, as evidenced by the range of 3 to 5 and a mean score of 4.46. A mean value surpassing 4 indicates very high fulfillment. The standard deviation of 0.572 hint relatively low variability in reactions demonstrating that vast number of responders were regularly fulfilled with the timeliness of the project. Increased satisfaction with completion of project timelines is a positive sign of good performance of a project. This alludes that the project was concluded within the time-frame stipulated.

Data from research posited that beneficiaries rated adherence of the project to the apportioned budget moderately well, as depicted by a range of 2 to 4 and a mean value of 3.01. A mean figure exceeding 3 hints moderate fulfillment or satisfaction.

A standard deviation of 0.125, which is relatively low alluded that responses were somewhat consistent. It showed that with majority of participants expressed moderate fulfillment with the budget adherence of the project. Noting a gap that needs improvement, the overall satisfaction hints that the project handled its budget quite well. Data from the study expressed that beneficiaries marked the standard of the project deliverables quite highly, as described by a continuum of 3 to 5 and a mean value of 4.32. A mean value surpassing 4 hints satisfactory fulfillment. Additionally, standard deviation of 0.680 hints some divergence in responses. This though majority of participants posited very high satisfaction level with project deliverables standards. This alludes to a strengthened indicator of success and performance of a project. This is because high-quality deliverables often result to effectiveness of a project in addition to satisfaction of the beneficiary.

Research data demonstrates that beneficiaries assumed that the project realized its goals and aims moderately well. This was illustrated by a continuum of 2 to 3 and a mean value of 2.98. A mean value greater than 2 hints that the project largely accomplished in attaining its aims. Reduced standard deviation of 0.124 proposed that reactions from participants were consistent, with vast majority highlighting a moderate extent of fulfillment concerning attainment of project aims and goals. Although there exists a void for improvement, main perception is positive.



Data from the study demonstrate that beneficiaries were overly contented with the main results of the project. This is expressed by a range of 4 to 5 alongside a mean value of 4.02. A mean value greater than 4 hints greater satisfaction.

Likewise, standard deviation of 0.143 hints a relatively reduced variance in responses. This is a clear illustration that a vast number of participants consistently described high contentment with the outcomes of the project. High overall fulfillment is a strong indicator of successful project performance and positive project impact.

The findings align well with Cooke & Kothari (2001) underlined the critical importance of beneficiaries actively engaging in development efforts. High levels of satisfaction with project completion dates, delivery quality, and overall project results indicate that beneficiaries were actively involved and collaborated with, as is encouraged by participatory techniques. This lends credence to the idea that inclusive practices improve project outcomes and productivity.

4.5 Relationship of Beneficiary Participation and Project Performance

The relationship between beneficiary participation and the project performance is shown in the table below:

Table 5

Regression of project planning beneficial participation and project performance: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	31.943	4	10.314	192.941	.000 ^a
	Residual	7.302	141	0.054		
	Total	39.24	147			

Predictors: The predictors in the model include a constant (intercept) and beneficiaries' participation in project planning, project implementation, and project monitoring. These are the independent variables being tested to understand their impact on project performance.

Dependent Variables: The dependent variables in the analysis are project performance indicators, specifically timeline completion, adherence to the budget, quality of deliverables, and achievement of objectives. The following represents aspects of project performance that were measured.

The "Regression" component which was 31.943 demonstrates project performance variance that can be elucidated by the predictors. In this case, participation of beneficiaries in project cycles. The regression analysis hints that engagement of beneficiaries in planning of project, implementation of project, and monitoring of project all possess a substantial impact on performance of projects in the context of timely conclusion, budget adherence, quality or standards of deliverables, and attainment of goals. This research outcomes means that the degree of beneficiary involvement in different cycles of the project considerably impacts outcomes. Of a project.

Study outcomes concur with Bredillet et al. (2018) demonstrating that project success is largely impacted by degree of active beneficiaries' engagement. In relation to regression analysis, this offered additional evidence that beneficiaries' active involvement in designing project, enforcement, and monitoring is paramount to successful outcomes. To foster a project's efficacy, it is imperative to plug the information void concerning engagement of beneficiary, particularly in programs of HIV peer education.

4.1.6 Correlation between Beneficial Involvement on Planning Projects and their Performance

This part illustrates correlation between beneficial participation in planning projects and project performance. Research took into account key domains that represent beneficial participation and planning of projects. In this regard, research measured degree/level to which they resulted to performance of a project.

Table 6

Relationship of Beneficial Participation on Project Planning and Project Performance: Coefficients

Coefficients ^a						
Model		Unstandardized Coefficient		Standardized Coefficient	t	Sig.
		B	Std. Error	Beta		
1	(constant)	.388	.135		4.024	.004
	Strategic planning and review	.026	.099	.034	.0289	.787
	Work breakdown structure	.638	.064	.624	12.908	.000
	Annual plan	.291	.100	.378	2.968	.004



Predictors: The predictors in the model include a constant (intercept), strategic planning, work breakdown structure, and annual plan. These are the independent variables being tested for their impact on project performance.

Dependent Variables: The dependent variables in the analysis are project performance timeline completion, adherence to the budget, quality of deliverables, and achievement of objectives. These are the outcomes of interest that the predictors aim to explain.

Table shows the relationship between several variables of the independent variable and the project performance.

The findings indicated that beneficiaries' participation in strategic planning are significant to project performance as there is a positive coefficient (0,638 and 0.64) and P-values are less than 0.05. It implies that enhancing the involvement of beneficiaries affects the effectiveness of project Performance.

The findings align well with Giramata et al. (2016), highlighting the favorable influence on project performance of increased beneficiary engagement. This provided further evidence that beneficiaries' participation in strategic planning was associated with statistically significant positive coefficients (0.638 and 0.64) and P-values lower than 0.05. But further study is needed to fill the information gap about how beneficiary engagement in HIV Peer Education Projects in Gicumbi District, Rwanda, specifically affects these programs.

4.1.7 Relationship of Beneficiaries' Engagement During Project Implementation and Project Performance

Finding provided shows the results of a regression analysis that explores the relationship between beneficiaries' participation in project planning (predictors) and various project performance indicators (dependent variables).

Table 7

Relationship of Beneficiaries' Engagement During Project Implementation and Project Performance: Coefficients

Coefficients ^a						
Model		Unstandardized Coefficient		Standardized Coefficient	T	Sig.
		B	Std. Error	Beta		
1	(constant)	.398	.143		4.027	.005
	Health care and psychosocial support	-.026	.098	-.038	-.0256	.797
	Supportive supervision	.648	.072	.628	13.919	.000
	Training of beneficiaries	.293	.100	.378	2.978	.004

Healthcare and Psychosocial Support: The positive unstandardized coefficient (B) of 0.398 and the significant standardized coefficient (Beta) of 0.648 indicate that increased healthcare and psychosocial support are associated with higher project performance. This suggests that when beneficiaries receive better healthcare and psychosocial support during the project, it positively impacts project performance. The statistically significant relationship ($p = 0.005$) underscores the importance of providing adequate support in these areas for improved project performance.

Supportive Supervision: The positive unstandardized coefficient (B) of 0.026 and the standardized coefficient (Beta) of 0.038 suggest that supportive supervision has a relatively positive relationship with project performance. And the statistical significance of this relationship ($p = 0.000$) implies that there is a meaningful impact. In this case, it appears that excessive or overly controlling supervision may hinder project performance.

Training of Beneficiaries: The positive unstandardized coefficient (B) of 0.293 and the strong standardized coefficient (Beta) of 0.628 highlight the importance of training beneficiaries during project implementation. A one-unit increase in training is associated with a substantial increase in project performance. The highly significant p-value ($p = 0.000$) reinforces the importance of providing training opportunities for beneficiaries. This finding underscores that well-trained beneficiaries are more likely to contribute positively to project performance.

The findings align well with Rogers (2003), in that they stress that beneficiaries' involvement is crucial to the project's success. The significance of beneficiaries' active engagement in project execution is shown by the favorable correlations between healthcare, psychological support, supportive supervision, and training. This lends credence to Rogers' claim that beneficiary engagement is crucial to the acceptance of innovations and the success of projects, and it also supports the results that higher beneficiary involvement favorably affects project performance.



4.1.8 Relationship between Beneficiaries' Participation in Project Monitoring and Control

The data finding explores the relationship between beneficiaries' participation in monitoring and control activities (including supervision, feedback meetings, and the acceptability of feedback) and project performance indicators (timeline completion, adherence to the budget, quality of deliverables, and achievement of objectives).

Table 8

Relationship between Beneficiaries' Participation in Project Monitoring and Control: Coefficients

Coefficients ^a						
Model		Unstandardized Coefficient		Standardized Coefficient	T	Sig.
		B	Std. Error	Beta		
1	(constant)	.378	.133		3.027	.005
	Monitoring and control supervision	.025	.088	.038	.0256	.797
	Feedback meetings	.658	.082	.618	12.918	.000
	Acceptability's of feedback	.273	.100	.378	2.778	.003

Outcomes of regression analysis hint that participation of beneficiaries in activities pertaining to monitoring and control, encompassing supervision, feedback meetings, and feedback acceptability, all possess a considerable impact performance of projects. This is in the scope of timely conclusion, budget adherence, quality and standards of deliverables, and attainment of goals. In totality, the predictors elucidate a substantial segment of the variance in performance of projects.

The standardized coefficients, also known as Beta value offer clear understanding into the associated benefits of every predictor. As an illustration, "Monitoring and control supervision" seems to gain the strongest positive effect (Beta = 0.378) on performance of projects, next to "Feedback meetings" with Beta 0.273 and lastly "Acceptability of feedback" with Beta 0.088.

The connected p-values for all predictors all fall below 0.05. This is an illustration that every predictor is separately significant in explicating performance of a project.

In the end, study outcomes hint that promoting participation of beneficiaries in matters pertaining monitoring and control, covering reliable supervision, yielding feedback meetings, and the feedback acceptability, can lend positive outcomes of project performance.

Outcomes from the research conform with Amy et al. (2009), who emphasized the benefits of programs related to HIV peer education in Sub-Saharan Africa to mitigate the AIDS scourge. In the same vein, Amy et al. (2009) asserted the value of PLHIV support in peer education, regression analysis posit that beneficiary involvement in activities control and monitoring fosters performance of a project, hinting that everybody is of the same opinion to get enhanced outcomes.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

Outcomes of research reveal the benefits of beneficiary participation in different cycles of a project which encompass planning, implementation, and monitoring. Engaging actively positively and favorably impacts performance of projects alongside ascertaining conforming with requirements and expectations of beneficiaries. As such, the project attained great degrees of fulfillment and satisfaction in core indicators of performance. This entailed its main success and positive impact on beneficiaries. Although there was noted successes, there remains areas for improvement for instance boosting supportive supervision and expanding scope of participation in matters concerning monitoring and control.

5.2 Recommendations

Research recommended that HIV Peer Education Project ought to review and fine tune supportive supervision technique in order to handle the different satisfaction and fulfillment degrees among beneficiaries. Similarly, it should guarantee that supervisors offer the prerequisite guidance, direction and support while averting unreasonable control. Observing consistent and yielding feedback meetings to seize beneficiary input and interests should be practiced. In the same vein, there should be formation of a strong system for monitoring and evaluation to consistently evaluate performance of projects as well as conforming to evolving needs of beneficiaries. Also, establishing plans to ensure sustainability ascertains that a projects' positive and favorable impacts are preserved after its conclusion. By implementing and enforcing these recommendations, projects in the future can additionally promote engagement of



beneficiaries and performance of projects, in the end resulting to more, better successful outcomes and favorable impacts on beneficiary communities.

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Effect of Contract Management Practices on Organizational Performance of Rwanda Development Board (2017-2022)

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ABSTRACT

The general objective of this research project was to assess the effect of contract management on organizational performance. The following were specific objectives of the study: to analyze the effect of contract planning on performance of Rwanda Development Board, find out the effect of contract negotiation on performance of Rwanda Development Board, assess the effect of contract implementation on performance of Rwanda Development Board and assess the effect of contract monitoring on performance of Rwanda Development Board. To achieve these objectives, literature was reviewed on the subject matter, and then data was collected from 156 employees of RDB and they were chosen by using census sampling technique. Questionnaire, observation, interview guide and documentation were used as tools of data collection. Data was analyzed by using both quantitative data and qualitative data by presenting the findings of respondents through the mean and standard deviation. Findings indicated that there is positive link between contract management and organizational performance whereas it was found that the effect of all contract management on organizational performance will be 1.462 percent; a unit increase in the use of contract planning would lead to an increase in RDB's performance by 19.2%; a one percent increase in the use of contract implementation would lead to an increase in RDB's performance by 3.8%; a one percent increase in the use of contract monitoring would lead to a 35% increase in RDB's performance. Overall, contract monitoring had the greatest effect on RDB's performance, followed by contract implementation, while contract planning took third place, and lastly, contract negotiation. At a 5% level of significance and a 95% level of confidence, contract planning varies at a 0.010 level of significance; contract negotiation had a 0.048 level of significance; contract implementation had a 0.031 level of significance; and contract monitoring had a 0.029 level of significance. All the variables were significant ($p < 0.05$). The study also concludes that the main objective of contract management is to ensure that the borrower's contractors, suppliers, or consultants meet agreed project specifications and completion dates.

Keywords: Contract Implementation, Contract Management, Contract Monitoring, Contract Negotiation, Organizational Performance

I. INTRODUCTION

The current global business environment is highly competitive and organizations currently face large and highly efficient competitors all over the globe (Adiguzel, 2019). This as a result has made contract management essential for further development and growth of business entities. Contract management entails the whole process of, contract cycle, contract relationship, contract implementation, and contract monitoring and payment calculation. Similarly, procurement performance is achieved when, contract execution and the expected project on outcomes or end results are realized (Khan et al., 2017).

A successive Procurement performance ensures an organization's services delivery is of high quality, timely and efficient. Having efficient procurement performance is possible if organizations have effective contract management systems in place and an effective oversight committee (Odhiambo & Kwasira, 2019). However scandals at the local levels have led to renewed interests in minimizing contractors opportunistic behaviors and ensuring accountability throughout the contracting process (Kim, 2015).

The public procurement directive the suppliers are evaluated in terms of financial criteria, quality and value for the money, the main aim being reducing cases of contract breaching and cases of corruption. An effective contract management process entails, contract cycle, contract relationship, contract implementation and contract monitoring through legal support training and utilization of possibilities in procurement and supply chain systems (Hassan & Omwenga, 2023).

Yegon and Mbeche (2018) studied the determinants of procurement contract management of select state corporations. The study notes contract relationship with contractual terms as the culmination of procurement



performance. Kipkemoi and Gacuri (2018) argue that contract documentation and the entire process of contract management system should be done according to public procurement act guidelines. Furthermore, public procurement officers in charge of contract management have been stage-managing the contracts to suit their desires, large sums of taxpayers' funds has been lost through legal cases, and the remedy is to have a good contract management legal framework.

Thai (2017) posits that procurement contract management negotiations allow both parties to fulfill their obligations to achieve the objectives required by the contract. They involve managing all transactions between clients and contractors, from contract award to work completion and acceptance or contract termination, payment and dispute resolution (Sriboonchitta & Wiboonpoongse, 2018). Contract management also includes building good relationships between customers and suppliers. It continues throughout the life of the contract and involves proactive management to anticipate future needs and respond to situations as they arise (Gordon et al., 2019). Contract management (sometimes called contract execution or contract fulfillment) begins when the contractor is selected and the procurement contract is signed. Contract management includes the organizational aspects of contract management; contract terms, payment and monitoring; dispute resolution; contract modification, termination, breach and record keeping (Jolly, 2022). Additionally, contracts are often complex, may involve many people, take a long or long time, and consume many resources. Therefore, it is important to manage them properly. The general objective of this research project was to assess the effect of contract management on organizational performance.

1.1 Research Objectives

The specific objectives were:

- i. To assess the effect of contract planning on performance of Rwanda Development Board.
- ii. To find out the effect of contract negotiation on performance of Rwanda Development Board.
- iii. To determine the effect of contract implementation on performance of Rwanda Development Board.
- iv. To examine the effect of contract monitoring on performance of Rwanda Development Board.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study was grounded institutional theory, negotiation theory, and the principal agency theory.

2.1.1 Institutional Theory

Institutional theory is an old and popular tool for analyzing various aspects of organizations (Cai & Mehari, 2015). Other scholars argue that organizations and their environments are well articulated through institutional theory (Aksom & Tymchenko, 2020). The theory is popular because it explains the role of different stakeholders in a given setting (Dwivedi & Dwivedi, 2021). The theory has been used to study elements of public procurement due to the participation of different stakeholders (Obanda, 2010; Matto, 2017). The theory has been used in studies of procurement and supply chain performance (Kauppi, 2013; Tumuramye et al. 2018). The authors agree with Scott (2004) who advocated the three pillars of any institution, namely regulation, norms and cultural perception. For them, the regulatory pillar emphasizes the use of laws, rules and sanctions as enforcement tools. In explaining the normative pillars, they refer to the norms and values that should be considered in the implementation of institutional functions (Obanda, 2010).

2.1.2 Negotiation Theory

Negotiation theory points out that negotiation is a specialized and formalized form of agreement, which is mainly used to reach a common agreement on important issues (Druckman, 1986). Negotiation is important when one party needs the other to come to an agreement on how to achieve its goals. The main reason for negotiating is to create a common environment that leads to long-term trust between the two parties. This ensures that those involved are more focused on the terms to be agreed. It is the most effective form of conflict resolution and contract management; therefore, effective skills and experience are required. The theory further holds that negotiation is a process in which two parties with different positions reach a common position under agreed rules. Negotiations go through stages that include setting the agenda, seeking guiding principles, identifying issues, negotiating a favorable concession exchange, and seeking implementation details. Transitions between stages are called turning points. There are many methods that can be used as a basis for negotiation: structural analysis, strategic analysis, process analysis and comprehensive analysis. Individual negotiation methods are described in the following subsections (Shah & Shah, 2023).



2.1.3 The Principal-Agent Theory

Principal-agent theory shows the relationship between a contractor or supplier and a buyer (principal) as an agent. It also shows the relationship between contractors or suppliers as prime contractors and subcontractors. An extensive literature review illustrates how principal-agent theory is applied (Braun and Guston, 2003). It considers three different aspects that pose risks to the relationship between the buyer and the contractor or supplier. In any formal situation, the owner of a project hires a contractor or supplier to perform all the activities to complete the project, whether it is construction or delivery of goods. With regard to principal-agent theory, the relationship between a contractor or supplier and a customer must also contain the interests of both parties (Guston, 1996; Garen, 1994).

