EFFECT OF PUBLIC EDUCATION EXPENDITURE AND PER CAPITA INCOME ON GENDER PARITY IN KENYA

BY

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DECLARATION

I hereby declare that this thesis is my original work and has not been presented in any university for award of any degree.

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Declaration by supervisors

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To my late father Jacktone Kagunza Mahangilu and my late Father in law Jefferson Mweu Kabeba.

ABSTRACT

Education is widely recognized as a crucial catalyst for economic development due to its capacity to cultivate human capital, a fundamental factor in fostering economic progress. To effectively attain the sustainable development goals (SDGs), it is imperative for the Kenyan government to prioritize the provision of inclusive and equitable quality education, as well as the facilitation of enhanced learning outcomes for all individuals. The achievement of gender parity, as assessed by the Gender Parity Index (GPI) of 1, is crucial for the realization of gender equality in the field of education. This objective aligns with Goal 5 of the Education for All (EFA) initiative, which aims to eliminate gender gaps in in enrolment at the primary and secondary levels education. The majority of research conducted on the impact of public education spending and per capita income on educational outcomes has been focused on metrics such as primary school enrollment, secondary school enrollment, adult literacy rates, and secondary school transition rates. Gender parity, however, has not been extensively utilized as a measure for assessing educational outcomes in these studies. The studies also employed the measure of overall education expenditure, rather than examining expenditure at different levels of schooling. The primary objective of this study was to investigate the impact of public education expenditure and per capita income on gender parity in Kenya. Specifically, the study aimed to assess the influence of expenditure on secondary education on gender parity, analyze the effect of expenditure on primary education on gender parity, and examine the effect of per capita income on gender parity in Kenya. This analysis was based on the human capital theory and the public spending theory proposed by Musgrave and Rostow. The research employed a correlational research approach, utilizing annual time series data spanning a period of 50 years from 1972 to 2021. The data was gathered from the world development indicators. The research utilized the Johansen Co-integration test to ascertain the existence of a long-term relationship among the variables. Additionally, the Vector Error Correction Mechanism was employed to integrate both long-term and short-term dynamics. Lastly, Granger causality analysis was conducted to determine the direction of causality. The study revealed unidirectional causality from expenditure on secondary education, expenditure on primary education, per capita income to gender parity in Kenya. The normalized co-integrating coefficients of 8.94, 2.29 and 0.0075 along with t-statistic values of 6.4317, 9.9565 and 2.8846 that surpassed the threshold of 2 implied that a one percent increase in expenditure on secondary education, expenditure on primary education and per capita income increased gender parity by 8.94%, 2.29% and 0.0075% respectively in the long run. Gender parity is significantly error correcting at 10.61% annually. The study concluded that in the long run, expenditure on primary education, expenditure on secondary education and per capita income promotes gender parity in Kenya. In view of this, the study is significant to literature by proving the human capital theory and the Musgrave's and Rostow's public expenditure theories by underscoring the importance of public investment in education and per capita income as key factors influencing the degree of investment in human capital. The study recommends increased financial allocation to the primary and secondary level of education with utmost efficiency and establishment of a robust data collection and monitoring system for efficient monitoring and tracing of the enrolment rates and to facilitate evidence based decision making which in the long run will help the country achieve the targeted gender parity index of 1.

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ACRONYMS AND ABBREVIATIONS

ADF test:	Augmented Dickey Fuller test
AIC	Alkaike Information Criterion
BG test:	Breusch-Godfrey test
CLRM:	Classical Linear Regression Model
DW	Durbin Watson
ECM	Error Correction Model
EFA:	Education For All
FDSE:	Free Day Secondary Education
FPE:	Free Primary Education
GDP:	Gross Domestic Product
GPE:	Global Partnership for Education
GPI:	Gender Parity Index
HCT:	Human Capital Theory
ILO:	International Labour Organization
JB test:	Jacque Berra test
KNBS:	Kenya National Bureau of Statistics
OECD:	Organization for Economic Co-operation and Development
OLS:	Ordinary Least Squares
SANE:	South Africa, Algeria, Nigeria and Egypt
SDG:	Sustainable Development Goals
UNESCO:	United Nations Educational Scientific and Cultural Organization
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
VIF:	Variance Inflation Factor

OPERATIONAL DEFINITION OF TERMS

Gender parity index: number of female students enrolled in primary and secondary schools as compared to the number of male students.

Gender parity- There is an equitable distribution of girls and boys enrolled in primary and secondary schools in relation to their respective proportions among the population.

Gross enrolment rate- number of students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school age population

Per capita income- refers to total GDP divided by the total population of a country

Public education expenditure- refers to the aggregate monetary resources allocated by the government to the primary and secondary levels of education as a percentage of total budgetary allocation to the education sector.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Education expenditure refer to the budgetary financial allocation by the government to the education sector. Education is an intrinsic entitlement extended to all individuals, and it assumes a pivotal function in facilitating economic advancement and fostering societal advancement. The aforementioned benefits arise from the process of educational development, as it enables economies to assimilate contemporary technology, enhance human capital, enhance health outcomes, foster social equality and cultural diversity, augment productivity, and generate employment opportunities (Republic of Kenya, 2015; Nafziger 2006; Psacharapoulos, 1988). The major objective of Kenya's Vision 2030 blueprint is to facilitate the transformation of the nation into a globally competitive and affluent entity by the year 2030. This transformation is envisioned to be built around the fundamental pillars of social, economic, and political growth. Education, being a fundamental element of society, holds significant importance in enabling the development of knowledge, attitudes, and skills that are vital for Kenya's progress as a nation striving for global competitiveness. Additionally, it assumes a pivotal role in the systematic acquisition of novel knowledge, aiming to improve goods and processes (Republic of Kenya, 2007).

Education outcomes which include gender parity in education as noted by Schultz (1981) are key elements in human capital development which are vital in accelerating revenue growth and advancement. The international community acknowledges the significance of the Education for All (EFA) program, which was introduced in Dakar, Senegal in 2000. This effort has set forth six objectives, namely the provision of excellent education, promotion of adult and youth literacy, achievement of gender parity, and enhancement of skill development. The aforementioned results

have had a substantial effect on the formulation of education policy in developing nations, as well as on international efforts in the field of development cooperation (UNESCO, 2015). The educational objectives were expected to be achieved by the year 2015. By 2015, around 33% of the 164 countries had successfully attained the literacy objective. The achievement of quality education, gender parity, and skill formation has not been fully realized, as indicated by the fact that only 52% of all nations have achieved universal primary enrollment and 46% have obtained universal secondary education enrolment (Global Partnership for Education, 2017; UNESCO, 2015).

1.1.1 Per Capita and Public Education Expenditure, Per capita income and gender parity

The notion of gender parity refers to the objective of attaining a balanced and equitable representation of both females and males, in accordance to their respective demographic proportions (Republic of Kenya, 2015). The realization of gender equality in education requires the achievement of gender parity in enrollment, as measured by the gender parity index (GPI). Goal 5 of the Education for All (EFA) project aims to address the issue of gender disparities in primary and secondary education. According to the trend forecasts for the Gender Equality Index in elementary and secondary education across 164 nations, it was observed that just 62 countries, representing 37.8% of the total, had successfully attained the stated objective of achieving gender parity in enrollment by the year 2015. Nevertheless, it is important to highlight that all Sub-Saharan African nations, including Kenya, failed to attain gender equality in elementary and secondary education levels (UNESCO, 2015).