2.2 Empirical Review

Gamariel and Faustin (2021) investigated the correlation between Rwandan local government contract planning and procurement and disposal unit performance. Employing a descriptive and relational research design, they distributed questionnaires to 103 respondents in Musanze district. However, five respondents failed to return the questionnaires, necessitating further interviews with management. Utilizing SPSS, they employed the Spearman test to elucidate the nature and extent of the relationship between the variables under scrutiny. The findings revealed intriguing insights. Notably, 88.8% of the respondents strongly concurred that all key materials provided by the customer had been identified. Conversely, 24.5% of the respondents expressed disagreement regarding the timely procurement of planned resources. Furthermore, a substantial 82.7% fully endorsed the existence of a budget for officer training, while 34.7% disagreed with the assertion that procurement officers adhere to established procurement guidelines. The study also uncovered perceptions regarding resource allocation for control and risk management processes. A staggering 96.9% of respondents fully agreed that adequate resources were allocated to these processes. However, a significant 38.8% disagreed with the adequacy of internal control processes.

Kiamba (2016) examined the effectiveness of contract management negotiations in public institutions in Tanzania using the city of Kinondoni as an example. The sample size of the study was 23 respondents. Recruit the sample size using targeted sampling techniques. It turns out that most stakeholders have neither soft nor hard skills in the negotiation process in the research field. The consequences were delivery delays, major variances in contract handling, and a lack of professionalism. Therefore, the study recommends that contractors and clients should effectively evaluate the time to deliver a project or work and come to an agreement on whether the supplier will be able to complete the work within the stipulated deadline. Additionally, the study recommends considering hiring contractors to perform the actual work requested by clients. Finally, procurement professionals should receive at least 72 hours of specialized training per year.

Tallam and Yusuf (2018) focused on the impact of monitoring intensity on the procurement performance of public organizations in El Goyo Marakwet County. The study was based on relational contract theory and principal-agent theory. A descriptive research design was chosen, using a questionnaire as the primary data collection tool. The unit of analysis for this study is the employees of the finance and procurement departments of the district government. The study found that the organization was able to increase oversight to improve procurement performance. The results show that monitoring intensity is a factor affecting organizational procurement performance.

III. METHODOLOGY

The study utilized both descriptive and correlational research designs to investigate the relationship between contract management practices and organizational performance within the Rwanda Development Board (RDB). The study population consisted of 156 employees from various departments within the RDB, and the universal sampling technique was employed due to the manageable size of the target population. Data collection instruments included self-administered questionnaires, document analysis, and interviews, both primary and secondary. Prior to data collection, a pilot study was conducted to validate the questionnaire, ensuring its reliability and validity. Data processing and analysis involved standard error checking, editing, coding, and tabulation, followed by descriptive statistics such as means and standard deviations. Inferential statistics, including correlation and regression analysis, were then employed to examine the relationship between contract management practices and organizational performance. Ethical considerations were paramount, with confidentiality and anonymity of respondents guaranteed throughout the study.



IV. FINDINGS & DISCUSSIONS

4.1 Age of Respondents

Table 1 reveals that the majority of respondents, comprising 66 individuals (42.3%), fell within the age group of 31–40 years. Following closely, 46 respondents (29.5%) were in the age group of 41–50 years. Furthermore, 23 respondents (14.7%) belonged to the age group of 21–30 years, and finally, 21 respondents (13.5%) were aged 51 years and above. This distribution implies that individuals from all age categories participated in this study.

Table 1

Age of Respondents

Age	Frequency	Percent
21-30 years	23	14.7
31-40 years	66	42.3
41-50 years	46	29.5
51 years and above	21	13.5
Total	156	100.0

4.2 Gender of Respondents

Table 2 indicates that the majority of respondents, totaling 81 individuals (51.9%), were male, while the remaining 75 respondents (48.1%) were female. Thus, it can be concluded that both male and female employees currently working at the Rwanda Development Board participated in this study. However, there was a slight gender imbalance among the respondents, with the female category slightly outnumbering the male category.

Table 2

Gender of Respondents

Gender	Frequency	Percent
Male	75	48.1
Female	81	51.9
Total	156	100.0

4.3 Level of education

Table 3 indicates that the majority of 81 respondents, representing 51.9%, hold a bachelor's degree, followed by 59 respondents, representing 37.8%, who hold a master's degree, and finally 16 respondents, representing 10.3%, who hold a secondary level certificate. Therefore, the many employees of working at Rwanda Development Board have well accomplished their studies.

Table 3

Level of Education

Education Level	Frequency	Percent
Master's degree	59	37.8
Bachelor's degree	81	51.9
Secondary level	16	10.3
Total	156	100.0

4.4 Years of Experience

Table 4 reveals that 49 respondents, constituting 31.4%, fall into the category of 1 to 5 years of service, while the second largest group comprises 66 respondents, accounting for 42.3%, with service years ranging from 5 to 10 years. Additionally, 41 respondents, making up 26.3%, have been employed for 10 years or more. Therefore, it can be inferred that the human development policies implemented by the Rwanda Development Board have led to higher levels of engagement among employees. This enhanced engagement contributes to a positive organizational culture, thereby increasing productivity and ultimately enhancing the efficiency and effectiveness of the organization.

**Table 4***Years of Experience*

Years of experience	Frequency	Percent
1 to 5 years	49	31.4
5 to 10 years	66	42.3
10 years and above	41	26.3
Total	156	100.0

4.4.1 Effect of Contract Planning on Performance of Rwanda Development Board

The objective assessed the effect of contract planning on performance of Rwanda Development Board. The results are presented in Table 5.

Table 5*Perceptions of Respondents on "Effect of Contract Planning on Performance of Rwanda Development Board"*

	Mean	Std. Dev.
The contract planning process in RDB is thorough and comprehensive.	4.38	.500
The objectives and deliverables of contracts in RDB are clearly defined.	4.88	.342
The scope of work in contracts at RDB is well-defined and aligned with organizational goals.	4.69	.479
The terms and conditions of contracts in RDB are fair and balanced.	3.06	.574
The risk assessment conducted during contract planning in RDB is effective.	5.00	.000
Stakeholders in RDB are adequately involved and aligned during the contract planning phase.	4.81	.403

N-156

Table 5 presents the perceptions of respondents regarding the effect of contract planning on the performance of the Rwanda Development Board (RDB). Respondents generally agreed that the objectives and deliverables of contracts are clearly defined, with this item receiving the highest mean score of 4.88 (SD=0.342). Similarly, respondents perceived the scope of work in contracts at RDB to be well-defined and aligned with organizational goals, as evidenced by a mean score of 4.69 (SD=0.479). Additionally, stakeholders were perceived to be adequately involved and aligned during the contract planning phase, with a mean score of 4.81 (SD=0.403). However, the findings also reveal areas for improvement. The item related to the fairness and balance of contract terms and conditions received a lower mean score of 3.06 (SD=0.574), indicating some dissatisfaction among respondents in this aspect. Fair and balanced contract terms are essential for fostering trust and collaboration between parties, highlighting a potential area of concern that warrants attention. On the other hand, the risk assessment conducted during contract planning received the highest mean score of 5.00, indicating unanimous agreement among respondents. The findings show potential areas for improvement in contract planning processes at RDB. These findings align with the findings by Umulisa et al. (2015) who found that efficient contract planning is essential for procurement and disposal processes.

4.4.2 Effect of Contract Negotiation on Performance of Rwanda Development Board

The objective examined the effect contract negotiation on performance of Rwanda Development Board. The results are shown in Table 6.

Table 6*Perceptions of Respondents on "Effect of Contract Negotiation on Performance of Rwanda Development Board"*

Statements	Mean	Std. Dev.
Contract negotiations in RDB lead to mutually beneficial agreements.	4.88	.342
The negotiation process effectively addresses concerns and conflicts between parties in RDB.	4.75	.447
The terms and conditions agreed upon during contract negotiations in RDB are fair and reasonable.	4.12	.342
The negotiation team in RDB is competent and skilled in achieving favorable outcomes.	5.00	.000
The negotiation process in RDB ensures that the contracts align with organizational policies and regulations.	3.41	.592
Communication and documentation during contract negotiations in Rwanda Development Board are clear and well-documented.	4.00	.000

N=156

Table 6 indicates that the respondents generally agreed that contract negotiations lead to mutually beneficial



agreements, with this item receiving the highest mean score of 4.88 (SD=0.342). Similarly, respondents perceived the negotiation team at RDB to be competent and skilled in achieving favorable outcomes, as evidenced by a mean score of 5.00 (SD=0.000). Additionally, respondents indicated that the negotiation process effectively addresses concerns and conflicts between parties, with a mean score of 4.75 (SD=0.447). However, there were areas for improvement identified by respondents. The item related to the alignment of contracts with organizational policies and regulations received a lower mean score of 3.41 (SD=0.592), indicating some dissatisfaction in this aspect. Furthermore, while communication and documentation during contract negotiations were perceived to be clear and well-documented (mean=4.00, SD=0.000), there may still be room for enhancement to ensure transparency and accountability in the negotiation process. The findings show that while respondents generally perceive contract negotiation practices at RDB positively, there are areas for improvement, particularly regarding alignment with organizational policies and regulations. These findings are in agreement with the findings by Druckman (1986) who found that the success of the negotiation process is aiming to create a win-win situation for both parties. Negotiation is important when one party needs the other to come to an agreement on how to achieve its goals. The main reason for negotiating is to create a common environment that leads to long-term trust between the two parties. This ensures that those involved are more focused on the terms to be agreed.

4.4.3 Effect of Contract Implementation On Performance of Rwanda Development Board

The objective explored the effect of contract implementation on performance of Rwanda Development Board. Results are shown Table 7.

Table 7

Perceptions of Respondents On "Effect Of Contract Implementation On Performance of Rwanda Development Board"

Statements	Mean	Std. Dev.
Contracts in RDB are implemented according to the agreed-upon terms and conditions.	4.24	.432
The implementation of contracts in RDB is efficient and timely.	4.50	.466
The resources allocated for contract implementation in RDB are adequate.	4.81	.403
The communication and coordination between parties during contract implementation in RDB are effective.	5.00	.000
The performance of contractors during contract implementation in RDB is satisfactory.	2.69	.704
Issues or disputes arising during contract implementation in RDB are promptly addressed and resolved	3.44	.727

N=156

Table 7 show that the majority of respondents agreed that contracts in RDB are implemented according to the agreed-upon terms and conditions, as indicated by a mean score of 4.24 (SD=0.432). Furthermore, respondents indicated that the implementation of contracts in RDB is efficient and timely, with a mean score of 4.50 (SD=0.466). Moreover, respondents perceived the resources allocated for contract implementation in RDB to be adequate, as evidenced by a mean score of 4.81 (SD=0.403). The communication and coordination between parties during contract implementation were perceived to be effective, with the item receiving the highest mean score of 5.00 (SD=0.000). However, there are areas for improvement identified by respondents. The performance of contractors during contract implementation was perceived to be less satisfactory, as indicated by a lower mean score of 2.69 (SD=0.704). Similarly, issues or disputes arising during contract implementation were perceived to be less promptly addressed and resolved, as indicated by a lower mean score of 3.44 (SD=0.727). The findings show the role of the contract management team in the RDB is to facilitate healthy communication and effectively oversee the contract lifecycle management process. In addition, the public agency's contract management team analyzes contract processes for workflow improvement, advanced risk management, and more. As noted by Marwanga (2015) in literature; organizational culture has a significant impact on performance agreement implementation through aspects such as performance contracts committee composition, employee awareness, and engagement. Top management commitment, especially compliance with performance contracts (PC) procedures, has a significant impact on the implementation of performance agreements. The regression equation shows that employee turnover and top management commitment have a significant impact on the implementation of departmental performance contracts. According to Scott (2004) in institutional theory; who advocated the three pillars of any institution, namely regulation, norms and cultural perception. For them, the regulatory pillar emphasizes the use of laws, rules and sanctions as enforcement tools. In explaining the normative pillars, they refer to the norms and values that should be considered in the implementation of institutional functions (Obanda, 2010).



4.4.4 Effect of Contract Monitoring on Performance of Rwanda Development Board

The objective examined effect of contract monitoring on performance of Rwanda Development Board. The results are shown in Table 8.

Table 8

Perceptions of Respondents on “Effect of Contract Monitoring on Performance of Rwanda Development Board”

Statements	Mean	Std. Dev.
The contract monitoring process in RDB is systematic and structured.	3.86	.512
The performance of contractors is regularly monitored and evaluated in RDB.	4.94	.250
The communication and reporting related to contract monitoring in RDB are timely and accurate.	4.25	.447
Issues or deviations from the contract terms identified during monitoring in RDB are appropriately addressed.	4.81	.403
The monitoring process in RDB ensures compliance with contractual obligations and regulations.	5.00	.000
The feedback received from stakeholders during contract monitoring in RDB is utilized to improve contract performance.	4.56	.512

N=156

Table 8 indicates that the majority of respondents agreed that the performance of contractors is regularly monitored and evaluated, as indicated by a high mean score of 4.94 (SD=0.250). Furthermore, respondents perceived the communication and reporting related to contract monitoring in RDB to be timely and accurate, with a mean score of 4.25 (SD=0.447). Additionally, respondents indicated that issues or deviations from the contract terms identified during monitoring in RDB are appropriately addressed, as evidenced by a high mean score of 4.81 (SD=0.403). Moreover, the monitoring process in RDB was perceived to ensure compliance with contractual obligations and regulations, with the item receiving the highest mean score of 5.00 (SD=0.000). However, respondents indicated some areas for improvement in contract monitoring practices at RDB. The contract monitoring process was perceived to be less systematic and structured, as indicated by a lower mean score of 3.86 (SD=0.512). The findings show that effective contract management at RDB includes on-site visits to ensure suppliers execute projects according to the terms of the contract (Braun & Guston, 2003).

4.4.5 Performance of Rwanda Development Board

The study sought to assess the performance of RDB (the dependent variable). The results are shown in Table 9.

Table 9

Perceptions of Respondents on “Performance of Rwanda Development Board”

Statements	Mean	Std. Dev.
The overall performance of RDB meets or exceeds expectations.	5.00	.000
RDB consistently delivers high-quality services and achieves desired outcomes.	4.33	.492
Stakeholders perceive RDB as being effective in fulfilling its responsibilities.	4.66	.480
RDB demonstrates a strong commitment to accountability and transparency.	5.00	.000
RDB effectively manages resources and budgets to optimize performance.	2.82	.638

N=156

Table 9 indicates that the majority of respondents agreed that the overall performance of RDB meets or exceeds expectations, as indicated by a high mean score of 5.00 (SD=0.000). Furthermore, respondents perceived RDB as consistently delivering high-quality services and achieving desired outcomes, with a mean score of 4.33 (SD=0.492). Stakeholders also perceive RDB as being effective in fulfilling its responsibilities, as evidenced by a high mean score of 4.66 (SD=0.480). Moreover, respondents indicated that RDB demonstrates a strong commitment to accountability and transparency, with a mean score of 5.00 (SD=0.000). However, respondents identified areas for improvement in RDB's performance. Specifically, RDB was perceived to be less effective in managing resources and budgets to optimize performance, as indicated by a lower mean score of 2.82 (SD=0.638). The findings show that RDB performance good. These findings align with the findings by Tallam and Yusuf (2018) who found that there was a total increase of 1,105,460 for international tourists.

4.5 Inferential Statistics

The researcher conducted a regression analysis to help explain this relationship. The study adopted the following linear regression model to depict the expected relationship between the variables:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon.$$



Where: Y = organizational performance, which was measured using the responses on the effect of contract management variables; a = the β_0 intercept, which is the value of Y when X is zero; X_1 , X_2 , X_3 , and X_4 are regression coefficients of the following variables, respectively: x_1 = contract planning; x_2 = contract negotiation; x_3 = contract implementation; and finally, X_4 = contract monitoring.

All five independent variables were also measured using the responses to each of the variables obtained from the respondents. The results are illustrated and explained next.

Table 9

Tests of Normality^b

	Contract management practices	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
RDB's performance	2	0.385	154	0.000	0.75	154	0.000

a. Lilliefors Significance Correction

b. RDB's performance is constant when Contract management practices = 1. It omitted.

Table 10

Correlation

		Organizational performance
Contract management practices	Pearson Correlation	.903
	Sig. (2-tailed)	.000
	N	156

According to Pearson's theory on coefficient of correlation, table 4.10 indicates that contract management and an organizational performance equal to .903, thus named that there is a fairly strong positive relationship between these two variables.

Table 11

Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.787 ^a	.619	.481	.246

a. Predictors: (Constant), Contract monitoring, Contract planning, Contract implementation, Contract negotiation

From the table 11 above, R is the correlation coefficient which shows the relationship between the study variables, from the findings shown in the table below there was a positive relationship between the study variables as shown by 0.619 at the 1% significance level. Furthermore, the Adjusted R squared is the coefficient of determination which tells us the variation in the dependent variable due to changes in the independent variables, from the findings in the table above the value of adjusted R squared was 0.481 which is an indication that there was variation of 61.9% on RDB's performance due to changes in contract planning, contract negotiation, contract implementation finally contract monitoring at 95% confidence interval. This is an indication that 61.9% of the changes in performance could be account for by the independent variables.

Table 12

Analysis of Variance

ANOVA						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.083	4	.271	4.469	.022 ^a
	Residual	.667	151	.061		
	Total	1.750	155			

Predictors: (Constant), Contract monitoring, Contract planning, Contract implementation, Contract negotiation

Dependent Variable: Performance of Rwanda Development Board

For a 5% level of significance, the numerator $df = 4$ and the denominator $df = 151$; therefore, table 12 shows that there is a significant variation at critical value equal to .022 as a link between contract management and RDB's performance.



Table 13
Regression Coefficients

Model		Coefficients				
		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
I	(Constant)	1.462	.394		3.708	.003
	Contract planning	.192	.283	-.270	-.679	.010
	Contract negotiation	.038	.349	.045	.110	.048
	Contract implementation	.115	.292	-.115	-.395	.031
	Contract monitoring	.350	.331	.350	1.057	.029

a. Dependent Variable: Organizational performance

From the regression equation below, it was found that the effect of all contract management on organizational performance will be 1.462 percent; a unit increase in the use of contract planning would lead to an increase in RDB's performance by 19.2%; a one percent increase in the use of contract implementation would lead to an increase in RDB's performance by 3.8%; a one percent increase in the use of contract monitoring would lead to an increase in RDB's performance by 11.5%; and lastly, a one percent increase in the use of contract monitoring would lead to a 35% increase in RDB's performance. Overall, contract monitoring had the greatest effect on RDB's performance, followed by contract implementation, while contract planning took third place, and lastly, contract negotiation. At a 5% level of significance and a 95% level of confidence, contract planning varies at a 0.010 level of significance; contract negotiation had a 0.048 level of significance; contract implementation had a 0.031 level of significance; and contract monitoring had a 0.029 level of significance. All the variables were significant ($p < 0.05$).

Substituting the estimated results in the empirical model specified in chapter three gives:

$$Y = 1.462 + 0.192X_1 + 0.038X_2 + 0.115X_3 + 0.350X_4 + 0.394$$

The above equation is our final estimated equation, which shows how much each independent variable may impact or influence the dependent variable, as already explained in the interpretation and analysis above.

4.6 Test of Hypotheses

The study assessed the effect of contract management on organizational performance were used. Findings are in the table below:

Table 14
Independent Samples Test

Levene's Test for Equality of Variances						t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Contract planning	Equal variances assumed	4.247	.038	-1.188	154	.255	-.256	.216	-.719	.207
	Equal variances not assumed			-.750	2.218	.525	-.256	.342	-1.598	1.085
Contract negotiation	Equal variances assumed	1.306	.022	-1.950	154	.071	-.513	.263	-1.077	.051
	Equal variances not assumed			-1.468	2.406	.259	-.513	.349	-1.797	.771
Contract implementation	Equal variances assumed	4.247	.058	-1.188	154	.255	-.256	.216	-.719	.207
	Equal variances not assumed			-.750	2.218	.525	-.256	.342	-1.598	1.085
Contract monitoring	Equal variances assumed	1.595	.019	-1.110	154	.287	-.346	.312	-1.020	.328
	Equal variances not assumed			-.678	1.088	.613	-.346	.511	-5.712	5.020



H_{01} : There is no significant effect of contract planning on performance of Rwanda Development Board; the results revealed that P-Value = .038 for this F-Test are less than our alpha value or 0.05, which is the case of our variance; are assumed to be equal if this value is bigger than 0.05, therefore assume them to be equal. So we can reject the null hypothesis.

H_{02} : There is no significant effect of contract negotiation on performance of Rwanda Development Board; as a result, F-Test is 1.306 and P-Value = .022; we can reject hypothesis.

H_{03} : There is no significant effect of contract negotiation on performance of Rwanda Development Board, therefore F-Test is 4.247 and P-Value = .058 therefore it means that all contract implementation variables jointly have not effectively positive and significant effect on RDB's performance in all level of significance. So we cannot reject the null hypothesis.

H_{04} : There is no significant effect of contract monitoring on performance of Rwanda Development Board, therefore F-Test is 3.019 and P-Value = .019; we reject null hypothesis and this means that all contract implementation variables are significant effects on RDB's performance in all level of significance.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

From the findings, the study concludes that the main objective of contract management is to ensure that the borrower's contractors, suppliers, or consultants meet agreed project specifications and completion dates. The purpose is also to manage the necessary changes, deal with claims or disputes, and get the contracts right through contract changes. Additionally, contract management also is an important part of any business as it helps reduce risk and ensures that all parties involved in the contract fulfill their obligations. With the right processes and systems in place, contracts can become more efficient and effective for everyone involved. Therefore, the researcher found that there is positive link between contract management and organizational performance whereas it was found that the effect of all contract management on organizational performance will be 1.462 percent; a unit increase in the use of contract planning would lead to an increase in RDB's performance by 19.2%; a one percent increase in the use of contract implementation would lead to an increase in RDB's performance by 3.8%; a one percent increase in the use of contract monitoring would lead to an increase in RDB's performance by 11.5%; and lastly, a one percent increase in the use of contract monitoring would lead to a 35% increase in RDB's performance. Overall, contract monitoring had the greatest effect on RDB's performance, followed by contract implementation, while contract planning took third place, and lastly, contract negotiation. At a 5% level of significance and a 95% level of confidence, contract planning varies at a 0.010 level of significance; contract negotiation had a 0.048 level of significance; contract implementation had a 0.031 level of significance; and contract monitoring had a 0.029 level of significance. All the variables were significant ($p < 0.05$).

5.2 Recommendations

The Rwanda Development Board is advised to prioritize the meticulous handling of contract negotiation procedures, adhering to best practices such as appointing skilled negotiators, setting clear agendas, and ensuring comprehensive discussions. Additionally, it is crucial for the organization to maintain rigorous contract management protocols, which encompass thorough reviews, precise terms and conditions, adherence to regulations, and effective dispute resolution mechanisms.

By adopting a structured approach to contract management, the Rwanda Development Board can consistently identify opportunities for cost savings, negotiate favorable terms, and cultivate strong supplier relationships. Such practices not only enhance operational efficiency but also contribute to the organization's overall performance and serve as a cornerstone of transparency and accountability in the public sector.

Furthermore, effective resource and budget management are essential for optimizing performance and facilitating the monitoring of policy implementation. Through strategic allocation and monitoring of resources, RDBs can ensure the efficient utilization of funds while upholding their commitment to fulfilling policy objectives.

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Assessment of Teambuilding and Employee Performance at Rwanda National Police Headquarters

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ABSTRACT

This work presents study aimed to analyze the effect of team building on employee performance at Rwanda National Police (RNP). The study was based on the following objectives: to find out the effect of defining shared goals of team on employee performance in Rwanda National Police, assess the effect of collaboration on employee performance in Rwanda National Police, determine the effect of commitment on employee performance in Rwanda National Police and determine the effect of team shared values on employee performance in Rwanda National Police. The research was based on equity theory and agency theory. The study used quantitative techniques to collect and analyze data. The study targeted a total of 500 police officers between 25 and 55 years who has been in service for at least ten years. These officers are expected to have gained technical skills and experience in various domain. The targeted population are Executive Officers, Senior Officers, Junior Officers and Noncommissioned officers. The population of the study selected using Slovin's formula, The sample size of the study was 222. The study used simple random sampling. The findings indicate the coefficient for Share Goals is β is 0.303 and the Sig. is 0.000, indicating that Share Goals has a statistically significant influence on Employees' Performance in RNP. The coefficient for Commitment β is 0.148 and the Sig. is 0.034, indicating that Commitment has a statistically significant influence on Employees' Performance in RNP. The coefficient for Collaboration β is 0.178 and the Sig. is 0.001, indicating that Collaboration has a statistically significant influence on Employees' Performance in RNP. The coefficient for Shared Values β is 0.309 and the Sig. is 0.000, indicating that Shared Values has a statistically significant influence on Employees' Performance in RNP. Rwanda National Police should implement transparent goal-setting processes, fostering a culture of collaboration through training and tools, enhancing commitment through recognition and growth opportunities, and promoting shared values to create a values-driven organizational culture.

Key words: Collaboration, Commitment, Employee Performance, Team Building, Team Shared Goals, Team Shared Values

I. INTRODUCTION

In today's dynamic and competitive business landscape, the success of an organization hinges on the collective performance of its workforce. The intricate interplay between effective team dynamics and individual employee performance has become a pivotal focus for businesses aiming to achieve optimal productivity and innovation. The assessment of team building and performance of employees is a strategic procedure that looks into comprehending how teams work together, communicate, and leverage their aggregate strengths to realize organizational aims. This assessment highlights both efficiency and synergy across teams in addition to examining the impact of personal contributions on overall results of teams (Sung and Choi, 2022).

Specifically, Rwanda National Police (RNP) has a pressing reason to perform an extensive assessment that looks into the connection between initiatives of team building and the resultant impact on performance of employees. Although the RNP has been proactive in enforcing a different team building tactics focusing on promoting collaboration, shared beliefs, and a sense of unity among its officers, an emerging worry is evident that these efforts might fail to attain the anticipated outcomes (Abbas, 2021).

Notwithstanding the existence of these interventions in team building, there are signs of a possible reduction in teambuilding levels and collective synergy amongst officers. This leads to queries regarding the efficacy of the present practices of teambuilding within the RNP alongside how they may be affecting different aspects of employee performance. A crucial area of interest is the impact of teambuilding on the service delivery standard by officers. Hinged on the premise that effective implementation of law and safety of public are key to the RNP's mission, comprehending how teambuilding impacts ability of officers' to perform collaboratively and offer the public high-quality services is paramount (Patterson, 2021).



At the same time, the alignment between efforts in teambuilding and the realization of desirable objectives within the RNP is a vital consideration. With targeted aims making a bedrock of reliable policing and success of organizations, it is important to evaluate whether the prevailing tactics of teambuilding are influencing favorably officers' ability to collectively realize goals.

1.1 Statement of the Problem

Rates of absenteeism within the RNP also require exploration in teambuilding settings. Highlighting the degree to which initiatives regarding team building lead to decreased rates of absenteeism among officers is crucial. This is because it affects directly the operational readiness and police force continuity.

Additionally, the spirit of innovation among officers, an essential feature for staying ahead in a continuous shifting landscape of law enforcement, is a domain that needs investigation. Often, team building is connected with the generation of innovative concepts and techniques, and determining whether efforts in teambuilding are boosting officers' ability to creatively contribute to their functions is important.

Taking into consideration the specific setting of a state body such as the RNP, this assessment looks into the unique constraints, opportunities, and goals that outline law enforcement endeavors. In exploring the complex link between teambuilding initiatives and indicators of performance in employees, this article intends to offer practical insights that can direct the optimization procedures in teambuilding within the Rwanda National Police (Rwankiko, 2021). The end objective is to ascertain that collaborative endeavors among officers effectively conform with the mandate of institution's, boosting overall effectiveness, safety of the public, and the successful attainment of organizational goals.

In this regard, the general research aim was to assess teambuilding effects on employee performance at Rwanda National Police.

1.2 Specific objectives:

- i. To find out the effect of defining shared goals of team on employee performance in Rwanda National Police,
- ii. To assess the effect of collaboration on employee performance in Rwanda National Police,
- iii. To determine the effect of commitment on employee performance in Rwanda National Police.
- iv. To determine the effect of team shared values on employee performance in Rwanda National Police.

1.3 Research Hypotheses

The study was guided by the following hypotheses;

H0₁: Team defining shared goals has no significance effect on employee performance in Rwanda National Police.

H0₂: Team collaboration has no significance effect on employee performance in Rwanda National Police.

H0₃: Team commitment has no significance effect on employee performance in Rwanda National Police.

H0₄: Team shared values has no significance effect on employee performance in Rwanda National Police.

II. LITERATURE REVIEW

2.1 Theoretical Review

A theoretical framework is essential to a researcher in limiting the scope of relevant data focusing on specific variables and viewpoint. Akintunde (2017) defines a theory as a fixed principle that has been developed to elucidate some characteristic of the natural world. A theoretical framework should reveal an understanding of theories and concepts that are relevant to the research topic. The theoretical review was built on the relevant theories that explain the effect of teambuilding on employees' performance.

2.1.1 Stakeholder Theory

It was first outlined by Professor Klaus Schwab in *Moderne Unternehmensführung im (Modern Enterprise Management in Mechanical Engineering)* in 1971. In that book, Schwab argued that the management of a modern enterprise must serve not only shareholders but all stakeholders (die Interessenten), to achieve long-term growth and prosperity. The stakeholder theory is a theory of organizational management and business ethics that addresses morals and values in managing an organization (Phillips and Freeman, 2021). The pros of stakeholder theory indicated that, the stakeholder is an instrumental theory of the corporation, integrating both the resource-based view as well as the market-based view, and adding a socio-political level through the action plan and results.

The public employees are considered to be patriotic as they contribute to work giving their skills and knowledge. Besides, in most organizations, human capital is often considered as an investment of the institution, whereby employees are required to make significant efforts and contributions without being trained regularly and



rewarded morally to boost their knowledge and skills. Therefore, through teambuilding and employee performance, institutions should consider employees as key stakeholders who can promote competence and enhance sustainability of the institutions they serve for.

2.1.2 Equity Theory

The equity theory, illustrated by Stacey Adams, was established on the principle that all people must be treated reasonably. The equity theory is based around the terms equity, as being treated respectfully in comparison to others and inequity where individuals consider not to be treated as favorably as others and how an individual whether is being treated with justice or injustice. Inputs is what the individual brings to the place of work, such as knowledge, skills and know-how and this is the main focus to be rewarded accordingly and fairly.

Grant and Shin (2011) exerted that one of the important issues about the equity theory relates to how the institution and employees deal with disparities that arise from different types of comparisons. When salary differences are high, high performers making self-comparisons distinguish high justice or equity, but standard and low performers making general comparisons may perceive low equity. Achieng (2022) outline that one solution to solve such a difficulty may recline in executing a salary privacy policy. Apparent fairness is considered important when analyzing pay and its relation to retention.

Kollmann et al. (2020) emphasized equity theory implies that the feeling of dissatisfaction comes from a principle that one is receiving less than one deserves. Consequently, inequality especially in rewards leads to frustration and finally to organizational exist. Additionally, paying the highest remuneration in business may not enhance retention, but being competitive in the businesses is paramount (Taylor, 2002). Nevertheless, remuneration is simple to emulate by competitors hence adapting a truly price determined strategy will not be sustainable in long term.

For that reason, remuneration can be vital to enhance retention of employees, and organizations should feature on pragmatic profit customized by employees and which are harder to replicate by competitors such as: education and support, promotion possibilities, balance between life and work and conducive workplace atmosphere (Moroko & Uncles, 2009).

Furthermore, the view of justice is a vital theory at the workplace where injustice has been linked to displeasure with rewards, reduced morale on the job and willingness to quit the organization. If employees are rewarded objectively, this lead them to trust their organizations considering it as vigilant, and grateful and may contribute to employees' retention mechanisms. Equity theory supports the variable teambuilding and equitable treatment of employees to boost their moral and performance as it addresses equitable ration between the inputs and outputs at the workplace.

2.1.3 Agency Theory

The theory starts with a principal giving orders and an agent taking these orders. However, the principal has specific interests (when giving these orders) and agent has specific interests (when taking these orders) and those interests must not be convergent. Further, because of specialization the agent has some information advantage about the used processes, the achieved results and the important circumstances of its tasks. The problem now is that the agent, as a utility maximizing actor, might use that advantage to pursue his own interests (Lane, 2013).

Now, by creating an agency and basically reducing input control and implementing a contract based result control and the problem with different interests and goals can be solved. On one hand the agent is now obliged to fulfill the contract and should produce exactly what the principal desired during the planning. On the other hand, the principal can no longer prescribe on how the agent has to execute its tasks. This could have a positive effect on the performance of the agency, as the agent can decide by himself on the optimal mix of inputs to produce the requested results (Verhoest, 2013).

According to that the agency should be as independent as possible from the core government to perform best, but the department or Ministry must be powerful enough to enforce the agency to produce the desired output. The information gap between the agent and the principals accords the agent an advantage over the principal. To ensure maximum return for little effort the agent may use the information for their own good and detriment to the principal (Mitchel, 2013).

There are different aspects of performance that are hard to measure while on the other hand they have the greatest influence on the achievements. Therefore, what was part of the performance contract are only the measurable aspects (Mayne, 2016), a challenge that the Agency theory does not address. The theory takes into account extrinsic motivation of the agent and ignores the intrinsic motivation. The match of the employee's intrinsic motivation and the public sector organization goals will reduce the burden on the government to motivate the staff (Spekle & Verbeeten, 2014). Given that employees were motivated to do what they do; this doesn't mean that autonomy should be refused completely in fact there is always leeway for variation within formal structures.



2.2 Empirical Review

2.2.1 Defining Shared Goals of Team

Inter-organizational communication plays an important role in promoting strategic collaboration among firms (Cameron & Whetten, 2011; Terence et al., 1988). Paulraj et al. (2008) performed an investigation in supply chain management by studying the antecedents and performance outcomes of inter-organizational communication. Paulraj investigated the inter-organizational communication and its effect as a relational competency as a strategic advantage for supply chain partners. They used structural equation modeling to test a number of hypothesized relationships based on a sample of over 200 United States companies. They reported some evidences for the notion of inter-organizational communication as a relational competency, which enhances buyers' and suppliers' performance.

Neill and Rose (2021) performed an empirical investigation on the impact of strategic complexity on marketing strategy and organizational performance and reported that the proposition that strategic complexity was an organizational capability, which enabled more important strategy making and produces superior firm performance. Many people believe that a positive approach may help increase performance of employees and performed an empirical survey to test this. They explained that many organizations normally depend on performance evaluation measures to receive feedback to managers based on the achievement of strategic objectives. They explained that performance evaluation had been concentrated on negative effects of performance, recommending that managers might not be achieving necessary reinforcement of the positive elements of their decisions.

2.2.2 Collaboration

According to Cravens et al. (2017), performance measures not only generate enough motivation, but also help communication and the exchange of necessary information among managers when it is applied properly. Under such circumstance, individual managers may reach their personal objectives, while the organization satisfies its strategic goals. The application of positive organizational scholarship rules on performance evaluation metrics can assist us to make the evaluation process, more effectively. They explain that using performance measures framed in a positive form normally helps create more creativity, more problem-solving ability, and wider communication among managers, leading to progress towards organizational goals.

Lin (2008) investigated the role of effective factors on organizational knowledge sharing where three factors of organizational structure, organizational culture and interaction among departments were reported to have positive effect on knowledge sharing. They reported that first, the situation of knowledge sharing is rather desirable, second age, work experience, field of study, educational level and organizational position did not have any influence on knowledge sharing and knowledge sharing had a positive relation with human factors and negative relationships with structural factors. They also recommended that there was a positive relationship among knowledge sharing, creative and supportive culture and negative relationship between knowledge sharing and bureaucratic culture. These days, teambuilding plays an essential role on the success of firms and there are many studies, which measure the impact of teambuilding.

2.2.3 Commitment

Sung and Choi (2022) studied the impacts of team knowledge management on the creativity and the performance of organizational teams in some Korean insurance companies. They reported that team knowledge utilization was positively associated with team creativity, which in turn forecasted team financial performance over a 6-month period. The positive influences of knowledge utilization were more important when team leaders maintained a systematic cognitive style and when teams were under uncertain circumstances. They also concluded that the systematic cognitive style of leaders impacted positively on team creativity and moderated the relationship between team knowledge stock and team creativity.