The persistent global worry over the achievement of education for all objectives is attributed to the fundamental impediment of insufficient financial resources, as highlighted by the Republic of Kenya (2015). In a research done by the World Bank in 2012, it was found that countries affiliated

with the Organization for Economic Co-operation and Development (OECD) invest an average of 5.5% of their Gross Domestic Product towards the allocation of financial resources for educational endeavors. On the contrary, it is evident that Sub-Saharan African nations allocate around 4.3% of their Gross Domestic Product (GDP) to the field of education. This allocation might be linked to the relatively weaker tax base in these countries.

The Kenyan constitution establishes a framework that promotes gender equality and prohibits discrimination based on gender. According to Article 2(a), the government is required to carry out the responsibilities outlined in the international treaties to which it has affixed its signature. The Kenyan government has exhibited its commitment to promoting high-quality education and equal opportunity for all citizens by its active engagement in several international, regional, and national agreements and policy documents. In addition to the Universal Declaration of Human Rights and the Convention on the Elimination of All Forms of Discrimination against Women and the Convention on the Rights of the Child, other significant international agreements and declarations are included in the aforementioned documents and conferences. These include the Beijing Declaration and Platform for Action, the Dakar Framework of Action on Education for All, the Millennium Development Goals, and the Jomtiem World Conference. The national gender equality commission was established through the legislative enactment by the parliament in August 2011. The main goal of this commission is to address and reduce gender imbalances and oppose prejudice against individuals of all genders.

It is evident that there has been a discernible upward trajectory in government expenditure allocated to the education sector, as well as an increase in per capita incomes, spanning across

many years. An illustrative instance of this phenomenon can be observed in the upward trajectory of the overall government expenditure on education in Kenya. There was a significant rise in expenditure, with an increase from Kshs. 85 billion in the fiscal year 2003/04 to Kshs. 496.8 billion in the fiscal year 2019/20. The increase in student enrollment can be ascribed to the enactment of the Free Primary Education (FPE) policy and the provision of Free Day secondary school education (FDSE) policies (Republic of Kenya, 2020; Republic of Kenya, 2016).

In the year 1970, the index was recorded as 0.45, signifying a ratio of 45 female students for every 100 male students. Nevertheless, as of 2009, the index exhibited a notable rise to 0.9, indicating a discernible reduction in the disparity between genders in terms of school attendance. However, the objective of attaining full equity in enrollment, as measured by a gender parity index of 1, has presented significant difficulties (Nicolal, Prizzon, & Hine, 2014). A review of the education sector development plan of Kenya for the period from 2018 to 2022, it is apparent that the Gender Parity Index (GPI) for the year 2018 was documented as 0.95. The presented data indicates a divergence of 1 from the desired objective, implying a deficiency in attaining gender equality within the educational framework.

Extensive scholarly investigations have been conducted to explore the correlation between public investment in education, individual income levels, and educational accomplishments. Numerous studies have been conducted in various countries, such as Nigeria (Obi et al., 2016; Dauda, 2011; Anyanwo & Erhijakpor, 2007), India (Iyer, 2009), and Kenya (Mbaya, 2016). These studies collectively demonstrate there is a multifaceted link between the overall funds allocated on education and per capita income, wherein both variables display both positive and negative

impacts on educational achievement. In specific cases, the increase in government expenditure on education and the growth in per capita income have been linked to higher levels of enrollment, advancement, and achievement in primary and secondary educational institutions. However, when considering alternate scenarios, it is evident that these same qualities were associated with a decline in educational attainment rates. Nevertheless, it is imperative to acknowledge that the emphasis on metrics such as enrollment, transition, and completion rates, along with the overall public funding allocated to education, poses challenges in determining the specific impact of individual components of public expenditure on education on achieving gender parity as an educational outcome. The justification for doing this investigation is based on this rationale.

1.2 Statement of the Problem

Gender parity in education facilitates equitable opportunities for both girls and boys, enabling them to maximize their individual capabilities. Globally, gender inequality in education is considered one of the main problems facing developing countries. Within the context of the Sustainable Development Goals (SDGs), the gender equality in education is considered one of the most challenging goals for most developing Countries (United Nation). Despite the introduction of (FPE) and Free Day High School (FDSE) in Kenya, alongside other educational initiatives, discernible disparities persist in terms of gender-related discrepancies in performance, access, retention, transition, and attainment across all educational tiers. Within the specific context of Kenya, there is a notable gap observed in the distribution of educational outcomes among various counties and genders. For instance, there has been a constant pattern of male students outnumbering female students in elementary and secondary school enrollments, hence worsening the discrepancy in gender equity.

The evaluation of educational achievements in many research endeavors, including those carried out in Kenya, has primarily depended on measures such as enrollment rates in primary and secondary schools, adult literacy levels, and rates of transition from secondary to higher education. Nevertheless, it is crucial to acknowledge that these studies have not specifically prioritized the assessment of the degree of gender parity in educational achievements. Moreover, the study employed a measure of total expenditure on education, rather than investigating the allocation of funds towards certain educational degrees.

The efficacy of progressive policies in mitigating the gender parity gap may be hindered in the absence of a complete comprehension of the diverse factors that can contribute to narrowing the disparity, such as public investment in education and individual income levels. The association between public investment in education and per capita income, as well as its impact on gender parity, remains a subject of uncertainty in Kenya. The primary intent of this research study was to investigate the influence of government funding on secondary schools in Kenya in relation to achieving gender equality. The results obtained from this research endeavor will enhance our comprehension of the interplay between these variables, hence filling in the existing lacunae in our current knowledge base.

1.3 Objectives of the Study

1.3.1 General Objective

To evaluate the effect of public education expenditure and per capita income on gender parity in Kenya.

1.3.2 Specific Objectives

i. To assess the effect of expenditure at the secondary level of education on gender parity in Kenya.

ii. To analyze the effect of expenditure at the primary level of education on gender parity in Kenya.

iii. To evaluate the effect of per capita income on gender parity in Kenya.