Cooper-Thomas et al. (2022) establishing that high levels of expectations and frequent performance reviews can increase employee participation and cooperation. The scarcity of resources has lead organizations to think more about reducing costs and increasing productivity and efficiency. Reduced variation in processes can reduce cost over time as it relates to process improvement (; however, an organization must continue to incorporate processes that enhance employee engagement.

2.2.4 Team Shared Values

Employee engagement has emerged as one of the greatest challenges in today's workplace. With complexities and stringent regulations in many organizations, employee engagement will continue to challenge organizations in the future. This aspect challenges management because engagement is a critical element in maintaining the organization's vitality, survival, and profitability. Organizations that have highly engaged employees have greater profits than those



that do not (Schneider et al., 2018). Organizations with highly engaged employees experience increased customer satisfaction, profits, and employee productivity.

Harvey et al. (2020) explained the consequences of globalization of business, which leads in the emergence of hyper-competition in various firms. It has been lately observed that many organizations with different branches located in various geographical locations where many inter organization communications must happen over internet facilities such as email or other similar services. In fact, inter-organizational relationships have created motivation among many people to improve coordination and communication among the members of the global network. He developed the concept of 'timescapes' to help effective inter-organizational and inter-cultural communications.

III. METHODOLOGY

3.1 Research methodology

In this chapter, the methodology used to collect the study data has been presented. The section indicates the research design to be used by the researcher to achieve the research objectives as well as to answer the research questions, the population studied, the sample size and sampling procedure, the collection methods data, the data analysis as well as ethical considerations that were taken into account during this research.

3.2 Research Design

The researcher conducted both descriptive and correlational studies. Descriptive survey research use surveys to collect information on a variety of issues, quantitative and qualitative approach used for data collected with questionnaire and correlational studies research design examined at the links that exist between variables under the study.

3.3 Study Population and Sample Size

The study targeted a total of 500 police officers between 25 and 55 years who has been in service for at least ten years. These officers are expected to have gained technical skills and experience in various domain. The targeted population are Executive Officers, Senior Officers, Junior Officers and Noncommissioned officers. Sample size is part of the population that the researcher chooses to use in a research as a representation of the total population. The population of the study selected using Slovin's formula. Therefore, the sample size of the study was 222 police officers.

3.4 Data Collection Instruments

Data Collection Instruments are tools or techniques used to gather information and data for research purposes. In this study, questionnaires were used to gather primary data. Police officers served as the primary sources. Textbooks, journals, publications, and websites that discuss the subject served as secondary data sources. Questionnaires contained some study-related questions that were the same for everyone in order to collect data.

3.5 Data Analysis Method

Data analysis involves reducing the accumulated data to a manageable size, developing summaries, researching patterns and applying statistical techniques, while data preparation includes editing, coding and data entry. Data coding involves assigning numbers or other symbols to responses. Data entry converts information gathered by secondary or primary methods into a medium for visualization and manipulation. Version 22.0 of the Statistical Package for Social Science (SPSS) was used as a tool to analyze the data. The Statistical Package for Social Sciences (SPSS) for quantitative analysis was used in the study.

IV. FINDINGS & DISCUSSIONS

The chapter comprises the data presentation, analysis, and interpretation of the findings as set out in the research methodology. The findings have been presented through the effect of teambuilding on employee performance at Rwanda National Police. These findings are related to the following objectives of the study: To find out the effect of defining shared goals of team on employee performance in Rwanda National Police, assess the effect of collaboration on employee performance in Rwanda National Police, determine the effect of commitment on employee performance in Rwanda National Police and determine the effect of team shared values on employee performance in Rwanda National Police. Additionally, these data were presented in the form of descriptive statistical tables, percentages, the mean, and the standard deviation for the data analysis process. Based on the objectives of the study and research questions, information was gathered from 222 respondents taken from Rwanda National Police officers.



This chapter was organized in such a way that the information from primary data was analyzed using Statistical Package for the Social Sciences (SPSS) version 22.0.

Table 1

Perception of Respondents on Defining Shared Goals of Team in RNP

Shared goals	Mean	SD
The shares goals of RNP teams are clearly communicated to all team members.	3.92	1.11
The team shared goals within the RNP framework are articulated in a way that is easy to understand.	4.15	0.82
Members of the team effectively elucidate the aims and priorities of their respective units.	4.05	0.89
There exists continuous communication regarding any particular updates or shifts in the RNP unit common objectives.	3.99	1.04
Members of a team are actively engaged in procedures concerning definition of RNP team aims.	4.06	1.16
Procedures of forming RNP team goals enables for different opinions to be considered.	4.34	0.8
RNP teams' goals conform with Resilience, Networking, and Partnerships principles.	4.33	0.9
RNP team goals alignment with the RNP model is emphasized by leadership	3.14	0.95
Overall	4	0.96

Table 1 above depicts an analysis of common goals within the Rwanda National Police (RNP) teams structure, focusing on facets connected to communication, conciseness, agreement with principles of organizations, and emphasis on leadership. Assessing shared goals is a vital segment in evaluating teambuilding initiatives effectiveness and their influence on performance of employee within RNP. The analysis is based on core rationale and opinions discussed earlier in teambuilding and organizational development context.

The first facet examines whether RNP teams shared goals are communicated clearly to the entire team members. A high mean value of 3.92 hints positive agreement goals are communicated effectively. The standard deviation of 1.11 depicts heterogeneity in respondents' reactions.

The second aspect assesses whether team shared goals within the RNP framework are articulated in a way that is easy to understand. The high mean score of 4.15 indicates a relatively high level of agreement in goal articulation with heterogeneous response among respondents (standard deviation of 0.82). The third aspect examines whether team members effectively explain the objectives and priorities of their respective teams. The high mean score of 4.05 reflects a positive assessment in this regard. While, Standard deviation of 0.89 indicates heterogeneity in response about the statement among respondents.

The fourth aspect explores whether there is consistent communication about any updates or changes in the RNP team shared goals. The high mean score of 3.99 suggests a positive agreement with heterogeneous response among. The standard deviation of 1.04 indicates heterogeneity in responses.

The fifth aspect assesses whether team members are actively involved in the process of defining RNP team goals. The high mean score of 4.06 reflects a positive assessment, emphasizing the importance of collaborative goal-setting in teambuilding with heterogeneity in response among respondents (with standard deviation of 1.16). The sixth aspect evaluates whether the process of setting RNP team goals allows for diverse perspectives to be considered. The very high mean score of 4.34 and standard deviation of 0.80 indicates a very high level of agreement with heterogeneous response among respondents.

The seventh aspect examines whether the goals of RNP teams align with the principles of Resilience, Networking, and Partnerships (RNP). The very high mean score of 4.33 and standard deviation of 0.90 suggests strong positive agreement with heterogeneity in responses among respondents. The final aspect assesses whether the alignment between RNP team goals and the RNP framework is emphasized by leadership. The neutral mean score of 3.14 indicates a potential gap in leadership emphasis on alignment. With the standard deviation of 0.95, there is a heterogeneity in responses among respondents about the statement.

The overall high mean score of 4.00 indicates positive agreement on all statements but with heterogeneity in responses as indicated by the overall standard deviation of 0.96 that the shared goals of team affect the employee performance. Regarding assessment of teambuilding and performance of employee in the Rwanda National Police (RNP), shared goals analysis denotes a number of strengths, encompassing goal articulation clarity, active engagement in definition of goals, and agreement with principles of organizations. Nonetheless, there are chances for enhancement in scopes e.g. clear and efficient communication of shared goals, regular updates, and leadership emphasis on



agreement. Dealing with these contexts can promote teambuilding efforts effectiveness and result to better performance of employee within RNP.

Outcomes align with Schöttle and Tillmann's (2018) research on the benefits of challenging and meaningful goals in promoting effectiveness of a team. The authors assert the value of goal setting that are both demanding and clear, conforming with the outcomes in Table 1 above that depict the positive effect of clear communication, articulation of goals, and agreement with organizational principles on performance of a team within the Rwanda National Police. This agreement strengthens the notion that goals which are well-communicated and challenging can result to enhanced performance of a team, as noted by Schöttle & Tillmann (2018).

The Stakeholder concept stresses the value of taking into account all stakeholders, encompassing employees, in organizational management. In this current survey, as anchored by the Stakeholder Theory, outlining shared goals within a team is viewed as a mechanism to handle both RNP and employees interests.

Table 2

Perception of Respondents on Team Collaboration

Collaboration	Mean	SD
Collaboration is actively promoted within RNP initiatives as a key aspect of teambuilding.	3.89	1.18
I feel that there is a strong culture of collaboration among members of RNP teams.	4.01	1.19
Team members are encouraged to share their expertise and insights to enhance collaboration.	4.09	1.19
Collaboration within RNP is perceived as essential for achieving our collective goals.	3.98	1.08
RNP initiatives provide opportunities for cross-functional collaboration and knowledge exchange.	3.87	0.97
Channels of communication across RNP teams are effective for distributing information and updates.	3.95	1.01
Members of a team voluntarily communicate relevant information with the rest to reinforce collaboration.	4.21	1.01
There exists goal sharing, communicating successes and constraints within RNP initiatives.	4.22	0.98
Overall	4.03	1.08

Table 2 above, illustrates collaboration analysis within Rwanda National Police (RNP) initiatives. The outcomes focus on its active promotion, tradition, inspiring expertise sharing, and its detected benefit in attaining shared goals. A central facet of teambuilding and organizational culture is collaboration and its assessment is crucial in grasping its effect on dynamics of a team and overall performance. The analysis combines key tenets and ideas from teambuilding and organizational development field.

The initial facet looks at whether collaboration is boosted actively within RNP initiatives as a core aspect of teambuilding. The elevated mean value of 3.89 hints a positive agreement and standard deviation of 1.18 denotes a heterogeneity reaction among responders that there exists a recognition of the benefits of collaboration, although there may be opportunities and chances for more active promotion.

The next aspect evaluates whether there is existence of a strong collaboration tradition among RNP team members. The elevated mean value of 4.01 depicts a favorable agreement of the prevailing collaboration culture. Nevertheless, a standard deviation of 1.19 demonstrates heterogeneity in participants' responses.

The third facet looks at whether members of the team are inspired to share their experience and insights to boost collaboration. An elevated mean figure of 4.09 and a standard deviation of 1.19 reflects a positive environment for expertise sharing with heterogeneous response among respondents.

The fourth aspect assesses whether collaboration within RNP is perceived as essential for achieving collective goals. The high mean score of 3.98 suggests that there is a positive recognition of the importance of collaboration in goal achievement. While the standard deviation of 1.08 indicates heterogeneous response among respondents.

The fifth aspect explores whether RNP initiatives provide opportunities for cross-functional collaboration and knowledge exchange. The high mean score of 3.87 and standard deviation of 0.97 indicates a moderate positive level of agreement on opportunities for cross-functional collaboration with heterogeneous response.

The sixth facet looks at communication channels effectiveness within RNP teams for information sharing and updates. A high mean figure of 3.95 and SD=1.01 hints that there is a positive alignment with heterogeneous reactions among participants.

The seventh element determines whether members of the team conveniently share desirable information with their peers to foster collaboration. A high mean value of 4.21 and SD=1.01 alludes a substantial positive agreement but heterogeneous answers among participants of information sharing. Outcomes conform well to Mentzer et al.



(2001) that complying to share information enhances goal sharing and cooperation. The last element assesses whether there is sharing of goals in dividing both successes and constraints within RNP initiatives. The elevated mean value of 4.22 with $SD=0.98$ illustrates a high positive agreement extent on share goals.

The overall high mean value of 4.03 and standard deviation of 1.08 alludes that there exists a positive agreement but heterogeneous reaction in responders on how collaboration of a team influence performance of employees. In assessing collaboration context within Rwanda National Police (RNP) initiatives together with its effect on teambuilding and organizational culture, the analysis demonstrates a number of strengths. These entail a positive collaboration tradition, inspiring expertise sharing, in addition to share goals in enjoying successes together as well as challenges. Nevertheless, there exists opportunities for better active collaboration promotion, boosting channels of communication, and promoting cross-functional collaboration. Dealing with these domains can additionally bolster collaboration within RNP and lead to better dynamics of a team and organizational performance. Outcomes conform to Rushton et al. (2017) study that effective channels of communication are essential for enabling collaboration and sharing of information.

Equity Theory stresses on the equal treatment and rewards among people in places of work. Collaboration among members of a team or unit is viewed as a way to ascertain justice and equal involvement. In assessing how collaboration influences performance of employee of RNP is emphasized by Equity, present aim delves into whether equal treatment and cooperation affect personal and performance of teams in RNP.

Table 3

Respondent's Views on Team Commitment

Commitment	Mean	SD
I am wholly devoted to collaborating with my RNP members effectively.	4.31	1.18
My commitment to RNP teambuilding inspires me to contribute actively to our aims.	3.49	1.45
I assign priority to our RNP initiatives success over individual preferences.	3.69	1.16
Illustrating commitment to teambuilding is paramount for RNP initiatives success.	3.95	1.04
I am wholly devoted to cultivating unity and cooperation within our RNP team.	3.75	0.82
My commitment to teambuilding inspires me to take part in unrestricted communication with my RNP team.	4.35	0.09
I persistently look forward to perform collaboratively to attain our RNP goals.	4.21	1.01
I am willing to go the extra mile to support my RNP team members when needed.	4.06	1.21
Overall	3.98	1

Within the table 3, the analysis assesses the commitment levels of team members within Rwanda National Police (RNP) initiatives and explores their implications for effective teambuilding and organizational performance. The mean scores and standard deviations (SD) associated with each statement provide insights into the depth of commitment and its real-world impact.

The high mean score of 4.31, coupled with a relatively low SD of 1.18, indicates that team members have a very strong positive commitment to collaborating effectively with their RNP peers but with heterogeneity in responses among respondents about the statement.

The high mean score of 3.49 and $SD=1.45$ suggests that while commitment-driven motivation exists with positive agreement. The relatively high SD of 1.45 indicates some heterogeneity in the extent to which commitment motivates team members. In practice, increasing the motivational impact of commitment can be achieved by reinforcing the idea that individual contributions directly contribute to the team's success. When team members are intrinsically motivated by their commitment to the team's goals, they are more likely to exhibit proactive and enthusiastic behaviors, going above and beyond to achieve those objectives.

A high mean value of 3.69 alongside a heterogeneity SD of 1.16, hints that members of a team regularly acknowledge the value of prioritizing RNP initiatives success over individual preferences. This was with a positive concurrence among responders and heterogeneous answers. In actual-world settings, this posits that while personal preferences may rarely affect decision-making, there is an overwhelming comprehension of the need to put first the goals of a team. Bolstering this comprehension can additionally promote dynamics of a team, ascertaining that personal preferences conform to organizational aims and encouraging success collectively.

The high mean value of 3.95 stresses acknowledgement of commitment's core function of RNP initiatives success. The relatively decreased SD of 1.04 depicts heterogeneity in answers in grasping of this importance among members of a team. In real world, this indicates the awareness that a team which is committed is well equipped to



cope with obstacles and attain anticipated results. Leveraging this comprehension, leadership of RNP and team members can regularly stress the value of commitment in endeavors of teambuilding, bolstering the message that commitment is not just hype but a fundamental success driver.

The elevated mean value of 3.75, with a relatively decreased SD of 0.82, hints that members of the team are devoted to promoting a sense of unity and cooperation amongst their RNP team. This is together with positive agreement and heterogeneous reaction among those polled. In real world, this devotion transmutes into a collaborative culture where members of a unit actively help one another, perform cohesively, and in unity follow shared goals. This cultural facet results to better cohesion in a team and in the end, improved RNP initiatives outcomes.

The very high mean score of 4.34, accompanied by an exceptionally low SD of 0.09, indicates that commitment to teambuilding drives team members to engage in open communication with a very strong positive agreement and homogeneity in participants' responses on the statement. In practice, this means that team members actively share information, feedback, and insights transparently. The low SD signifies a unanimous commitment to open communication, which enhances share goals, ensures that all team members are well-informed, and fosters better decision-making and overall team effectiveness.

The high mean score of 4.21 reflects a strong positive agreement on commitment to collaborative efforts aimed at achieving RNP goals. The heterogeneity SD of 1.01 indicates that team members heterogeneously exhibit a determination to work together efficiently and effectively. In practical terms, this commitment translates into persistent efforts to overcome obstacles, adapt to changing circumstances, and maintain focus on achieving shared objectives, ultimately resulting in the successful execution of initiatives.

The high mean score of 4.06, with a relatively high SD of 1.21, Indicates a strong positive willingness among team members to support their peers when needed, even beyond their regular responsibilities with heterogeneous response among participants. In practice, team members who are willing to go the extra mile exhibit a deep commitment to team success. They readily step in to provide assistance or support during challenging situations, contributing to a collaborative and resilient team.

The overall high mean score for team commitment is 3.98, with a standard deviation of 1.00. This numerical value of 3.98 indicates a relatively high positive level of agreement on commitment among RNP team members but with heterogeneous response. This high level of commitment bodes well for the organization, as it suggests a cohesive and motivated workforce that prioritizes collective success. While the mean score is already quite positive, there is room for improvement in certain aspects, such as strengthening the motivational aspect of commitment and further aligning personal preferences with team goals.

The findings in Table 3 align with the emphasis of Finland (2021) on the significance of a committed team. Finland (2021) posit that a team which is committed goes further to attain targets and objectives, comprehending their duties in achieving them. The bolstered commitment seen in this research, as depicted by elevated mean values and decreased standard deviations demonstrates the value of commitment in promoting collaboration, open communication, and a devotion to shared goals within Rwanda's National Police (RNP) team. This commitment-driven technique leads to better effectiveness of a team and the successful execution of RNP initiatives, in agreement with Finland's viewpoint.

The Agency Theory focuses on the correlation between principals (leaders) and agents (employees) and how their interests can be merged. Commitment of employee is seen as alignment measure between goals of an employee and the organization's goals. By exploring the influence of commitment on performance of employee, this aim evaluates whether Agency Theory tenets, which entail conforming interests and trust, affect performance of a person within the Rwanda National Police.

Commitment to teambuilding analysis within RNP initiatives offers valuable perceptions into the actual-world deductions of levels of commitment. Outcomes emphasize the strengths and opportunities for betterment in dynamics of a team and stress the key function of developing commitment as a guiding force behind successful teambuilding endeavors and organizational performance within the Rwanda National Police.

**Table 4***Respondent's Views On Team Shared Values*

Shared values	Mean	SD
Shared values are well and articulately communicated and mixed into RNP initiatives.	4.42	1.16
Shared values are the directing tenets for planning and enforcing RNP initiatives.	3.43	1.45
Consistent reminders, notifications and updates stress the function of shared beliefs in RNP initiatives.	3.69	1.16
Shared values are acknowledged in RNP team meetings, debates and discussions.	4.45	1.04
The shared values worked out in RNP conform with Resilience, Networking, and Partnerships principles	3.75	0.82
Members of a team actively connect the values of the organization with the core principles of RNP.	4.35	0.09
Shared values act as a connector between personal endeavors and the wider mission of RNP	4.21	1.01
Concurrence of shared values with tenets of RNP is adequately debated and strengthened.	4.06	1.21
Overall	4.05	0.99

Table 4 above depicts an increased mean value of 4.42. This demonstrates strong positive concurrence among responders that shared values are communicated effectively and effortlessly incorporated into Resilience, Networking, and Partnerships (RNP) initiatives. This conform to Dermol and Širca (2018) study which stress on the benefits of explicit value communication in organizational culture. The relatively low standard deviation ($SD = 1.16$) hints a relatively heterogeneous reaction, denoting a high level of concurrence among responders on this facet.

On the other hand, the neutral mean value of 3.43 for this argument hints areas for improvement in adopting shared values as directing principles in the setting of RNP initiatives. According to Vidgen et al. (2017) outcomes reflects the conventional impediments organizations undergo in transferring values into actionable tactics. The relatively elevated standard deviation ($SD = 1.45$) reflects a heterogeneity in answers, hinting some differences in perceptions concerning the effectiveness of shared values as directing tenets.

Increased mean value of 3.69 posit that while reminders, notifications and updates concerning shared values prevail, there may be opportunities and options to boost their effectiveness with positive concurrence among responders. This confirms with the opinion advanced by Kotter and Heskett (2022). The authors asserted the value of continuous strengthening of organizational values. A standard deviation ($SD = 1.16$) hints a level of heterogeneity in answers, denoting some difference in perceptions concerning the efficacy of reminders, notifications and updates.

On the other hand, a very high mean value of 4.45 hints a strong favorable agreement on the reality that shared values feature actively in RNP team meetings, debates and discussions. Outcomes conform well to Brown (1998) findings that a bolstered organizational commitment to debating and strengthening shared values within RNP initiatives settings. The relatively low standard deviation ($SD = 1.04$) indicates a relatively heterogeneous response, reflecting a higher degree of agreement among participants.

The high mean score of 3.75 indicates agreement on alignment between the shared values and the core principles of RNP. The standard deviation ($SD = 0.82$) suggests a relatively heterogeneous response, indicating a relatively consistent perception among respondents regarding this alignment.

The very high mean score of 4.35 reflects a proactive approach by team members in connecting organizational values with the fundamental principles of RNP. The very low standard deviation ($SD = 0.09$) indicates a high level of consensus among respondents, suggesting a very strong agreement on this aspect.

Another high mean score, 4.21, indicates that shared values effectively bridge the gap between individual efforts and the overarching RNP mission with a very strong agreement among respondents on the assertion. The standard deviation ($SD = 1.01$) suggests a degree of heterogeneity in responses, indicating some diversity in perceptions regarding the effectiveness of shared values as a bridge.

Finally, elevated mean value of 4.06 indicates that there is a positive agreement on conformity between shared values and RNP principles is regularly debated and supported within the organization. The relatively increased standard deviation ($SD = 1.21$) hints heterogeneity in answers, revealing some differences in perceptions concerning the frequency and effectiveness of discussions and support.

The somewhat high overall mean value of 4.05 shows a general favorable agreement that shared values are effectively incorporated into RNP's actions, conform with its mission, vision and principles, and act as a link between personal endeavors and the wider organizational mission. Although there exists some heterogeneity in reactions across specific arguments ($SD=0.99$), the overall agreement alludes that shared values function considerably in forming the organizational culture and directing conduct within the Rwanda National Police.



Equity Theory postulates how shared values within a unit can lead to a sense of justness and shared anticipations. By investigating the effect of team shared values on employee performance, this objective examines whether the principles of fairness and equity, as emphasized by the Equity Theory, influence individual and team performance within the Rwanda National Police.

In summary, these findings offer a comprehensive view of the integration and impact of shared values within RNP initiatives, taking into account both the mean values and standard deviations, which provide insights into the consensus and variability of responses among participants. This analysis sheds light on both strengths and areas for potential enhancement in fostering a cohesive and value-driven organizational culture.

Table 5

Respondents Views on Employee's Performance in RNP

Employee's performance	Mean	SD
Team's efforts have contributed to achieving shorter response times to emergency calls.	3.71	1.17
The rate at which police clear criminal cases has improved over the past year.	3.97	1.19
Disciplinary actions within RNP are applied fairly and consistently.	4.21	1.03
Police officers have built positive relationships with the community they serve	4.19	1.13
Police officers are proud to be a member of the Rwanda National Police, and committed to delivering high-quality service to the community.	4.22	1.02
The communication and coordination among officers within department are efficient and effective.	4.05	1.21
The police officers respond promptly to emergency calls and incidents.	3.71	1.17
The police officers maintain a respectful and professional behavior when interacting with community members.	4.16	1.18
Overall	4.03	1.13

The table 5, the level of agreement (mean=3.71 which is high) here suggests that respondents team's efforts have contributed to achieving shorter response times to emergency calls. The standard deviation (SD = 1.17) implies some heterogeneity in views. Respondents generally agree that the rate at which police clear criminal cases has improved over the past year (mean=3.97 which is high). The standard deviation (SD = 1.19) highlights some heterogeneity in opinions. The very strong positive agreement here (mean=4.21 which is high) indicates that Disciplinary actions within RNP are applied fairly and consistently. The standard deviation (SD = 1.03) implies a heterogeneous.

Respondents strongly believe (mean=4.19 which is high) that police officers have built positive relationships with the community they serve. The standard deviation (SD = 1.13) indicates some heterogeneity in views. The data underscores the very strong positive agreement (mean=4.22 which is high) among respondents that police officers are proud to be a member of the Rwanda National Police, and committed to delivering high-quality service to the community. The standard deviation (SD = 1.012) indicates a heterogeneous response. While the mean score (mean=4.05 which is high) suggests a significant positive level of agreement, the standard deviation (SD = 1.21) indicates some heterogeneity in opinions regarding the communication and coordination among officers within department are efficient and effective.

The data suggests that the police officers respond promptly to emergency calls and incidents, with respondents expressing a high level of agreement (mean=3.71 which is high). The standard deviation (SD = 1.17) implies heterogeneity in views. This statement emphasizes that the police officers maintain a respectful and professional behavior when interacting with community members with strong positive agreement (mean=4.16) within RNP initiatives. The standard deviation (SD = 1.18) suggests heterogeneity. Overall, the respondents positively agreed on the employee's performance in Rwanda National Police (mean=4.03 which is high). The standard deviation of 1.13 indicates heterogeneity in response on the employee's performance in Rwanda National Police among respondents, there may be some variability in the perceived degree of alignment.

The findings are in line with Finland et al. (2021) mentioned that one of the most tangible indicators of enhanced employee performance resulting from effective teambuilding is the accomplishment of tasks and heightened productivity. Collaborative endeavors enable pooling of skills and expertise, facilitating teams to finalize complex projects more conveniently. The incorporated efforts of unit members mostly lead to faster completion of tasks, positively affecting overall levels of productivity.

To conclude, these outcomes demonstrate the complex correlation between teambuilding, collaboration, shared values, and quality of service within Resilience, Networking, and Partnerships (RNP) initiatives. Although there exists a general agreement on the benefits of these relationships, the standard deviations posit that individual



opinions can differ. To maximize quality of service, organizations may be required to consider how to enhance a shared comprehension of the significance of teamwork and shared values while acknowledging personal differences in perspective.

Table 6

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.870 ^a	0.757	0.752	0.3053052

a. Predictors: (Constant), Team shared values, Defining shared goals of team, Team commitment, Team collaboration

The table 6, presents the results of a regression analysis that investigates the effect of a set of predictor variables, including Share Goals, Commitment, Collaboration, and Shared Values on the dependent variable, Employees' performance in Rwanda National Police.

The multiple correlation coefficient (R) for Model 1 is 0.870, indicating a strong linear relationship between Employees' performance in Rwanda National Police and the combination of predictor variables (Team shared values, Defining shared goals of team, Team commitment, Team collaboration). This indicates that these predictors collectively influence and explain variations in employees' performance in Rwanda National Police. The coefficient of determination (R Square) is 0.752, implying that approximately 75.2% of the variance in Employees' performance in Rwanda National Police can be attributed to the predictor variables. This signifies a substantial degree of influence that the predictors have on performance ratings.

The findings align with Kraus and Riche (2016) emphasis on effective teambuilding. Research highlights that effective teambuilding leads to improved work quality through the exchange of diverse perspectives and ideas within teams, resulting in higher work standards and reduced errors. These outcomes mirror the results of the regression analysis, which demonstrate a strong relationship between predictor variables related to teamwork and employees' performance, emphasizing the significant influence of effective team dynamics on performance outcomes in Rwanda National Police.

Table 7

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	62.844	4	15.711	168.951	.000 ^b
	Residual	20.227	217	0.093		
	Total	83.071	221			

a. Dependent Variable: Employee performance

b. Predictors: (Constant), Team shared values, Defining shared goals of team, Team commitment, Team collaboration

The table 7, presents the results of an analysis of variance (ANOVA) for a regression model that aims to assess the statistical significance of the relationship between the dependent variable, "Employees' Performance in RNP" (as indicated in note a), and a set of predictor variables, including Share Goals, Commitment, Collaboration, and Shared Values. Most importantly, the F-statistic of 168.951, along with a significance level (Sig.) of 0.000, indicates that the regression model is statistically significant at the 0.05 alpha level. This implies that the combination of Share Goals, Commitment, Collaboration, and Shared Values collectively contributes significantly to explaining Employees' Performance in RNP.

Outcomes are in agreement with Stahl and Maznevski (2021) study which stress on the benefit of effective team building. The authors underscores that effective team building promotes creativity, invention and innovation, which are main guides of employee performance. This concurs with the perception that collaborative settings, where people with different skill sets function as a whole, results in novel solutions and innovation in products, services, and procedures. Outcomes of research, as well as Stahl and Maznevski viewpoint, demonstrate the positive and favourable influence of team building and collaboration on performance of organizations and innovation.

To conclude, the ANOVA outcomes strongly hint that the chosen predictors, encompassing Share Goals, Commitment, Collaboration, and Shared Values, all together play a statistically substantial function in explaining and predicting Employees' Performance in the RNP setting. The F-statistic's significance at the 0.05 alpha level underpins the usefulness of these elements in forming and affecting performance of employees within this particular organizational setting. This depicts the value of considering and bringing up these facets to boost performance results in RNP context.

**Table 8***Coefficients*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.315	0.127		2.472	0.014
	Defining shared goals of team	0.303	0.042	0.325	7.231	0
	Team collaboration	0.148	0.07	0.156	2.14	0.034
	Team commitment	0.178	0.051	0.184	3.498	0.001
	Team shared values	0.309	0.072	0.328	4.274	0

a. Dependent Variable: Employee performance

Table 8 above depicts outcomes of a multiple regression analysis, seeking to explore the connection between the dependent variable, "Employees' Performance in RNP" (as specified in note a), and a set of predictor variables, encompassing Share Goals, Commitment, Collaboration, and Shared Values. At the same time, four specific hypotheses are tested regarding the influence of these predictor elements on performance of employees in RNP. From the table, there is analysis, interpretation, and discussion of the data as well as hypotheses testing

The constant also known as the intercept in the framework is 0.315 along with a standard error of 0.127. The coefficient depict the anticipated figure of Employees' Performance in RNP when all predictor variables are zero. This means that an increase of one unit in Share Goals is linked with an increase of 0.303 units in Employees' Performance in RNP. In addition, the associated significance level (Sig.) is 0.000, representing that Share Goals possess a statistically significant influence on Performance of Employees in RNP. The coefficient which is unstandardized for Commitment equals 0.148. This hints that an increase in one unit in Commitment is linked with an increase of 0.148 units in Employees' Performance in RNP. At the same time, the associated significance level (Sig.) equals 0.034, depicting that Commitment has a statistically substantial effect on Employees' Performance in RNP. The coefficient which is unstandardized for Collaboration equals 0.178. This hints that an increase in one unit in Collaboration is connected with an increase of 0.178 units in Performance of Employees in RNP. The associated significance level (Sig.) is 0.001, depicting that Collaboration has a statistically substantial effect on Employees' Performance in RNP. The coefficient of unstandardized for Shared Values equals 0.309. This means that an increase in one unit in Shared Values is linked with an increase of 0.309 units in Performance of Employees' in RNP and the linked significance level (Sig.) equals 0.000, depicting that Shared Values possess a statistically significant effect on Performance of Employees' in RNP.

The findings align with Khosravi et al. (2020) emphasis on the pivotal role of teambuilding. Researchers highlights how teambuilding fosters collaboration, enhances task accomplishment, improves productivity, and contributes to innovative outcomes. This mirrors the significant relationship found in Table 8 between predictor variables (Share Goals, Commitment, Collaboration, and Shared Values) and Employees' Performance in RNP, emphasizing the essential connection between teambuilding and elevated employee performance.

The multiple regression analysis underscores that Share Goals, Commitment, Collaboration, and Shared Values collectively and significantly influence Employees' Performance. Specifically, each of these factors has a statistically significant and positive impact on employee performance. This suggests that teams that define shared goals and objectives, exhibit commitment, foster collaboration, and uphold shared values tend to have higher employee performance outcomes.

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

The general objective of this study was to assess the effect of teambuilding on employee performance at Rwanda National Police. Specifically, this research was guided the following specific objectives: To find out the effect of defining shared goals of team on employee performance in Rwanda National Police, to assess the effect of collaboration on employee performance in Rwanda National Police, to determine the effect of commitment on employee performance in Rwanda National Police, and to determine the effect of team shared values on employee performance in Rwanda National Police. The results indicate that Share Goals has a statistically significant influence on Employees' Performance (Sig. = 0.000). The Commitment has a statistically significant influence on Employees' Performance (Sig. = 0.034). The Collaboration has a statistically significant influence on Employees' Performance (Sig. = 0.001). Shared Values has a statistically significant influence on Employees' Performance (Sig. = 0.000). Hence, the null hypotheses (H01, H02, H03, and H04) proposing no significant influences of Share Goals,



Commitment, Collaboration, and Shared Values on employee performance in Rwanda National Police, are rejected, as their p values were less than 0.05 indicates a significant effect of these teambuilding aspects on the employee performance in Rwanda National Police.

5.2 Recommendations

RNP should implement a comprehensive and transparent goal-setting process that involves employees in defining and aligning their individual and team goals with the organization's mission and objectives. RNP should foster a culture of collaboration by organizing cross-functional training, workshops, and team-building activities that encourage open communication, idea sharing, and joint problem-solving. Develop initiatives to enhance employee commitment, such as recognizing and rewarding dedicated service, providing opportunities for professional growth and development, and establishing mentorship programs to strengthen the sense of belonging and dedication among the workforce. RNP recommended to promote and reinforce the organization's core values through consistent communication and role modeling by leadership.

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An Assessment of Level of Prominence Given to Children's Rights in The *Daily Nation* and *Standard* Online Newspapers in Kenya

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ABSTRACT

This study sought to assess the level of prominence given to children's rights stories in two major newspapers with extensive reach in Kenya and the East Africa region: The Daily Nation and The Standard. Specifically, the study conducted a content analysis to explore the volume of coverage dedicated to children's stories between January and December 2020. The study further examined the prominence given to children's rights to education, health, and protection from child labour in the selected newspapers. Agenda-setting theory was utilized, and a purposive sampling technique was adopted to select the two newspapers, as well as stratified random sampling for selecting the newspaper articles. Additionally, eight editors and reporters who write and report about children's issues for the selected media organizations were purposively sampled to participate in Key Informant Interviews. The study found 303 online articles which had general stories featuring children's issues but analyzed 93 articles (55 in The Daily Nation and 38 in The Standard) with relevant content where children were the main focus. The research findings revealed that most articles about children (72%) were presented as news reports, and there was generally low coverage of child rights issues. However, the media provided opportunities for children to comment on their issues without violating the ethical principles of journalism. Based on these findings, the study concludes that there was low coverage of child rights issues in the media. It recommends that media organizations hire and retain specialist journalists who write and report about children's issues, media stakeholders use awards to motivate and inspire outstanding child rights journalists, and that academia incorporate children reporting as a unit into journalism education curricula.

Keywords: Child Labour, Child(ren) Rights, Daily Nation, Education, Health, Media, Newspapers, Standard

I. INTRODUCTION

Although the debate on children's rights has been there since the 19th century, it came to the fore after the world wars in the 20th Century (Dirikoç, 2022). During the agricultural capitalism periods before the Industrial Revolution, children belonged to their fathers and were also used for domestic labour. This was the period of "no child rights" as they broke away from their homes. As children continued to provide cheap labour, the world realized the challenges they faced, leading to campaigns of the 1920s termed 'child rescue age,' which resulted in compulsory education as part of disciplining the child (Bendo, 2020; Dirikoç, 2022). These campaigns also led to the regulation of children's working conditions to ensure their rights were protected.

Despite being integral to nearly all aspects of public policy discourse and during international and regional gatherings such as World Children's Day (UNICEF, 2023), discussions involving children have historically been adult-dominated. Globally, children and their issues have not received adequate coverage in the media. Children are shunned or scantily reported in the media, and their coverage have often been relegated to brief mentions or fillers in newspapers or broadcasts (Internews Europe, 2014; Oyero, 2010).

Kalombe and Phiri (2019) recognizes media as a powerful tool in disseminating truthful information, connecting the society, and creating awareness for planned development and social change. Media portrayal of children, as highlighted by Mulugeta (2014), shapes public perceptions and influences decision-making processes, not only within governments but also among stakeholders advocating for children's rights. Media coverage of children has played a critical role in raising public awareness about child rights issues, yet Agboola (2020) argues that media institutions have failed to meet expected standards in advocating for child rights and development. For example, when media cover children's health issues, they tend to emphasize catastrophes and epidemics, rather than offering preventative health information before diseases occur (Mulugeta, 2014).