1.4 Research Hypothesis

i. H_0: Public expenditure at the secondary level of education has no significant effect on gender parity in Kenya

ii. H_0: Public expenditure at the primary level of education has no significant effect on gender parity a in Kenya

iii. H_0: Per capita income has no significant effect on gender parity in Kenya

1.5 Significance of the Study

Kenya has acknowledged the fundamental status of education as a basic entitlement and the imperative for ensuring equitable access and opportunities. The manifestation of this phenomenon is evident in the implementation of the 2010 Constitution and the formulation of several policies and legislation, such as the Gender Policy in Education, the gender policy within the realm of

education and training, and the fundamental Act of 2013, among other examples. In addition, the country has exhibited its commitment to international accords like as the Sustainable Development Goals, which seek to achieve universal access to inclusive and equitable education of high quality, as well as foster gender equality in educational opportunities. Despite the implementation of significant legislative and regulatory initiatives, the education of girls continues to be influenced by gender stereotypes, economic barriers, and societal customs, leading to their heightened disadvantage in comparison to boys (Nzesei, 2017; Republic of Kenya, 2015). The issue of mitigating educational disparity may not be adequately resolved through the simple enactment of progressive legislation, as it requires a complete comprehension of the multifaceted factors involved. Undertaking a research endeavor centered on examining the influence of public allocation in education on gender parity in Kenya has the potential to generate significant knowledge regarding the correlation between financial allocation in education and per capita income and its resultant effects on educational achievements. This analysis offers significant insights for policymakers, educators, researchers, and other pertinent stakeholders involved in formulating policies that are in line with the long-term socio-economic goals stated in Vision 2030, the 2010 constitution, and the fourth global sustainability target (SDG) that places particular emphasis on the achievement of comprehensive and equitable access to high-quality education for all individuals.

1.6 Scope of the Study

The research utilized a dataset comprising yearly time series observations over a duration of 50 years, precisely ranging from 1972 to 2021. The research employed data relating to many components of public education spending, including both primary and secondary education expenditures, as well as per capita income. The major purpose of this research was to analyze how

public education expenditure affect educational outcomes, with a special emphasis on gender parity in enrolment at the primary and secondary levels education. This analysis also took into consideration the effects of temporal trends. In 1972, Kenya recorded the lowest gender parity index of 0.71 in relation to the other years and as per the International Labour Organization (ILO) 1972 report there was little attention devoted to the needs of terminal primary school pupils (Lindsay, 1980).

1.7 Theoretical Framework

The theoretical structure of this research work was premised on the Musgrave-Rostow public expenditure theory. The theory as argued by Smith (2006) and Schultz (1972) postulate that the advancement in human capital investment is majorly influenced by expenditure, incomes and time.

Therefore, in order to achieve gender parity in education, inputs such as expenditure on education, per capita income, time and other factors are necessary. This can be hypothesized as in model 1.1 and 1.2.

$$G_t = f\left(P_t, S_t, Y_t\right) \quad (1.1)$$

$$G_t = f\left(P_t, S_t, Y_t, \varepsilon\right) \quad (1.2)$$

Where

G- Gender parity in primary and secondary school enrolment

S- Expenditure on secondary education

P- Expenditure on primary education

Y- Per capita income

t - Time

ε- Error term

From model 1.2, gender parity is a function of expenditure on secondary education, expenditure on primary education and per capita income. This implies that a change in expenditure on secondary education, a change in expenditure on primary education and a change in per capita income is likely to have an effect on gender parity. This model agrees with the human capital theory and Musgrave and Rostow's public expenditure theory that postulate that advancement in human capital is majorly influenced by expenditures, income and time.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This part offers a thorough evaluation of the relevant scholarly literature and identifies the existing research deficiencies that the present study seeks to fill. This study provides a thorough examination of both theoretical and empirical literature, along by an assessment of the current deficiency in the extant body of research.

2.2 Theoretical Literature

2.2.1 The Human Capital Theory

This theory according to Fix (2018) was put forward in the 20th century. The proponents that include Schultz (1961), Becker (1960) and Mincer (1958) in their research work showed that the theory aims at linking income and human capital. Investment in human capital as noted by Schultz (1972) involves investment in education experiences and training which improves productivity that in turn increases income. According to the theory as noted by Peters (2015) and Smith (2006), individuals choose to invest in themselves through education and training where education is seen to be a vital instrument for enhancing economic growth i.e., the greater the investment in education by people, the better their future welfare and performance of economy. Since majority of individuals lack adequate resources to entirely invest in their own human capital (education), governments typically intervene with subsidies provided through public expenditure on education (Smith, 2006).

As applied in this study, the human capital theory holds that investment in education through public education expenditure and per capita income creates productive stocks embodied in individuals

for providing services over future periods (Schultz, 1972). Public education expenditure is vital for improving access and quality of education for girls (Wawire & Ngware 2019). Higher per capita income levels in Kenya have been linked to better educational investment at the household level leading to improved educational outcomes. Families with higher incomes are more likely to invest in education thereby enhancing gender parity (World Bank 2018).

2.2.2 Musgrave and Rostow's Public Expenditure Theory

The Musgrave-Rostow model posits that economic growth is dependent on an increase in public expenditure. According to Guandong and Muturi (2016), there is an indication that in the initial phases of economic development, there will be a substantial increase in public expenditure. According to Edame and Eturoma (2014), the rationale behind increased government expenditure in the early phases is driven by the imperative to establish fundamental economic infrastructure, it is important to develop key components such as transportation networks, water supply systems, and sanitary facilities. As the economy advances, there is a noticeable change in public investment towards the facilitation of human capital development. This movement is accomplished by allocating more resources towards the enhancement of education, health, and welfare services (Guandong& Muturi, 2016). Nevertheless, there are opponents who contend that this theory fails to acknowledge the role of the private sector in fostering development, as it presupposes that government expenditure has a pivotal role as the primary engine for fostering economic expansion (Muthui et al., 2012).

The human capital and Musgrave-Rostow theories as applied to the study demonstrate that public expenditure on education, per capita incomes and time are critical in determining the level of the allocation of resources towards the development and enhancement of individuals' knowledge, skills, and abilities. However, as noted it is evident that the theories view public expenditure, time

and incomes as the key drivers of human capital development disregarding many other factors and more importantly in examining education as a human capital investment, specificity to the outcomes of education such as gender parity, school enrolment, literacy and completion rates among others were not considered.

2.3 Empirical Literature

2.3.1 Educational Outcomes and Public Education Expenditure

In a study conducted by Baldacci, Guin-Siu, and Mello (2003), a sample of 94 developing nations was studied to assess the efficacy of public expenditure on healthcare and education as indicators of social development. The researchers observed a notable and favorable correlation between government expenditure and the levels of enrollment in educational institutions. A study conducted by Okodua, H., Olabanji, O. E., and Ese, U. (2014) examined a sample of 58 countries characterized by low- and middle-income levels. The study found a positive and statistically significant relationship between funding for secondary education and overall secondary school enrollment. The utilization of this enrolment rate is frequently employed as a metric to assess educational achievement. While the primary emphasis of the study was on the progress of low-income countries, it is crucial to acknowledge that the exclusion of Kenya should not be interpreted as indicative of the applicability of the results to Kenya as a whole.