According to the United Nations Population Fund (UNFPA, 2020), children are a huge demographic, constituting about 46% (around 24 million) of Kenya's total population. This implies they cannot be ignored or left out of public discussions. However, media attention on children's issues has remained inadequate, with advertisements and content serving commercial interests often taking precedence over news (Oriare et al., 2010). Bitrus-Ojiambo and King'ori (2020) note that children's stories in Kenyan media frequently lack comprehensive coverage and are sometimes framed through stereotypical and patriarchal lenses, thereby overlooking the voice of a child. According to Bitrus-Ojiambo and King'ori, stories of child abuse, children's involvement in crime, and street children often dominate headlines, overshadowing broader child rights issues such as education, health, protection from child labor, and freedom from discrimination. This imbalanced portrayal often depicts children either as 'victims' or as 'dangerous.'

In 2004, the United Nations Children's Fund (UNICEF) observed that media suppresses children's voices when covering children's rights issues. It further contended that children and young people are inadequately covered in the news, often portrayed within sensationalist contexts such as educational or health neglect, exploitation, and violence (Gigli, 2004). In response, UNICEF developed the Principles and Guidelines for Media Reporting on Children in 2018, aimed at guiding journalists to cover children's issues in the public interest while safeguarding their rights and minimizing risks (Waddell, 2018).

1.1 Statement of the Problem

Media coverage of children can help policymakers and the public understand what should be done to address issues facing children. However, the coverage tends to focus on certain issues, including sexual violence and abuse (Mejia et al., 2012; Döring & Walter, 2020; Kitzinger, 2004), while ignoring others, such as the rights of children. Saint-Jacques et al. (2012) analyzed 1,211 articles in Canada to examine child maltreatment and child protection services (CPS) and found that the number of newspaper articles dealing with child maltreatment and CPS increased by 65%. Furthermore, Ramabu (2020) examined 101 newspaper articles in Botswana from January 2017 to April 2020 and found that a quarter of articles on child sexual abuse (26%) were not reporting on the incidents.

Despite efforts to strengthen the accuracy, quality, and utility of the media's portrayal of children and their rights, prior studies examining news coverage of child abuse and neglect have demonstrated significant distortion, under-representation, and inadequate reporting (Davies et al., 2017; Gillespie et al., 2014). These findings point to concerns about how reporting may be skewed or sensationalized to compete for readers, and how the media may be perpetuating common misconceptions about these issues facing children. Failure by the media to give attention to children's issues is a missed opportunity to inform policymakers and the public about the issues, contributing to inaction of the relevant stakeholders.

While there are studies on media coverage of children, only few have focused on Kenyan newspapers, especially on child rights (Bitrus-Ojiambo & King'ori, 2020; Ortum, 2013), and thus a gap remains. A report by Reporters Without Borders (RSF, 2021) indicate that media outlets in Kenya, whether state-owned or private, tend to shun topics that could jeopardize their revenue streams due to political influence. Media practitioners and organizations in Kenya also attribute the minimal or lack of comprehensive coverage of children's stories to many laws and policies that discourage photographing or interviewing children on sensitive issues without parental consent. This potentially discourages journalists from pursuing stories related to children, leading to lower coverage.

Therefore, this study sought to assess the level of prominence given to children's rights in *The Daily Nation* and *The Standard* newspapers in Kenya between January and December 2020, confining itself to three themes: education, health, and child labour.

1.2 Research Objective

The main objective of this study was to assess the level of prominence given to children's rights in *The Daily Nation* and *The Standard* newspapers in Kenya between January and December 2020. Specifically, the study sought to:

- i. Explore the volume of coverage given to child rights stories by *The Daily Nation* and *The Standard* newspapers.
- ii. Examine the prominence given to children's education, health and child labour in *The Daily Nation* and *The Standard* newspapers.



II. LITERATURE REVIEW

2.1 Theoretical Review

This study borrowed heavily from the agenda-setting theory, put forth by McCombs and Shaw in 1972, which posits that members of the audience not only learn about public issues through mass media, but also attach meaning to such issues depending on the emphasis placed to it by the media (Blasco-Duatis, et al., 2019). Thus, the media influences the importance of topics on the public by attaching prominence and frequency to the coverage of issues. According to McLeod et al. (2009), it also involves the ability of media to control the topics which are perceived by members of the public as important. Audiences care more about certain topics or believe they are more salient in their lives based on the frequency with which media cover the topics (McCombs, 2002). In other words, the more salient a news issue is, in terms of frequency and prominence, the more important the audience will regard the issue to be.

Agenda-setting hypothesis has been outlined by McQuail (2010) as follows: A public debate is represented by a set of important issues; An agenda originates from the public opinion and proposals from political interests; Competing interests seek to promote the salience of their issues; Mass media news select issues for more or less attention depending on pressure, especially from interested elites, public opinion and real-world events; Media gives public recognition to the current agenda and further effects on the public and evaluation of the political scene; and Agenda effects are peripheral and short term.

The study adopted agenda setting theory since it offers explanations on how media prioritization of children in its coverage is likely to mount pressure on government and other stakeholders to develop interventions that prioritize the wellbeing of children. If the media set the agenda of public discussion, then we assume that sustained media coverage of children's rights will directly influence the level of attention people put on children's stories.

2.2 Empirical Review

Even though members of the public learn about certain issues touching on children through first-hand experience and interactions with close family members, West et al. (2011) note that the public often depend on media outlets to broadly inform their thinking about schooling. This demonstrates the important role media plays, though not fully understood, in the formation of children's issues (Gerstl-Pepin, 2007). Sustained media coverage of children's issues such as child labour, education or harassment, can potentially influence how the public and policymakers think about important educational issues, and which issues are deemed "important". It is for this reason that media has become a platform for debates over school or educational reforms, with child rights advocates investing substantial resources to framing educational "problems" and "solutions" (Malin & Lubienski, 2015).

A study by Campanella (2015) analyzed education and school stories from 5000 news sources for a period of 25 years to give a view of the media broader landscape beyond national news. This study discovered that coverage of education constituted 7% of the media coverage in 2014, depicting a change. Comparatively, Campanella's study found less coverage of education in the national news (2%), which concurs with West et al. (2009) who focused on sports, events and school funding.

Numerous studies have also revealed evidence of inadequate coverage of education, while some observing that coverage tend to be "thin" or superficial, lacking historical, moral, and practical context (Moses & Saenz, 2008; Taiphapoon and Muthitacharoen, 2009). Other studies note that the coverage is not well-informed by education research and offer a biased position on issues by highlighting some voices and perspectives, such as those of government officials, over others, such as those of teachers (Tamir & Davidson, 2011).

Nkwam-Uwaoma and Ndukwu, (2020) analysed two national newspapers in Nigeria, to explore how they covered violence against children. Their study dwelt on the frequency, length, level of prominence, direction and sources of information reported on the topic. In total, 168 articles were analysed for a period of twelve months indicating inadequate length and space given to reports on violence against children. Similarly, Asare-Donkoh (2017), concluded that the Ghanaian newspapers devoted minimal attention to children's issues leading to low coverage. Politics and other subjects dominated in the newspapers as opposed to children's issues. This study utilized agenda-setting theory, recognizing the immense potential media has in shaping narratives. According to Asare-Donkoh, children's issues are never prioritized in public discussion and as a result, children do not find a place on the national agenda of policymakers. This low coverage of children has also been emphasized by Oyero (2010).

Media in Malawi successfully highlighted activities by various stakeholders in the child protection sector, including government officials, non-governmental organizations, and other key players, leading to enhanced child protection (Mang'anda, 2012). For instance, *The Nation* newspaper consistently covered child labor issues for the past decade and maintained a library with a dedicated section compiling all the stories related to child labor and numerous news pieces. On the contrary, Mengal et al. (2019) uncovered a significant lack of children's rights coverage in both Pakistani (*The Nation*) and Indian (*The Hindu*) print media, particularly in areas such as their developmental,



education, health, and safety rights. The study notes these critical aspects of children's rights were rarely featured in the Indian and Pakistani press, creating challenges in identifying and addressing significant issues related to children's rights.

Ashaba and Agaba, (2018) attempted to analyse 185 child abuse stories published in *The New Vision* in Uganda and findings revealed bias in coverage with most of the news stories centred around cities mainly Kampala, ignoring stories of children in rural areas. The study further found that journalists in Uganda lack special training on child rights reporting and that media houses are driven by commercial interests. On their part, Ho and Chan, (2018) reviewed a total of 579 newspaper articles on child maltreatment from four local newspapers in Hong Kong in 2016, by examining differences in reporting style, media framing, newspaper credibility, and drew a comparison between free versus paid newspapers. Their study found a vast majority of news reports focused on specific cases or events and seldom discussed child maltreatment as a broader social issue.

Tenor and Himma-Kadakas (2024) were interested in assessing the impact of editorial processes on the representation of young people in news coverage in Sweden and Estonia to address the historical imbalance and misrepresentation of young voices in previous studies. Their study discovered that children were underrepresented in the news. Tenor and Himma-Kadakas argue that prevailing editorial interpretations of media accountability not only limit the presence of young voices in the news but also fail to effectively address potential harm. The researchers also analyzed ethical breaches related to minors and conducted semi-structured interviews with editors as part of their methodology.

Kagunda and Nabushawo (2020) discovered in their study that children experiencing mental health issues were frequently confined to their homes and restrained, justified by concerns that "they might harm themselves and harm others." During interviews with mental health professionals, the study found that certain journalists exhibited considerable apprehension, particularly the fear of potential attacks when invited to cover events related to mental health, including visits to rehabilitation centres. To overcome these challenges, the study suggests the need to enhance the capabilities of health journalists, who play a crucial role as guardians of health-related matters in the mass media industry. This will enable journalists to effectively utilize contextual, thematic, and economic viewpoints in their coverage of children with mental health issues.

III. METHODOLOGY

3.1 Research Design

This study employed a mixed-method approach, using both quantitative and qualitative methods. This included content analysis and key informant interviews (KIIs). Content analysis was chosen because, since the 1920s, it has evolved as the best research technique in social sciences (Collins, 2011; Robson, et al., 2014). Content analysis has been described by Mayring (2000) as a systematic and rule-guided technique used to analyze the informational contents of textured data. Furthermore, Forman & Damschroder (2007) observed that this technique combines both quantitative and qualitative methods to make sense of textured data.

3.2 Target Population and Sample Size

All licensed newspaper publications in Kenya, totaling eight newspapers – *The Daily Nation*, *The Standard*, *The People Daily*, *Business Daily*, *The Star*, *Taifa Leo*, *X News*, and *The East African* – comprised the target population for this study. Furthermore, all newspapers and digital stories on child rights issues (specifically education, health, and child labor) presented as advertisements, commentaries, documentaries, news reports, and other programs formed the unit of analysis.

Content analysis involved examining coverage of child rights issues published by the newspaper articles in the selected major newspapers in Kenya, during the study period (January to December 2020). The two newspapers were selected based on a number of factors, such as wider coverage and distribution, frequency of publication, accuracy and speed of their reporting, their political stance as independent newspapers, and their availability and accessibility in different formats, among other factors.

Findings from the *State of the Media Report* by Media Council of Kenya (2022), indicate *The Daily Nation* (53%) and *The Standard* (22%) as the most dominant newspapers with the highest number of readerships. Based on evidence, the study selected only two newspapers of the eight existing newspaper brands in Kenya through a purposive sampling technique, and employed a stratified random sampling in selecting the newspaper articles. Through stratification, the newspapers were categorized based on ownership. All the newspapers selected are privately owned, and since the publications are available in both hard and digital copies, the study focused on the digital/online version because of its availability within the required time frame for the researcher.



The researcher also conducted Key Informant Interviews (KIIs) with 8 purposeful selected individuals (reporters and editors) from *The Nation* and *Standard Media*, who are professionals and experts who have first-hand information and knowledge as they write and report about the children's rights issues in Kenya. According to Kamal et al. (2018), KIIs are an effective way to gather first-hand knowledge about a particular issue.

3.3 Data Analysis

Quantitative data were collected using a coding tool/guide, while qualitative data were collected by taking notes. To ensure control for the study, the researcher engaged two research assistants who pre-tested the coding tool, and coded items were tested for validity and reliability by assessing the level of agreement or disagreement between the two researcher assistants. Quantitative approaches involved analyzing the coded descriptive statistics such as frequency and percentage, using the statistical package for social science (SPSS), which were then presented in the form of tables and graphs. On the other hand, qualitative data were sorted and summarized based on themes.

IV. FINDINGS & DISCUSSIONS

4.1 General Information on Newspaper Coverage of Child Rights Issues

This study assessed the level of prominence given to children's rights stories in the two selected newspapers in Kenya. Specifically, the study explored the volume of coverage dedicated to children's rights stories by both *The Daily Nation* and *The Standard* newspapers. It also examined the prominence given to education, health and child labour in these newspapers. The study identified 303 general stories featuring children's issues but analyzed 93 stories with relevant content on child rights (mainly education, health and child labour) over a period of twelve months. The 210 stories were deemed irrelevant, as they primarily focused on politicians, challenges faced by pregnant and lactating mothers, doctors' strikes, press releases by government and its agencies, and COVID-19 updates where children were either just mentioned, or their pictures used, thus the researcher omitted them because they did not directly focus on child rights. It is worth noting that this study relied mainly on online publications of the selected newspapers.

4.2. Volume of Child Rights Content Covered in *The Daily Nation* and *The Standard* Newspapers

The findings show that *The Daily Nation* provided more coverage of child rights in 55 (59%) and *The Standard* in 38(41%) of the stories analyzed. The majority (72%) of the stories on child rights were covered in form of news reports, with other story formats including opinion/feature at 15%, press releases at 4%, and photographs/cartoons at 9% of the stories analyzed.

As shown in Table 1, both newspapers depicted images of child rights mainly in photographs/cartoons. On the other hand, *The Daily Nation* increasingly covered child rights in news reports, and this shows the level of attention the newspaper gave to children, ensuring they represent issues in a way that appeals to the emotions of stakeholders who can then address children's issues.

Table 1

Volume of Child Rights Content Covered in the Daily Nation and Standard Newspapers

Story format	<i>Daily Nation</i>	<i>Standard</i>	Total	Percentage
News Report	42(57%)	25(43%)	67	72%
Opinion/features	7(50%)	7(50%)	14	15%
Advertisement	0(0%)	0(0%)	0	0%
Press Release	3(75%)	1(25%)	4	4%
Photographs/Cartoon	3(38%)	5(63%)	8	9%
Total	55(59%)	38(41%)	93	100%

In Figure 1, the study presents findings on trends of coverage during the twelve-month period. Higher coverage/more stories were observed in June (11) and October (16), with education issues dominating the coverage. Generally, these findings show that child rights remained an important topic in the media throughout the year, although the level of coverage might not be adequate compared to other topics such as politics, sports or crimes.

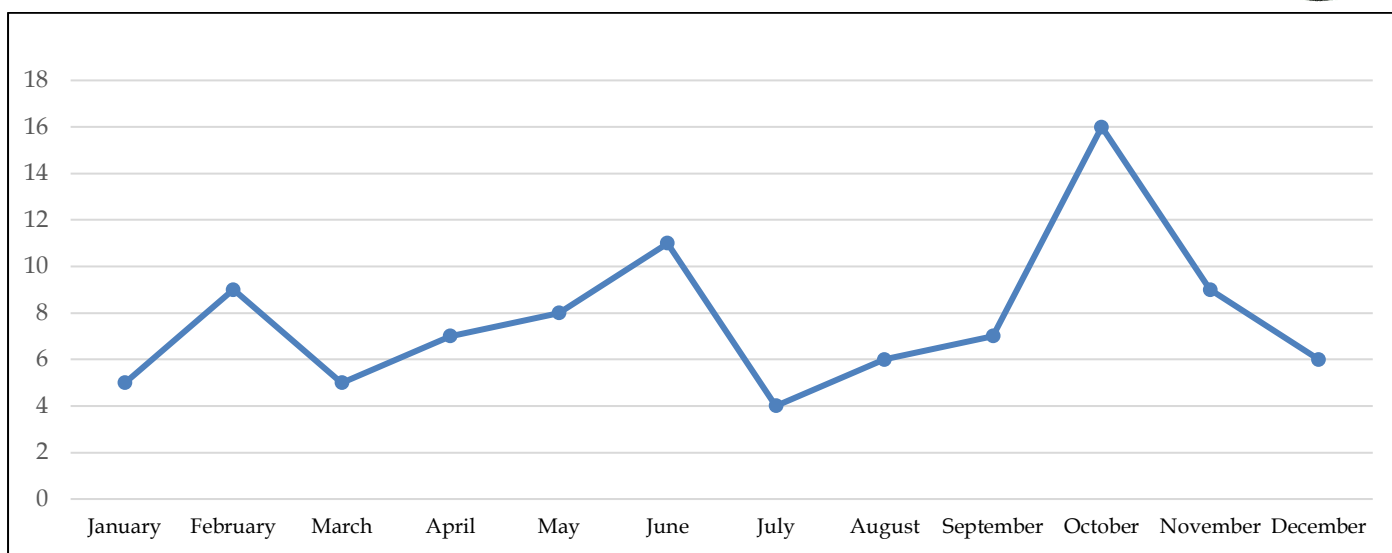


Figure 1
Trend of Coverage During the Twelve-Month Period

4.3. Level of Prominence Given to Child Rights Issues Across the Two Newspapers

Table 2 displays the frequency of coverage to explain the level of prominence given to child rights stories by the selected newspapers. The coverage of education issues was raised at least once in 48% of the stories included in the study, suggesting it was a critical component of debates about the closure and reopening of schools in Kenya. These articles highlighted the challenges that many children have faced in school, as well as the implications this could have on children's performance and career advancement in the future. As one article describes;

"...thousands of parents whose children are transiting from pre-school to primary usually spend a lot of money to allow their children sit entry exams, mostly done during Third Term. This is illegal according to both the Basic Education Act, 2013, and Basic Education Regulations, 2015" (The Standard, 2020).

Another article adds;

"...more than 150 children, including 20 Class Eight pupils, are reportedly pregnant in Tana Delta Sub-County, according to Moving the Goal Post, an organisation advocating for the rights of the girl-child." (The Daily Nation, 2020).

Also evident in Table 2, the health dimension (32%) was a prominent topic amid the health risks to children and child labour issues. When we look at the prominence of specific components of child rights in the individual newspapers, we find that *The Standard* gave more prominence to health (57%) and child labour (56%). On the other hand, *The Daily Nation* gave prominence to the education stories of children during the period under study.

An in-depth analysis of some newspaper articles shows an attempt to prominently highlight issues of children's rights. These articles challenged stakeholders to ensure every child's right is protected, especially where they live, learn, and play. While highlighting the plight of children, the media was acknowledged for its role in sensitizing and increasing societal awareness and responses to the educational needs of children. For example, *The Standard* newspaper invited education expert Dr. Domentier Kalthula to critically examine the rights of children during the COVID-19 pandemic:

"All this means that when schooling restarts, disadvantaged children will find themselves even further behind their peers. For students with learning disabilities, and those living in remote areas, the situation is bleak. Besides missed learning opportunities, students from poor backgrounds are also losing access to the meals that are made available by the World Food Programme (WFP) and the Government of Kenya through The School Feeding Program that was initiated in 2009" (Standard, March 2nd 2020)

The findings also indicate that journalists always try to look out for news stories that attract a significant audience or readership. By selecting certain children's stories, they discovered that some were newsworthy, as evidenced by the comprehensive reviewed of the status of children at school during the reopening, which depicted the image of children as the weaker links who needed support. For instance, shortage of handwashing facilities in schools was highlighted as a problem with some children being disadvantaged. An article from *The Daily Nation* on October



2, 2020, illustrates this, “While his age mates are asleep, he wakes up at 6am, dresses in long sleeve shirt, jeans cut into shorts and old rubber shoes and heads to farms nearby to look for work.” Similarly, *The Standard* reported on October 13, 2020, “Shortage of hand washing facilities is a problem in our school. We are contemplating how to engage parents to acquire them...”

Media coverage of children's rights during the period under scrutiny also highlighted challenges in girl child's education. For example, some dropped out of as a result of school closures prompted by the COVID-19 pandemic. This suggests that schools serve as a haven for girls. As one article illustrates:

“Girls are married off at 12 years when they are anatomically immature and that has a domino effect, stated Dr Mohamed during the meeting organized by UN H6 (Global Health Partnership) partners - UNAids, UNFPA, UNICEF, WHO, UN Women and World Bank, joint implementers of the \$21 million programme, in collaboration with the Government of Kenya” (The Daily Nation, December 18, 2020)

Table 2

Level of Prominence by Topic Across the Two Newspapers

Topic	Daily Nation	Standard	Total	Percentage
Child labour	8(44%)	10(56%)	18	19%
Education	24(53%)	21(47%)	45	48%
Health	13(43%)	17(57%)	30	32%
Total	45(48%)	48(52%)	93	100%

During in-depth interviews with reporters and editors who cover children's rights, it was confirmed that inequalities facing children while at school or at home are normally given attention by the media. In fact, media houses are keen in highlighting government policies which promotes children's right to quality education.:

When covering education issues in the lens of children, we hold a critical role in addressing disparities and advocating for equitable access to education. We shine a light on inequalities, whether they stem from socioeconomic or gender-based barriers, while ensuring that children's voices are heard loud and clear. We examine government policies and systemic issues within the education system, we hold authorities accountable for providing quality education for all children. We also spotlight successful interventions and grassroots efforts, empowering communities to stand up for children's rights and fostering dialogue to instigate change.

(Key Informant 3,2024)

The media has also been keen to highlight challenges ailing the education sector like cases of children who fail to transition to the next level in their academics due to poverty, thus, they were unable to afford school fees. Other students missed out on the bursaries allocated by government.

As a journalist, I have covered numerous stories concerning access to education. When the government announced the introduction of free and compulsory primary education, Kenyans expected all children would have the opportunity to enroll in school and attain the highest standards education from nursery through secondary (high) school. Unfortunately, I have covered many cases of children missing out of school because they lack school levies. (Key Informant 6,2024)

4.4 Discussions

Based on the above findings, this study argues that although child rights issues are portrayed in the two newspapers as important, their coverage is still low, similar to findings from previous studies conducted by Asare-Donkoh (2017), Ortum (2013), Oyero (2010), and Bitrus-Ojiambo & King'ori (2020). Journalists interviewed during key informant interviews (KIIs) admitted that the media does not give children's stories the attention they deserve compared to other topics such as business, governance, politics, and sports—sentiments confirmed by studies conducted by Collings et al. (2016) and Larsen (2017). Some journalists reported political interference in Kenya as a major barrier in their coverage of children's rights issues: “Sometimes our media organizations tend to avoid topics that could jeopardize their revenue streams due to political influence” (Key Informant 7, 2024). This is in tandem with findings from a Reporters Without Borders (RSF, 2021) report. Other journalists mentioned the existence of punitive laws, policies and guidelines on reporting about children as a major setback, hampering their coverage of children's stories.

Generally, these findings agree with the agenda-setting theory, which explains that the media sets an agenda by telling people what is more important through the frequency of reporting, and if a story is not reported, it indicates that the story is considered unimportant. Therefore, much of what the public knows about issues around them depends



so much on the map created by stories in the media (McCombs & Valenzuela, 2020). Further, these findings have been reinforced by the notion of media framing, which, according to Entman (1993), “attention to some aspects of reality while obscuring other elements, might lead audiences to have different reactions.” By reporting children’s issues in news reports or editorials/opinions, the media can structure and determine the importance attached to news information based on the importance it attaches to an issue, how the issue is packaged, and how it is presented to the public for consumption.

This study also found that the media raised an alert on child labour and other violations of children’s rights, for example, children being misused on farms: “*While his age mates are asleep, he wakes up at 6am, dresses in long sleeve shirt, jeans cut into shorts and old rubber shoes and heads to farms nearby to look for work.*” (Daily Nation, October 02, 2020). However, Saint-Jacques, et al. (2012) argue that no matter how much the media pretends to be concerned about child protection, they do not publish as many articles as they need to influence child protection services. The study also notes that certain media outlets in Kenya tend to avoid topics that could jeopardize their revenue streams due to political influence, which is consistent with findings from a report by Reporters Without Borders (RSF, 2021).

V. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

This study analyzed newspaper coverage to assess the level of prominence given to children's stories. The findings reveal that there was low coverage of children, even though the media offered opportunities for children to comment on their issues without violating the ethical principles of journalism. This low coverage is attributed to the commercial interests of many media organizations, lack of specialized journalists who write and report on children’s issues, and the lack of motivation for journalists who devote their time to covering children’s stories, according to KIIs. There was diversity in the voices of stakeholders, including subject matter experts, who addressed issues related to children. For example, experts in the education and health sectors delved into specific issues affecting children. This was evident from the sustained awareness created by the media on children missing school and those engaged in child labour. The two selected newspapers also provided an in-depth coverage of government laws, policies and interventions. Media coverage also addressed discrimination against children, particularly focusing on the challenges girls faced, including health issues like period poverty, and other barriers preventing them from accessing education. Based on these findings, it can be argued that these newspapers did not give children’s issues the expected prominence, a conclusion confirmed by reporters and editors during key informant interviews.

5.2 Recommendations

Based on the analysis of the two selected newspapers’ coverage of children's rights (which cannot be considered fully representative) for one year, this study recommends that future research conduct a case study of all the major newspapers circulated in Kenya for a longer period, and examine specific components of child rights, such as child labour, education, and health, to assess the prominence given to children's stories by the newspapers. The study also recommends that academia incorporate children's reporting as a unit into journalism curricula to ensure journalists understand its importance and implications at an early stage. Additionally, it suggests that media organizations hire and retain specialist journalists who write and report on children’s issues for improved and sustained coverage. To increase media coverage of children, the study urges media stakeholders and child-focused organizations to use awards to motivate and inspire outstanding child rights journalists. This can be achieved through collaboration with the Media Council of Kenya during the Annual Journalism Excellence Awards (AJEA). Since the media is interested in stories that sell, the study also recommends that journalists explore opportunities to ensure children's stories that meet public interest are well covered in the media.

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The Role of Compensation on Job Satisfaction, Employee Performance and Organisational Performance

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ABSTRACT

Present research looked at the role of compensation on job satisfaction, employee performance and organisational performance. The study was underpinned through social-exchange theory. Further, research used quantitative approach through which gathering data employed questionnaires. Descriptive research design was adopted. Research used one of Tanzania's public organisations as a case study. The study opted to collect data from all the employees (107) of the organization hence sampling was not done. Out of 107 respondents, data were collected from 85 respondents which accounts for a response rate of 82.5%. Collected data were analyzed through descriptive and inferential statistics. Descriptive outcomes involved frequencies, means and standard deviations while those from inferential statistics were correlations and regressions. The study found compensation has significant positive influence on job satisfaction ($\beta=.790$, $P\text{-value}=.000$), employee performance ($\beta=.429$, $P\text{-value}=.000$), and organisational performance ($\beta=.551$, $P\text{-value}=.000$). The study calls for organisations to design and use effective compensation polices, strategies and practices to create supportive environment for employees to attain job satisfaction, employee performance and organisational performance as well.

Keywords: Compensation, Employee Performance, Job Satisfaction, Organisational Performance, Social Exchange Theory

I. INTRODUCTION

Job satisfaction is a global concern in workplaces and it one of the areas that scholars and practitioners of management have given much attention (Hünefeld et al., 2020). This is because it predicts so many other organisational outcomes, including but not limited to, employee absenteeism, turnover, and employee performance (Al-Ali et al., 2019; Gazi et al., 2022; Koo et al., 2020). Further, organisations invest in varied resources and strategies to ensure employees are satisfied. Empirical evidence shows that organisations in the USA, Japan, Germany and other western countries are facing a challenge of low job satisfaction (Alonderiene & Majauskaite, 2016; Drabe et al., 2015). Job satisfaction entails one's contentment about his/her job. A satisfied employee is considered an important asset that has to be retained at all costs. The literature explains how compensation is paramount in boosting workers' job satisfaction in various organisations (Adanlawo et al., 2023; Salisu et al., 2015). On the other hand, employee and organisational performance is also another area of concern globally. Stakeholders are concerned with how employees and their respective organisation in general perform given amount of investments that are done in their respective organisations (Alnachef & Alhajjar, 2017).

Job satisfaction, employee performance and organisational performance in African organisations need empirical and strategic approaches to deal with. Studies show that organisations are experiencing unsatisfactory levels of job satisfaction, employee and organisational performance. In Nigeria, low job satisfaction is linked with working conditions, training, leadership, working tools and infrastructure, and learning opportunities (Olufayo & Akinbo, 2021; Azi & Augustine, 2016; Lasebikan et al., 2020). The situation is similar in so many other African countries like Kenya, Uganda, Ethiopia, Ghana, and Zambia, to mention a few (Addis et al., 2018; Aruasa et al., 2019; Emmanuel & Akonor, 2017; Kim et al., 2021). While the issue of job satisfaction, employee performance and organisational performance seem to be a problem in many African countries, the magnitude and strategies used to improve the situation differ from a country to a country and an industry to an industry. This calls for more empirical studies with specific focus on different geographical areas to understand varied contexts and come up with appropriate solutions.

Job satisfaction, employee performance and organisational performance in Tanzanian organisations have been areas of concern for years. To deal with the problem there are organisations that have been implementing different strategies. Some strategies relate to improving compensation practices. Contrary to expectations, organisations have been reporting low level of job satisfaction which consequently lead to various outcomes like high labour turnover, low motivation and commitment (Mbunea et al., 2021; Mgaiwa, 2021; Mwita et al., 2023). This calls for further



investigation on how compensation is practiced and its role on job satisfaction. However, compensation of employee is not only for satisfying employees but also to enhance employee and organisational performance. Investments in organisations are assessed on their abilities to enhance organisational performance (Chalutz Ben-Gal, 2019). Managers' success is always gauged by how they contribute towards achievement of organisational goals (Moeuf et al., 2020). The need to assess the role of employee compensation on organisational performance is paramount to justify the efforts and resources invested in compensation (Maloa, 2018). Admittedly, compensation is centered in the reciprocity fashion. This means, employees receive financial and non-financial benefits for what they offer in achieving organisational goals and vice versa. This implies, compensations offered to employees will be lost in vain if employees do not have substantial contribution to organisational performance. This is the case in Tanzania context, performance of employees and organisations especially those in the public sector has been questionable (CAG, 2024; Mahuwi & Panga, 2020; Matemani, 2019). Current research emphasized on assessing role employee compensation on job satisfaction, employee performance and organisational performance.

1.1 Statement of the problem

The relationship between employers and employees is considered to be transactional (Nurlina, 2022). Employees get paid for what they offer to their respective organisations. This makes compensation one of important management practices to ensure employees achieve both individual and organisational goals (Chalutz Ben-Gal, 2019). Moreover, compensation is provided to enhance job satisfaction, which is considered a determinant of so many other organisational outcomes.

The Tanzania public service has been in the spotlight for decades regarding its ability to meet expectations of various stakeholders especially the citizens. The major concern has been on the ability of the public servants to achieve their goals and those of their respective organisations. Empirical evidence shows that performance of the public servants and that of their respective organisations is not satisfactory (CAG, 2024; Matemani, 2019). Further, their level of job satisfaction is alarming (Masanja, 2021; Mwakasangula & Mwita, 2023).

Researchers have been linking employee performance, organisational performance and job satisfaction in the public sector with various aspects, including leadership styles, working environment, and availability of resources, among others (Sospeter & Hassanal, 2022; Mwita & Mrema, 2023). The influence of compensation on job satisfaction, employee performance and organisational performance has not been given enough attention. This study examined the influence of compensation on all the three dependent variables, namely, job satisfaction, employee performance and organisational performance.

1.2 Research Objectives

- (i) To examine the role of compensation on job satisfaction
- (ii) To examine the role of compensation on employee performance
- (iii) To examine the role of compensation on organisational performance

1.3 Hypotheses

The study aimed at testing the following hypotheses;

H1: Compensation significantly influences job satisfaction

H2: Compensation significantly influences employee performance

H3: Compensation significantly influences organisational performance

II. LITERATURE REVIEW

2.1. Social Exchange Theory

This concept postulates that an organisation receives benefits from its employees as an exchange of what it offers to them (Ahmad et al., 2023). This means the more an organisation invests to its people the more it gets returns. Accordingly, any individual, benefiting from the other, is indebted to reciprocate that individual. This can be by means of good deeds and commitment as highlighted by Xuecheng et al. (2022). This is elucidated by the reality that when workers perceive rewards that they receive to be fair and just they are more likely to be contented and invest more efforts in their assigned work and ultimately enhance their performance as well as that of their individual firms (Rasheed et al., 2020). The theory sees an employee as rational being who uses available information to make decision with regard to efforts and energy to invest in an organisation. Various studies such as Ko and Hur (2014); Redy (2020) Wijaya and Rezek (2020) used social exchange theory to link compensation with job satisfaction, employee performance and/or organisational performance.



2.2 Conceptual Review

2.2.1 Compensation

Compensation can be defined as benefits that an employee receives as the result of services he/she provides to an organisation (Khalid & Nawab, 2018). It is divided into financial and non-financial compensation. Financial compensation involves monetary benefits that employees receive as an exchange of what they offer to an organisation. On the other hand, non-financial compensation implies non-monetary benefits that employees receive in the course of service they provide to their respective organisations (Mahathir et al., 2020). This may include recognition, training and development opportunities, housing facilities and others. With reference to Tanzania, compensations that employees receive varies from one organisation to another and from one employee to another. However, public organisations have similar compensation packages. Public servants having similar qualifications generally receive the same compensation benefits with some variations in a few cases. One of the reasons is the fact that compensation decisions and strategies are on top-down basis (from respective ministries and the office responsible for public service management) (Sirili & Simba, 2021). Admittedly, organisations have internal compensation policies and practices that to the certain extent differentiate amount and types of compensations that employees receive from their respective organisations. Financial benefits such as travelling allowances, housing allowances, etc largely depends on employees' positions and ranks in an organisation.

2.2.2 Job or Work fulfillment/satisfaction

It depicts a good feeling or pleasant affection arising from acknowledgement of individual experiences at job or work, according to Locke (1976). There are numerous determinants of job satisfaction. They include, working conditions, leadership and supervision, compensation, training and career development opportunities, among other many variables (Farrington & Lillah, 2019; Rahayu et al., 2019; Salisu et al., 2015; Taheri et al., 2020). Job satisfaction has not explored extensively in Tanzania like in other countries specifically western countries. Limited empirical evidences available show that the level of job satisfaction in varied organisations especially public organisations is not satisfactory (Mgaiwa, 2021; Mwita et al., 2023). This has been linked with number of people who leave these organisations to go to work elsewhere and demonstration of unwanted behaviours like turnover and absenteeism (Mwita et al., 2023). Nevertheless, various initiatives have been put in place to help increase the level of employee job satisfaction. This includes improving working conditions of employees. One example that can be cited is rehabilitation and construction of modern offices by the government of Tanzania in the past few years. Additionally, the government has been improving financial benefits that employees in both private and public organisations receive. This is evident on how the government has been raising the minimum wage for employees in both private and public organisation.

2.2.3. Employee Performance

This term entails achievement of a person at work. This occurs after expending the needed effort on the job. It is usually connected through accessing adequate work, engaged profile in addition to colleagues/employers who are understanding in the midst (Pradhan & Jena, 2017). It is linked to how individuals at work perform their assigned roles and duties efficiently and effectively. Organisations are so concerned with how their respective employees perform since organisational performance largely depends on employee performance. Further, organisations invest numerous resources in employees expecting positive results (Inuwa, 2016).

2.2.4. Organisational Performance

This is a field which is overly studied in management sciences. With large amount of literature available on organisational performance yet, there is no consensus of one accepted definition. This is due to the reasons that there are numerous dimensions that one can use to measure performance. However, it is generally accepted that organisational performance has to do with an organisations' capacity to realize its pre-determined aims. While there is no consensus of what organisational performance is, Taouab and Issor (2019) link organisational performance with organisation's ability to meet expectations of various stakeholders. Performance of organisations in Tanzania is presented in different ways with different perspectives.