In 2016, Obi, Ekesiobi, Dimnwobi, and Mgbemena conducted a study with the objective of examining the relationship between government expenditure and educational outcomes in Nigeria. The research utilized the ordinary least squares (OLS) technique to examine time series data encompassing the years 1970 to 2013. The study findings indicated a statistically significant and favorable association between public investment and educational outcomes, specifically in regard to the rate of primary school enrolment. Similarly, the academic research carried out by Dauda

(2011) centered on evaluating the effect of government spending on education in Nigeria by analyzing literacy rates. In a similar vein, Adesiyan (2017) undertook a study aimed at investigating the connection between public spending and the rates of enrollment in primary and secondary educational institutions. The two studies produced noteworthy results, as Dauda (2011) established a strong and positive association between government spending and primary school enrollment rates, while Adesiyan (2017) observed a negative correlation between government expenditure and statistics on Secondary School Enrollment. The varying research findings within a country on the overall impact of education funding on educational outcomes have raised concerns about the possible effects of specific investments on primary and secondary education results. Moreover, it is crucial to recognize that employing literacy rates, primary and secondary school attendance as indicators of educational accomplishments does not inherently imply a causal connection between public expenditure on education and gender parity in education.

The study conducted by Carsamer and Ekyem (2015) examined the impact of educational expenditure on the enrollment rates of elementary and secondary schools in a sample of 20 African countries, with the exception of Kenya. The findings of the research indicate a direct relationship between educational investments and the levels of enrollment observed in basic and secondary educational institutions. The research undertaken by Mendis and Ichihashi (2014) unveiled a positive correlation between government expenditure and school enrollment in Sri Lanka, an emerging economy. The study utilized a panel consisting of nine geographically diverse areas around the country. The study's results demonstrate similar outcomes; however, employing total government expenditure on education and school enrollment as a metric for assessing educational accomplishments is insufficient in fully comprehending the relationship between primary and secondary school education funding and the attainment of gender equality in school enrollment.

An empirical investigation was conducted by Anyanwo and Erhijakpor (2007) with the aim of analyzing the correlation between government expenditure and school enrolment in South Africa, Algeria, Nigeria, and Egypt (SANE countries), with a specific emphasis on primary and secondary education. The study utilized panel data encompassing the years 1990 to 2002 for the aforementioned African nations. The ordinary least squares analysis shows a positive and statistically significant correlation between public education spending and student attendance in grades one through twelve. The research conducted by Iyer (2009) in India encompasses a comprehensive examination of time series data through a comparative approach. The findings of this investigation yield result that cast doubt on the conclusions drawn by Anyanwo and Erhijakpor (2007). The study's findings suggest a negative correlation between expenditure levels, per capita income, and the rate of enrolment. The conflicting results makes it difficult to apply the findings to Kenya. Furthermore the studies used enrolment rates as proxies for educational outcomes. This makes it difficult to ascertain whether public education expenditure and per capita income will have the same impact on gender parity in Kenya.

The objective of Mbaya's (2016) research was to analyze the effect of government spending on education in Kenya. Time series data were used for the study, which covered the years 1980-2013. Results showed a favorable correlation between the share of public funds spent on education and student achievement. The research included primary school completion rate and secondary school transition rate as indicators for evaluating educational accomplishments. Ordinary Least Squares (OLS) regression analysis was used to look at how different variables impacted elementary school graduation rates, including public expenditure on primary education, per capita income, urban population, primary teacher quality, and primary school pupil-teacher ratio. The primary aim of the research was to evaluate the influence of public spending in education on the rate of elementary

school completion. In this study, a regression analysis was utilized to examine the association between the rate of student transition from primary to secondary school and many characteristics. Spending by the government on secondary education was examined, as were the qualifications of secondary school teachers, the student-to-teacher ratio in secondary schools, average household income, and the rate of urbanization. The analysis shows that long-term rates of primary school completion and short-term rates of transition to secondary education are strongly and statistically significantly correlated with the allocation of public money towards education. The study was carried out in Kenya; nonetheless, it is crucial to acknowledge that utilizing primary completion rate and secondary transition rate as indicators for educational outcomes may not yield a comprehensive comprehension of the impact of education expenditure on gender parity in education.

2.3.2 Educational Outcomes and Per Capita Income

Adesiyan's (2017) research used time series data from Nigeria to investigate the link between GDP per capita and elementary and secondary school enrollment. Ordinary Least Squares (OLS) regression results showed that there is a positive link between GDP per capita and education levels. In their study, Okodua et al. (2014) analyzed a panel of 58 countries, Nigeria being one of them. The study's results show that a country's GDP is positively related to the number of its citizens who have completed secondary school. Moreover, research conducted in Nigeria by Dauda (2011) and Obi et al. (2016) found no statistically significant link between per capita income and adult literacy rates or primary school attendance. Adult literacy rate and primary school attendance are used as measures of educational achievement in Kenya, but the contradictory conclusions linked to these measures make it difficult to evaluate the possible influence of educational investment on gender parity in the education system of Kenya.

Anyanwo and Erhijkpor (2007) set out to conduct an empirical analysis of the connection between per capita income and enrollment in school across four African countries: South Africa, Nigeria, Algeria, and Egypt. The findings of the study indicated a statistically significant association between the factors. The present study sought to replicate the methodologies employed by Anyanwo and Erhijkpor (2007) through the examination of a panel dataset comprising 94 developing nations. Baldacci et al. (2003) demonstrated a robust positive association between per capita income and educational attainment levels.

Using time series data, Iyer (2009) and Mbaya (2016) independently investigated the correlation between India's per capita GDP and the quality of its public schools. According to Iyer's (2009) research, there is evidence to support the claim that enrollment rates in India decline as per capita income rises. Mbaya (2016), on the other hand, found a considerable and remarkable correlation between Kenya's per capita income and the percentage of students who graduate from primary school and go on to high school. The study's findings show that different measures of educational success are affected in different ways by changes in per capita income. So, it may be argued that generalizing things like school enrollment or transition rates might not be the best way to make conclusions about gender equality.

2.3.3 Public education expenditure, per capita income and gender parity

Forsythe et al (2003) in their study on the impact of economic growth on gender inequality for a group of developed and developing countries over the period 1974-1979 creates a gender inequality index that covers three dimensions of inequality namely education, health, and income. According to the study economic growth has a significant positive impact on gender inequality and that countries with higher gender inequality and lower per capita GDP at the beginning of the study period would experience the highest impact of growth on gender inequality. The study also

concludes that government spending on education is the only factor that has a significant impact on reducing gender inequality especially in countries with relatively high public spending on education in year 1979.

In their study on a group of low middle-income countries over the period 2000-2010, Qaisrani and Ahmed (2014) concluded that economic growth had an insignificant impact on gender equality in primary education. This was attributed to the government's responsibility to provide free primary education through public spending on education. According to the study, per capita income did not have any significant impact on gender equality in primary education but had positive significant impact on gender equality in higher levels of education.

According to Dollar & Gatti (1999), there is a convex relation between economic growth and gender gap in education in secondary schools. The study also finds that economic growth has a limited impact on gender inequality for countries moving from low-income to middle income group, while it has positive impact for countries moving from middle-income to high-income group. The study also attributes gender inequality in health and education to religion, regional factors, and civil liberty. According to the study, gender inequality in education has a negative impact on economic growth.

Shultz (2006) on his study on relationship between trade liberalization and the gender inequality in education and health find a significant positive impact of public spending on gender equality in primary education. These results are attributed to the desire by the governments to achieve the Millennium Development Goals (MDGs) to provide primary education for all and free of charge.

2.4 Summary of Literature Gaps

The existing body of literature demonstrates that a significant amount of academic research has been undertaken to investigate the impact of public expenditure on education and per capita income on educational outcomes. Nevertheless, it is evident that a discrepancy exists in the recorded findings. The evaluation of educational achievements in many research endeavors, including those carried out in Kenya, has primarily depended on measures such as enrollment rates in primary and secondary schools, adult literacy levels, and rates of transition from secondary to higher education. Nevertheless, it is crucial to acknowledge that these studies have not specifically prioritized the assessment of the degree of gender parity in educational achievements. Moreover, the study employed a measure of total expenditure on education, rather than investigating the allocation of funds towards certain educational degrees. The uncertainty surrounding the effects of public investment on education and per capita income on educational success poses a significant obstacle in reaching a definitive conclusion. It remains unclear whether these variables have a positive or negative effect. The precise correlation between public investment in education and per capita income, as well as its impact on gender parity, remains uncertain. Hence, the principal aim of this research is to examine the impact of public investment in education on the advancement of gender parity within the particular setting of Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This part provides a thorough overview of the research design, study area, model specification, data collection and sources of data, measurement of variables, statistical analysis processes, and data presentation.

3.2 Research Design

The research study employed a correlational research design to examine the relationship between the independent variables and the dependent variable. According to Oso and Onen (2011), correlation research design provides rigorous and replicable procedure for understanding relationships and determines whether, and to what degree, a relationship exists between quantifiable variables. The application of a correlational study technique enabled the assessment of the extent of correlation between public expenditure on primary and secondary education, per capita income, and gender parity within the specific context of Kenya. Several tests were done to examine the relationship between the variables. Co-integration test was done to ascertain the long impact of the independent variables on the dependent variable. Vector Error Correction Mechanism was used to validate the existence of long-term relationship and correction of the short run disequilibrium. The Granger causality test was conducted to determine the presence of a unidirectional or bidirectional causal relationship between the variables. Selection of order for the Vector-Auto Regression was done to ascertain the ascertain the most suitable lag length.

3.3 Study Area

The study focused on Kenya as an independent nation which is located at a latitude of 0.02360S and a longitude of 37.90620E. The nation exhibits a decentralized system of governance, characterized by the presence of forty-seven counties, each of which is administered by a county government comprising a governor, county legislature, and executive body.

3.4 Target population

The target population for the study was the number of students enrolled in public primary and secondary schools in Kenya. According to Republic of Kenya (2021), the number of students enrolled in public primary and secondary schools in the country in the year 2020 was 11,862,223

3.5 Model specification

The study model based on theoretical framework equation (1.2) is specified as (3.1)

$$G_t = \alpha_0 + \alpha_1 P_t + \alpha_2 S_t + \alpha_3 Y_t + \varepsilon_t \quad (3.1)$$

Where

G- Gender parity in primary and secondary school enrolment

S- Expenditure on secondary education

P- Expenditure on primary education

Y- Per capita income

t- Time

ε- Error term (explains the other factors that affect gender parity).

From this model, gender parity in primary and secondary school enrolment if a function of expenditure on secondary education, expenditure on primary education and per capita income. This implies that a change in expenditure at the primary and secondary levels of education and per

capita income are likely to have an impact on gender parity. Musgrave and Rostows public expenditure theory argue that advancement in human capital investment is majorly influenced by expenditure, incomes and time (Schultz 1972). Based on model 3.1 advancement in human capital investment as proxied by gender parity in enrolment at the primary and secondary levels of education is mainly influenced by expenditure on secondary education, expenditure on primary education and per capita income.

3.6 Measurement of variables

Gender Parity (G_t)

Gender parity (G_t)the gender parity index was employed to evaluate the gross enrolment rates in primary and secondary schools, encompassing both public and private educational institutions, within the specific setting of Kenya.

$$Gender\ parity\ index = \frac{Gross\ enrolment\ of\ \ girls\ in\ primary\ and\ secondary\ schools}{Gross\ enrolment\ of\ \ boys\ in\ primary\ and\ secondary\ schools}$$

Expenditure on primary education (P_t)

Expenditure on primary education (P_t)the metric utilized to assess the allocation of resources towards elementary education is the ratio of government expenditure dedicated to education.

$$Expenditure\ on\ primary\ education = \frac{Expenditure\ on\ primary\ education}{Total\ expenditure\ on\ education} \times 100$$

Expenditure on secondary education (S_t)

Expenditure on secondary education (S_t) the determination of educational prioritization was contingent upon the proportion of financial resources allocated to secondary education in relation to the overall government expenditure on education.

$$Expenditure\ on\ secondary\ education = \frac{Expenditure\ on\ secondary\ education}{Total\ expenditure\ on\ education} \times 100$$

Per capita income (P_t)

Per Capita Income P_t was measured by the percentage annual GDP per capita growth

3.7 Data Collection and Sources of Data

This research utilized time series information collected annually spanning a period of fifty years, commencing in 1972 and concluding in 2021. The data utilized in this analysis were obtained from the World Development Indicators.

3.8 Data Analysis and Presentation

3.8.1 Descriptive Statistics

The data on the variables were computed to determine the mean, maximum value, minimum value, skewness, and standard deviation for each of the variables under consideration. The Jacque-Bera (JB) test was used to assess the variables' normality.

3.8.2 Unit Root Test

The ADF test was employed by the researcher to assess the stationarity of the time series. This was to analyze the potential lack of stationary states in the variables being studied. Gujarati and Ahmad (2008) did a study to investigate the determination of stationarity in a time series. They

examined whether the average, variance, and auto-covariance of the time series were constant irrespective of the time at which they were seen. This constancy of the statistical properties indicates temporal invariance.

3.8.3 A priori expectation

The a priori expectation is a key component that highlights the expected impact of the independent variables on the dependent variable. The signs attributed to each independent variable in the equation presented in Table 3.1 serve as evident indicators of this circumstance.

Table 3. 1: A priori expectations

Variable	Sign	Evidence
G_t	-	-
S_t	+	Mbaya (2016), Mendis&Ichihashi (2014), Baldacci et al (2003), Carsamer&Ekyem (2015), Dauda (2011)
P_t	+	Obi et al (2016), Anyanwo&Erhijakpor (2007), Okodua et al (2014), Mendis&Ichihashi (2014)
Y_t	+	Dauda (2011), Adesiyan (2017), Mbaya (2016), Baldacci et al (2003), Anyanwo&Erhijakpor (2007)

Note: G- Gender parity, P- Expenditure on primary education, S- Expenditure on secondary education, Y-per capita income

3.8.4 Correlation Analysis

The main intent of conducting correlation evaluation is to assess the extent of the linear relationship between two variables. The Pearson's correlation coefficient was used to measure the degree of association between government expenditure on primary and secondary education, per capita income and gender parity index in enrolment at the primary and secondary levels of education. A correlation coefficient of +1 indicates a perfect positive relationship between the variables. A correlation value of -1 signifies a perfect negative association between the variables

under investigation. The lack of a link between variables can be inferred when the correlation coefficient is equal to zero (Gujarati, 2008).