2.3. Empirical Review

2.3.1. Compensation and Job Satisfaction

Employees who receive sufficient compensation find it easier for them to solve various problems and ultimately life becomes better-off for them. Amount and types of compensation therefore play an important role for employees to assess whether they are fair and just by comparing with efforts they offer to their respective organisations (Yao et al., 2017). This implies workers who are better compensated are prone to like their jobs and find



happiness at work more. The study of Muguongo et al. (2015) which was done in Kenya among secondary teachers found compensation is a significant work fulfillment determinant. Similarly, study of Salisu et al (2015) which was done in Nigeria among public sector construction workers reported substantial and considerable correlation between pay and job fulfillment. Surprisingly, a recent study by Adanlawo et al (2023) indicated a detrimental connection between pay and job satisfaction. Possible explanation is presence of unattractive compensation in a situation where employees have other reasons to be satisfied.

H1: Compensation significantly influences job satisfaction

2.3.2. Compensation and Employee Performance

When employee consider pay or compensation as fair and just they tend to get motivated which is an important determinant of their performance at work. Organisations with attractive compensation packages both monetary and non-monetary compensation have higher chances of enhancing performance of their employees. The study of Darma and Supriyanto (2017) which was done in Indonesian technology industry shows positive link between pay and performance of employee. Further, Widagdo (2018) looked at the link between compensation and employee performance. The study highlighted compensation is a substantial element of performance in workers. Similar study was conducted by Okwudili and Edeh (2017) in the civil service context in Nigeria. Like previous studies, research reported favorable correlation between worker compensation and their performance.

H2: Compensation significantly influences employee performance

2.3.3. Compensation and Organisational Performance

Role of compensation on organisational performance cannot be underestimated. Organisations that offer better compensation packages tend to possess a higher probability to do better compared to those whose packages are considered unattractive. Compensation practices are linked to their ability to motivate people and therefore instill the spirit to work better and happily which are crucial to organisational performance (Cahyani et al., 2022). The study of Kayani and Gan (2022) which was done among Asia Pacific firms found increased pay of CEO resulted to boosted performance of firms. This was achieved by encouraging executives to enhance rewards of shareholders. On the other hand, basic salary is of no consequence. Kim and Jang (2020) conducted survey on impacts of increasing compensation on workers' performance in restaurants. Outcomes suggest restaurant businesses ought to embrace compensation of workers as an instrument in management. This will promote performance in respect to growth of profits in the short-term and longterm revenue advantage. Outcomes similarly imply that businesses in restaurant sector ought to take into account adjusting small but consistent improvements in compensation of employees so as to preserve enhanced performance results.

H3: Compensation significantly influences organisational performance

2.4. Conceptual Framework

The study developed the conceptual framework that shows how the independent variable (i.e. compensation) affects job satisfaction, employee performance and organisational performance. The framework is presented in figure 1.

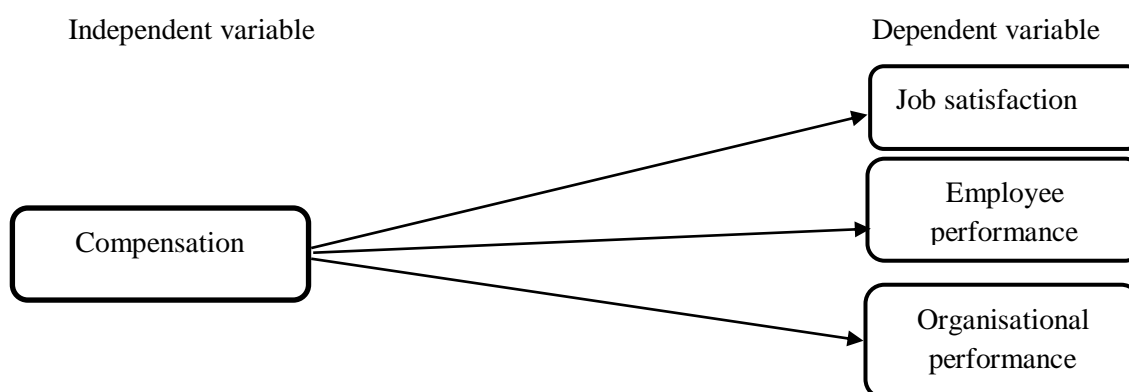


Figure 1
Conceptual Framework



III. METHODOLOGY

Research adopted a quantitative approach that involved use of case study through which Tanzania Education Institute (TIE) which is located in Dar es Salaam, Tanzania was used. Descriptive design was used to Quantitative approach is applicable in research aiming at examining connection between elements (Mwita, 2022). The organisation had a total of 107 employees. To ensure that sufficient amount of data is collected the researchers opted to collect data from all the employees however, 103 were reached. The target was reached by 79.4% after 85 respondents successfully and correctly filled the questionnaires and returned for data analysis. The questionnaire used had four scales which had five-point likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Compensation was measured by a scale by Chuang and Liao (2010), Job satisfaction was measured by a scale by Brayfield and Rothe (1951) and organisational performance was measured by a scale by Ironson et al (1989). On the other hand, employee performance was measured by a scale developed by Pradhan and Jena (2017) which measures three categories of performance i.e. task performance, adaptive performance and contextual performance. Data analysis involved descriptive and inferential statistics. Descriptive statistics was used to calculate means and standard deviations of each construct and variable involved in the study. Inferential statistics was used analyze correlation and testing hypotheses.

IV. RESULTS & DISCUSSIONS

4.1 Response Rate

The study focused on collecting data from 107 employees of Tanzania Institute of Education. Questionnaires were distributed to 103 respondents. Out of 103 questionnaires distributed, 85 questionnaires were correctly filled and included in the study which accounts for 82.5% response rate. A rate of 70% and above is considered very good for social science research (Mugenda & Mugenda, 2003).

Table 1

Response Rate

<i>No. of distributed questionnaires</i>	<i>No. of collected questionnaires</i>	<i>Response rate</i>
107	103	82.5%

4.2 Demographic characteristics of respondents

The study involved a total of 85 respondents who had different demographic characteristics. Out of the 85 respondents, 44(51.8%) were males and 41 (48.2%) were females. A total of 3(3.5%) had age of below 23 years, 43 (50.6%) were of age ranging from 23 to 33, the age bracket of 34 go 43 had 32 respondents (37.6%) and 7 respondents (8.25) were of the age ranging from 44 to 53. On marital status, 16 respondents (18.8%) were married and 33 (38.8%) were not married. On education level, 16 (18.8%) had diploma qualification, 53 (62.4%) had bachelor degree, 14 (16.5%) had master's degree qualification and 2 (2.4%) were PhD holders. The data show how diverse the respondents were which gives an impression data provided came from a representative sample. The results are summarised in Table 2.

Table 2

Demographic Characteristics

<i>Characteristic</i>	<i>Category</i>	<i>Frequency (%)</i>
Gender	Male	44 (51.8%)
	Female	41 (48.2%)
Age	Below 23	3 (3.5%)
	23-33	43 (50.6%)
	34-43	32 (37.6%)
	44-53	7 (8.2%)
Marital status	Married	52 (61.2%)
	Not married	33 (38.8%)
Education level	Diploma	16 (18.8%)
	Bachelor degree	53 (62.4%)
	Master's degree	14 (16.5%)
	PhD	2 (2.4%)
Total		107



4.3. Descriptive Results

Descriptive statistics was involved to calculate mean and standard deviation of each variable involved in the study. The results are presented below.

4.3.1. Reliability of the research instrument

To ensure reliability of the questionnaire used, the study checked for Cronbach alpha. The test showed that compensation had coefficient of 0.771, job satisfaction had .890, employee performance had 0.890 and organisational performance had .828. The coefficients for all the variables are above 0.7. As the general rule, any value equal or above 0.7 signifies that a scale is reliable for data collection and analysis.

Table 3

Cronbach Alpha Values for the Variables

Variable	Cronbach's Alpha	No. of items
Compensation	.771	7
Job satisfaction	.890	4
Employee performance	.890	7
Organisational performance	.828	23

4.3.2 Compensation

The results in Table 4 shows means and standard deviations for constructs of compensation. The weighted mean is 3.46 and standard deviation is 1.023. The mean shows that compensation a slightly above the mid-point. This gives an impression that although compensation cannot be considered excellent, employees find it somewhat satisfying. The standard deviation shows that the scores from the respondents were not far from the mean score since the difference from the mean score was relatively low.

Table 4

Descriptive Results for Compensation

Statements (Constructs)	Mean	S. D
EC1: On average the pay level (including incentives) of our employees is higher than that of our competitors	3.64	.687
EC2: Employee salaries and rewards are determined by their performance	3.31	.772
EC3: My organisation rewards employees for new ideas for improving customer services	3.22	.878
EC4: My organisation provides a variety of benefits	3.41	.745
EC5: My organisation attaches importance to the fairness of compensation/rewards	3.73	2.296
EC6: Employees receive monetary or nonmonetary rewards for great effort and good performance	3.41	.917
EC7: My organisation gives special rewards to employees who are excellent in serving customers	3.52	.868
Weighted mean & standard deviation	3.46	1.023

4.3.3 Job Satisfaction

The results in table shows that employees are, too the large extent, satisfied with their job with the mean score of 3.74. By considering that the scale had five points (from 1 to 5), the respondents agree that they are satisfied with their job. The standard deviation of .812 shows that there was no significant dispersion from the mean score.

Table 5

Descriptive Results for Job Satisfaction

Statements (constructs)	Mean	S. D
JS1: I feel real enjoyment in my job	3.64	.843
JS2: I like my job better than the average worker does	3.65	.896
JS3: Most days I am enthusiastic about my job	3.94	.696
JS4: I feel satisfied	3.72	.811
Weighted mean & standard deviation	3.74	.812

4.3.4. Employee Performance

Employee performance had three sub-variables which are task performance, adaptive performance and contextual performance. Task performance had a mean of 3.36 and standard deviation of 1.030, adaptive performance



had a mean of 3.21 and standard deviation of 1.078 and contextual performance had a mean of 3.63 and standard deviation of 1.240. Generally, there were no significant differences of performance levels among the three variables although the contextual performance was the highest. The results show that employee performance was slight above the average. One can draw a conclusion that although employee performance was perceived to be above average yet the need for a better performance is desired. The standard deviations for all three sub-variables show that the respondents' scores distributions were not significantly far from the mean scores.

Table 6*Descriptive Results for Employee Performance*

Statements (constructs)	Mean	S. D
TP1: I use to maintain high standard of work	3.72	.750
TP2: I am capable of handling my assignments without much supervision	3.49	.895
TP3: I am very passionate about my work	3.33	.918
TP4: I know I can handle multiple assignments for achieving organisational goals	3.34	.907
TP5: I use to complete my assignments on time	3.01	1.384
TP6: My colleagues believe I am a high performer in my organisation	3.25	1.327
Weighted mean & standard deviation	3.36	1.030
AP1: I use to perform well to mobilise collective intelligence for active team work	3.41	1.303
AP2: I could manage change in my job very well whenever the situation demands	2.86	1.432
AP3: I can handle effectively my work team in the face of change	3.54	1.385
AP4: I always believe that mutual understanding can lead to viable solution in my organisation	2.47	1.087
AP5: I use to lose my temper when faced with criticisms from my team members	2.99	1.116
AP6: I am very comfortable with job flexibility	3.75	.575
AP7: I use to cope well with organisational changes from time to time	3.44	.645
Weighted mean & standard deviation	3.21	1.078
CP1: Used to extend help to my co-workers when asked or needed	3.27	.697
CP2: I love to handle extra responsibilities	3.42	.762
CP3: I extend my sympathy and empathy to my co-workers when they are in trouble	3.49	.840
CP4: I actively participate in group discussion and work meetings	3.59	.776
CP5: I use to praise my co-workers for their good work	3.61	.742
CP6: I deliver lot of satisfaction nurturing others in organisation	3.75	.738
CP7: I use to share knowledge and ideas among my team members	3.78	.8822
CP8: I use to maintain good coordination among fellow workers	3.98	.672
CP9: I use to guide new colleagues beyond my job purview	3.76	.826
CP10: I communicate effectively with my colleagues for problem solving and decision making	3.69	.900
Weighted mean & standard deviation	3.63	.784

4.3.5. Organisational Performance

Results in Table 7 show that the weighted mean for organisational performance was 3.76 and the standard deviation was 1.240. The mean score implies that organisational performance is generally satisfactory with consideration that the highest score of the scale was five (5). Admittedly, there is a room for improvement to make organisational performance more impressive. The standard deviation of 1.240 shows that the dispersion from the mean score was not something to worry about.

Table 7*Descriptive Results for Organisational Performance*

Statement (constructs)	Mean	S. D
OP1: My organisation has better quality of products and services as compared to others	3.67	.822
OP2: My organisation develops new products/services	3.74	.875
OP3: My organisation is able to attract essential employees	3.64	.911
OP4: My organisation is able to retain essential employees	3.73	.918
OP5: In my organisation, the customers/clients are satisfied with the organisation products/services	3.54	.868
OP6: In my organisation, there is a good relationship between management and employees	3.79	.901
OP7: In my organisation, there is good relationship among employees in general	4.18	3.385
Weighted mean & standard deviation	3.76	1.240



4.4. Correlation Analysis

Correlation analysis was done to test how compensation was related with job satisfaction, employee compensation and organisation compensation. The results show that compensation was positively and strongly correlated with job satisfaction ($r=.738$). On the other hand, correlation between compensation and employee performance ($r=.463$) was moderate and positive. Moreover, correlation between compensation and organisational performance was moderate and positive ($r=.425$).

Table 8

Correlation Matrix

Indicator		Compensation	Job satisfaction	Employee performance	Organisational performance
Compensation	Pearson Correlation	1			
	Sig. (2-tailed)				
Job satisfaction	Pearson Correlation	.738**	1		
	Sig. (2-tailed)	.000			
Employee performance	Pearson Correlation	.463**	.594**	1	
	Sig. (2-tailed)	.000	.000		
Organisational performance	Pearson Correlation	.592**	.581**	.425**	1
	Sig. (2-tailed)	.000	.000	.000	

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

4.5. Hypothesis Testing

Research tested hypothesis using ANOVA. The results summarized in Table 9 depict compensation had a substantial explanatory power on job satisfaction by 54.5%. Further, it was found that compensation positively and significantly influence job performance ($\beta=.790$, $P\text{-value}=.000$). Moreover, it was found that compensation had a significant explanatory power of 35% on employee performance. Outcome, denote compensation had a significant positive effect on employee performance ($\beta=.429$, $P\text{-value}=.000$). Further, compensation had significant explanatory power of 21.5% on organisational performance. Moreover, the study confirmed the hypothesis that compensation positively influence organisational performance ($\beta=.551$, $P\text{-value}=.000$).

Table 9

Hypothesis Testing Results

Hypothesis	R	R ²	β	p-value	Decision
Compensation significantly influences job satisfaction (H1)	.738	.545	.790	.000	accept
Compensation significant influence employee performance (H2)	.592	.350	.429	.000	accept
Compensation significant influence employee performance (H3)	.463	.215	.551	.000	accept

V. DISCUSSION OF RESULTS

The study found compensation has a significant positive impact on jobs satisfaction. This gives an implication that organisations with better compensation practices are more likely to improve job satisfaction of their respective employees. This finding is consistent with the findings of Muguongo et al (2015); Salisu et al (2015) and Adanlawo et al (2023). Compensation is paramount to job satisfaction since it is one of important factors that employees consider before joining any organisation and how long they will stay in an organisation. When compensation is not well administered in an organisation it may lead to low job satisfaction. It is important to consider that employees tend to compare their compensations with those of their counterparts. Counterparts could be fellow employees or even employees of another organisation. This calls the need to consider internal and external consistency when designing compensation packages for an organisation to ensure employees do not feel the sense of inequity.

The second objective of this study was to examine the role of compensation of employee performance. The study found compensation has significant positive effective on employee performance. This finding supports the findings of Darma and Supriyanto (2017); Widagdo (2018) and Okwudili and Edeh (2017) which found similar findings. The finding entails that when employees consider compensation practices and packages attractive it will



improve their performance. Admittedly, it is an expectation and wish of every organisation that employees will perform extraordinarily. As pointed out in this study, the link between compensation and employee performance has been well established by various researchers in the literature. One might be interested to know why organisations do not offer attractive compensation for them to perform better. Ability to pay has been cited as one of the common reasons. Some organisations find compensation a challenging practice because of their limited financial capacity to compensate their employees satisfactorily (Leer Jørgensen et al., 2020). However, compensation does not involve financial compensation only, since there are other non-financial compensations when well administered can enhance performance of employees. Organisations that have good compensation policies and practices can benefit by enhancing performance of their employees. This seems to be more relevant in public organisations in Tanzania in which managers have limited influence on how much an employee have to be compensated.

The third objective of this study focused on the relationship between compensation and organisational performance. The study found compensation has a significant positive effect on organisational performance. This makes compensation one of important determinants of organisational performance. The findings are consistent with those of Cahyani et al (2022); Kayani and Gan (2022) and Kim and Jang (2020). Given unsatisfactory performance of many public organisations in Tanzania, these findings call for the government to assess and rethink about compensations that public servants receive. By considering the nature of services that public organisations offer for the citizens the issue of organisational performance has to be taken seriously by examining all determinants of organisational performance including compensation.

This study's findings also support the social exchange theory that underpinned the study. What organisations do to their employees has reciprocal effect on what employees will offer to their organisations. Giving employees attractive compensation, having effective compensation policies and practices is considered as investment that can help organisations to have employees who are satisfied, perform extraordinarily as well as having ability to enhance performance of their respective organisations.

VI. CONCLUSIONS & RECOMMENDATIONS

6.1 Conclusions

Research sought to assess the role of compensation on job satisfaction, employee performance and organisational performance. Based on the findings, compensation plays a substantial and favorable role on job satisfaction, employee performance and organisational performance. Organisations with effective compensation are more likely to have better results and achieve a competitive advantage. Compensation policies, practices and strategies therefore deserve a serious attention in organisations. It should be noted that employees are the most valuable resources in any organisation and therefore ensuring they have better compensation is vital not only for them to offer positive outcomes to an organisation but also to retain them. This validates concept of social exchange that postulates that employer-employee relationship is based on reciprocity. Employees will invest their energy and efforts in an organisation as a result of fair and equitable compensation.

6.2 Recommendations

This study, recommends that organisations have to consider designing and reviewing their compensation policies and strategies to ensure they can make working places preferred by employees. This is an important determinant of job satisfaction, employee performance and organisational performance as well.

Organisations are recommended to ensure they have leaders and managers who are competent in administering employee compensation effectively. This can be done by ensuring those who get promoted to managerial positions understand well principles and practices of compensation. Organising capacity building programmes will help to achieve this as well.

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