3.8.5. Selection of order for the Vector-Auto Regression (VAR)

This study utilized various statistical tests to ascertain the most suitable lag time. The conducted tests included many statistical measures, such as the sequential modified LR test statistic, the Final predictor error, the Akaike information criteria, the Schwarz information criterion, and the Hannan-Quinn information criterion. The objective of these studies was to ascertain the optimal time duration to be designated as the lag.

3.8.6. Co-integration Analysis

According to Gujarati (2008), co-integration refers to the statistical procedure of conducting a regression analysis between two time series variables, both of which exhibit unit roots. This practice can potentially result in regression conclusions that are misleading in nature. This discovery suggests that while each individual time series displays non-stationarity, it is possible for a linear combination of one or more time series to display stationarity. The research utilized the Johansen co-integration test, a widely recognized and reliable approach renowned for its resilience, especially when dealing with several variables. According to Gonzalo (1994). Its application aimed to ascertain the enduring impact of Kenya's primary education expenditures, secondary education expenditures, and per capita income on gender parity within the country. To achieve this objective, we performed an empirical investigation aimed at examining the null hypothesis that posits the absence of any long-term impact of Kenya's primary education expenditure, secondary school expenditure, and per capita income on gender parity.

3.8.7. Vector error correction mechanism

This study used the Vector Error Correction Mechanism to validate the existence of long-term relationship and correction of the short run disequilibrium. Emeka (2003) stressed that an important issue in econometrics is the need to integrate short run dynamics with long run equilibrium. Though there may be a long-term, or equilibrium relationship between variables, in the short run there may be disequilibrium. Following Granger representation theorem which states that If two (or more) variables Y and X are cointegrated, then the relationship between (or among) them can be expressed as error correction mechanism. The relationship in model (3.1) can be expressed as follows;

$$G_t = \alpha_5 + \sum_{i=1}^{p} \alpha_6 G_{t-i} + \sum_{i=1}^{p} \alpha_7 P_{t-i} + \sum_{i=1}^{p} \alpha_8 S_{t-i} + \sum_{i=1}^{p} \alpha_9 Y_{t-i} + \lambda_i \mu_{t-1} + \varepsilon_{1t} \quad 3.2$$

$$P_t = \alpha_{10} + \sum_{i=1}^{p} \alpha_{11} G_{t-i} + \sum_{i=1}^{p} \alpha_{12} P_{t-i} + \sum_{i=1}^{p} \alpha_{13} S_{t-i} + \sum_{i=1}^{p} \alpha_{14} Y_{t-i} + \lambda_i \mu_{t-1} + \varepsilon_{2t} \quad 3.3$$

$$S_t = \alpha_{15} + \sum_{i=1}^{p} \alpha_{16} G_{t-i} + \sum_{i=1}^{p} \alpha_{17} P_{t-i} + \sum_{i=1}^{p} \alpha_{18} S_{t-i} + \sum_{i=1}^{p} \alpha_{19} Y_{t-i} + \lambda_i \mu_{t-1} + \varepsilon_{3t} \quad 3.4$$

$$Y_t = \alpha_{20} + \sum_{i=1}^{p} \alpha_{21} G_{t-i} + \sum_{i=1}^{p} \alpha_{22} P_{t-i} + \sum_{i=1}^{p} \alpha_{23} S_{t-i} + \sum_{i=1}^{p} \alpha_{24} Y_{t-i} + \lambda_i \mu_{t-1} + \varepsilon_{4t} \quad 3.5$$

Where

p = lag length,

μ_{t-1} = Error correction Term (ECT) that guides the variables G_t, P_t, S_t, Y_t to restore back to equilibrium.

ε_{1t}, ε_{2t}, ε_{3t}, ε_{4t} = white noise error terms,

3.8.8. Granger causality test

The Granger causality test as conducted by the researcher to determine the presence of a unidirectional or bidirectional causal relationship between the variables. The theory that

investments in primary education, secondary education, and per capita income do not granger generate gender parity was put to the test. The test was vital because it helps in improving time series forecasting models by identifying leading variables that influence future outcomes (Granger, C.W.J, 1980)

3.9 Diagnostic Tests

3.9.1 Normality test

Normality test was carried out to verify if the error terms are normally distributed. The normality of the residuals was assessed using the Jarque-Bera (JB) test. The presence of a normally distributed sampling distribution of the residuals implies that the sampling distributions of both the exogenous and endogenous variables are likewise expected to exhibit normality. According to Gujarati (2008) the JB test statistic is given by;

$$JB = \frac{n}{6}(S^2 + \frac{(k-3)^2}{4})$$

Where n= no. of observations,

s= skewness and

k = kurtosis.

It follows a chi^2 distribution with 2 degrees of freedom($\chi^2\ (2df)$).

The test null hypothesis was based on the assumption that the residuals conform to a normal distribution. Non normality in the residuals will be corrected by using the Generalized Least Squares (GLS) which improves the validity of statistical inferences made about the coefficients (Greene, 2012)

3.9.2 Autocorrelation

Autocorrelation is observed when the error term in a specific temporal interval exhibits correlation with the error term in a different temporal interval. The purpose of doing the Breusch-Godfrey

(BG) test was to evaluate the absence of any correlations or covariance among the error components. The hypothesis proposed that there would be no first-order autocorrelation between the error term at time t and the error term at time t-1. One of the most notable advantages of the BG test is its capability to incorporate lagged values of the dependent variable (Gujarati 2008). The presence of autocorrelation in the disturbance term will be corrected using the Newey West method where corrected standard errors of the OLS estimators that are corrected of autocorrelation will be obtained (Gujarati 2008)

3.9.3 Multicollinearity

Multicollinearity refers to a case in which two or more explanatory variables in the regression model are highly correlated making it difficult to isolate their individual effects on the dependent variable. Detection was by Variance Inflation Factor (VIF). Gujarati (2008) argues that the rule of thumb is that if Variance Inflation Factor (VIF) exceeds 10, that variable is said to be highly collinear.

The presence of severe multicollinearity among the independent variables will be resolved by transforming the variables into the first difference form. This will help reduce the severity of multicollinearity because although the variables may be highly correlated, there is no apriori reason to believe that their difference will also be highly correlated (Gujarati 2008)

3.9.4 Heteroscedasticity

The standard linear regression model is based on the assumption that the disturbances in the population regression function exhibit homoscedasticity, which implies that they possess equal variances. White's general heteroscedasticity test which does not rely on the normality assumption was used to test the null hypothesis that the residuals are not heteroscedastic against the alternative

hypothesis that the residuals are heteroscedastic. The presence of heteroscedastity in the residuals will be resolved by obtaining White's heteroscedastity corrected variance and standard errors which are considerably larger than the OLS standard errors. This will make the estimated t-values smaller than those obtained by OLS (Gujarati 2008)

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the research findings by employing a range of visual aids, including tables, graphs, charts, and figures. The chapter presents a comprehensive examination of several statistical techniques commonly employed in empirical research. These techniques encompass diagnostic tests for vector error correction models, descriptive statistics, stationarity testing, correlation analysis, lag length determination, co-integration analysis, vector error correction analysis, , and Granger causality testing.

4.2 Residual diagnostic tests results

4.2.1 Normality test

The presence of a normal distribution of residuals is detected when the statistical analysis of the Jarque-Bera statistic does not provide results that are deemed to be statistically significant. The objective of this study was to examine the null hypothesis that the residuals adhere to a normal distribution. A probability value beyond 0.05 indicates insufficient evidence to reject the null hypothesis, while a probability value below 0.05 warrants the rejection of the null hypothesis regarding normalcy.

Table 4. 1: Normality test results

Lag	Jarque-Bera	Df	Prob.
1	4.303596	2	0.1163
2	2.546887	2	0.2799
3	3.085839	2	0.2138

According to the findings presented in Table 4.1, the Jarque-Bera probability values exceeded the significance level of 0.05 across different lag periods. Based on the findings obtained from the present analysis, it can be inferred that, at a significance level of 5 percent, there exists insufficient evidence to reject the null hypothesis, which posits that the residuals conform to a normal distribution. Therefore, it may be deduced that the residuals demonstrate a normal distribution.

4.2.2 Autocorrelation test results

The primary aim of the study was to determine whether there exists a link between the error term at time t and the error term at time t-1, as well as any other time period, within the context of the linear classical model. The null hypothesis of no first order autocorrelation was tested.

Table 4. 2: Auto correlation test results

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.6932	Prob. F(2,26)	0.2036
Obs*R-squared	5.3009	Prob. Chi-Square(2)	0.0706

The findings presented in Table 4.9 revealed an observed effect with a probability value of 0.0706, surpassing the significance threshold of 0.05. The results of this study indicate that, based on a significance level of 5%, there is insufficient evidence to reject the null hypothesis, which posits the absence of first order autocorrelation. Hence, it can be inferred that there is a lack of empirical support for the existence of serial correlation.

4.2.3 Multicollinearity

Multicollinearity refers to the case in which two or more explanatory variables in the regression model are highly correlated which makes it difficult to isolate their individual effects on the

dependent variable. This study involved the use of Variance Inflation Factor (VIF) to test for multicollinearity.

Table 4. 3: Variance Inflation Factor results

Variable	Centered VIF
P_t	9.3998
S_t	9.4183
Y_t	1.1271

Note: P- Expenditure growth at the primary level of education, S- Expenditure growth at the secondary level of education, Y-Annual Per capita income growth. The Rule of Thumb is that if VIF Exceeds 10, the Variable is said to be highly collinear.

The results in Table 4.3 clearly indicate all the VIF are less than 10, i.e. 1.1, 9.4 and 9.3. This implies that none of the variables is highly collinear.

4.2.4 Heteroscedasticity

Heteroscedasticity is a phenomenon that arises when the variability of residuals is not consistent across a range of observable variables, resulting in an unequal dispersion of the error term. The experiment aimed to assess the null hypothesis that the residuals do not exhibit heteroscedasticity, in contrast to the alternative hypothesis that the residuals do exhibit heteroscedasticity.

Table 4. 4: Heteroscedasticitytest results

VEC Residual Heteroskedasticity Tests (Levels and Squares)		
Joint test:		
Chi-sq	Df	Prob.
270.8122	280	0.6422

The observed chi-square value was 270.8122, and its corresponding probability was 0.6422. The probability, surpassing the predetermined significance level of 0.05, as denoted in table 4.4, implies that there is inadequate evidence to refute the null hypothesis. As a result, it was concluded that the residuals did not provide any indication of heteroscedasticity.

4.3 Descriptive Statistics

This study employs a range of statistical methodologies, encompassing several descriptive measures such as the maximum, minimum, standard deviation, and the Jarque-Bera test. The statistical tools employed in this study are utilized for the purpose of evaluating the distribution of the data under analysis, particularly with regard to the minimum, maximum, and mean values. The objective of computing the mean is to get the arithmetic average for each variable, so offering a comprehensive representation. The utilization of the standard deviation was employed to measure the extent of dispersion within the given distribution. The primary objective of the Jarque-Bera test is to evaluate the degree to which a specific dataset conforms to the underlying assumption of a normal distribution.

Table 4. 5: Descriptive Statistics results

Aspect	G_t	P_t	S_t	Y_t
Mean	0.9164	52.75	26.12	1.1731
Maximum	0.9704	68.09	43.12	13.0497
Minimum	0.7127	34.19	15.47	-3.7667
Std. Dev.	0.0582	10.46	9.59	0.9329
Jarque-Bera	1.9156	5.2573	4.0293	3.2195
Probability	0.0610	0.0722	0.0581	0.1054
Observations	50	50	50	50

Note: G- Gender parity, P- Expenditure on primary education, S- Expenditure on secondary education, Y-per capita income

From Table 4.5, the average gender parity index is 0.9164, expenditure on primary level 52.75% and 26.12% for expenditure on secondary level. This implied that for the last 50 years in Kenya, an average of 52.75% of the total public education expenditure was allocated to primary education as compared to an average of 26.12% allocated to secondary education. The maximum value for gender parity index was 0.9704 which was achieved in the year 2000. The minimum gender parity index of 0.7127 was achieved in the year 1972. In the year 2000, 68.09% of the total education expenditure was allocated to primary education which was the highest allocation over the study period that might indicate that more allocation to primary education has a greater impact on enhancement of gender parity.

In regard to expenditure on secondary education, the highest allocation of 43.12% was achieved in the year 2014 while the lowest allocation of 15.47% was in the year 1984. The highest allocation to secondary education for the last 50 years corresponds to the year when the 8-4-4 system of education was introduced which required an enhanced budget for implementation. The highest GDP per capita growth rate of 13.0497%in Kenya was realized in the year 1972 while the lowest

growth rate in GDP per capita of -3.7667% realized in the year 1992 which can be attributed to the political situation in the country where Kenya was transitioning from 26 years of single party rule to a multi-party-political system.

The average value of all the variables was found to be greater than the measure of dispersion represented by the standard deviation. This finding indicates the absence of outliers in the dataset, which provides an initial indication of a normal distribution of the variables. Moreover, the Jarque-Bera test was utilized to assess the normal distribution of the variables. Based on the null hypothesis, which posits that the variables conform to a normal distribution, the Jarque-Bera p-values for all the variables were found to above the significance level of 0.05. Consequently, the null hypothesis was deemed to be acceptable, indicating that gender parity, expenditure at the elementary level of education, expenditure at the secondary level of education, and per capita income demonstrated a normal distribution with a significance level of 5%. The gender parity index in Kenya presently stands at 0.9164, signifying notable advancements towards the desired gender parity index of 1, while not yet reaching complete fulfilment.

4.4 Unit Root Test

The ADF unit root test was employed by the researcher in order to evaluate the stationarity of the variables. The examination was conducted under the assumption that the variable being studied did not demonstrate stationarity, as stated by the null hypothesis. This study utilized three distinct variants of the (ADF) model, including the intercept model, the trend and intercept model, and the model without an intercept term. According to the results presented in Table 4.1, it is apparent that the probability values linked to the variables of gender parity, primary education expenditure, and secondary education expenditure exhibited statistical significance at the 1st difference, as they fell

below the predetermined significance threshold of 0.05. This suggests that the variables underwent first-order integration, indicating that they achieved stationarity after a single differencing operation. In contrast, the per capita income demonstrated a statistically significant probability value below 0.05 across multiple tiers. This finding indicates that the per capita income had an integrated order of zero (0), implying that it remained unchanged at a consistent level. The inherent immobility of all variables implies that the occurrence of erroneous regression findings is improbable, so indicating the appropriateness of conducting Vector Autoregression (VAR) analysis without raising concerns about its applicability.

Table 4. 6: Unit root test results

		LEVEL		1ST DIFFERENCE		
Variable	Model	ADF T- Statistic	P- Value	ADF T- Statistic	P- Value	Inference
G_t	Intercept	-3.1763	0.0279	-5.7207	0.0000	I(0)
	Trend & Intercept	-2.3824	0.3831	-5.5072	0.0002	I(1)
	None	0.9959	0.9133	-5.9612	0.0000	I(1)
P_t	Intercept	1.3089	0.6179	-3.6042	0.0093	I(1)
	Trend & Intercept	-1.9635	0.6056	-3.7049	0.0342	I(1)
	None	-1.2230	0.2000	-3.5343	0.0007	I(1)
S_t	Intercept	-0.3365	0.9114	-4.5781	0.0005	I(1)
	Trend & Intercept	-2.3247	0.4130	-4.8784	0.0013	I(1)
	None	0.6261	0.8482	-4.5345	0.0000	I(1)
Y_t	Intercept	-6.3824	0.0000	-3.0962	0.0353	I(0)
	Trend & Intercept	-6.4319	0.0000	-308452	0.0245	I(0)
	None	-5.9935	0.0000	-3.0643	0.0031	I(0)

Note: G- Gender parity, P- Expenditure on primary education, S- Expenditure on secondary education, Y-per capita income, I(1)- integrated of order 1, I(0)- Integrated of order 0

4.5 Correlation Analysis

The study utilized the coefficient of correlation (r) to determine whether there was a linear association between the variables under investigation.

Table 4. 7: Correlation analysis results

Variable	G_t	P_t	S_t	Y_t
G_t	1.0000			

P_t	0.1329*	1.0000		
	(0.0357)	-----		
S_t	0.1960*	-0.7452*	1.0000	
	(0.0012)	(0.0000)	-----	
Y_t	0.3221*	0.3298*	0.3325*	1.0000
	(0.0225)	(0.0193)	(0.0183)	-----

Note: Values in parentheses ( ) – p-values and * indicate significant at 5% level of significance. G- Gender parity, P- Expenditure on primary education, S- Expenditure on secondary education, Y-per capita income

The findings presented in Table 4.7 demonstrate a statistically significant correlation between the variables, with a significance level of 5%. The observed relationship between the independent variable suggests that none of the correlation coefficients exceeded 0.9, indicating the absence of multicollinearity due to the low extent of interdependence among the independent variables. This research examines the outcomes in accordance with the stated objectives, with a specific focus on the association between the independent factors and the dependent variable the association between the independent factors and the dependent variable as outlined in sections 4.5.1 to 4.5.3. Moreover, within section 4.5.4, a comprehensive examination is undertaken to explore the correlation between the independent variables.

4.5.1 Expenditure on secondary education and gender parity

The correlation coefficient calculated, which is 0.1960, along with a probability value of 0.0012 (below the significance level of 0.05), indicates a statistically significant positive association between gender parity and expenditure on secondary education. The data suggest a weak positive association between gender parity and expenditure on secondary education, as indicated by a coefficient of 0.1960, which is below the threshold of 0.5. This finding suggests that there is a positive correlation between the level of investment in secondary education and the achievement of gender equality. As a result, the null hypothesis, which assumes no correlation between expenditure on secondary education and gender parity, was refuted at a significance level of 5%. There is a positive correlation observed between gender parity and expenditure on secondary education in Kenya. Specifically, a rise in expenditure on secondary education is linked to an increase in gender parity, whereas a drop in expenditure is connected with a fall in gender parity. The observed result was expected and consistent with the investigations carried out by Mbaya (2016) in Kenya and Mendis & Ichihashi (2014) in Sri Lanka.

4.5.2 Expenditure on primary education and gender parity

The results presented in Table 4.7 demonstrate a correlation coefficient of 0.1329, together with a corresponding probability value of 0.0357. The results of this study suggest a statistically significant and positive association between gender equality and investment in primary education. The aforementioned deduction is substantiated by the observation that the probability value is lower than the predetermined significance threshold of 0.05. The findings of the study demonstrated the rejection of the null hypothesis, which posited that there is no statistically significant correlation between gender parity and expenditure on primary education. The null

hypothesis was found to be statistically significant and hence rejected at a significance level of 5%. Therefore, it can be deduced that there is a clear correlation between gender parity and the allocation of financial resources for primary education in Kenya. There exists a positive correlation between primary school expenditure and gender parity, indicating that an increase in expenditure is linked to an enhancement in gender parity, whereas a drop in expenditure is related with a deterioration in gender parity. The correlation observed in this study aligns with the anticipated outcomes and is in line with the findings documented by Obi et al. (2016) in their research conducted in Nigeria, as well as the findings reported by Anyanwo and Erhijakpor (2007) in their study encompassing various African countries including Nigeria, Algeria, Egypt, and South Africa.

4.5.3 Per capita income and gender parity

The association between per capita income and gender parity is depicted in Table 4.7. The calculated correlation value of 0.3221 indicates a positive relationship between the variables being examined. The obtained probability value of 0.0193, as determined through the analysis, indicates that the observed link holds statistical significance. The probability value that has been calculated is found to be lower than the crucial threshold of 0.05, suggesting a statistically significant positive correlation between per capita income and gender parity. A moderate correlation can be observed between gender parity and per capita income. This finding implies a direct association between per capita income and gender parity, suggesting that an elevation in per capita income is commonly accompanied by a rise in gender parity. The null hypothesis, which posits that there is no statistically significant relationship between gender parity and per capita income in Kenya, was rejected at a significance level of 5 percent. This discovery suggests a clear association between gender equality and the average per capita income in Kenya. Based on the existing data, there is

evidence supporting a positive correlation between per capita income and gender parity. This suggests that an increase in per capita income is typically accompanied by an enhancement in gender parity. Conversely, in situations when per capita income experiences a fall, there is an observable inclination towards the deterioration of gender parity. The obtained outcomes were in line with the suggested assumptions and further supported the discoveries of previous studies conducted by Dauda (2011) and Adesiyan (2017) in Nigeria.

4.5.4 Per capita income, expenditure on primary education and expenditure on secondary education

The data presented in Table 4.7 exhibits a correlation coefficient of -0.7452, accompanied by a probability value of 0.0000, which is lower than the conventional significance level of 0.05. The present discovery suggests a statistically significant negative relationship between the allocation of money to elementary education and the allocation of funds to secondary education. This observation suggests the existence of a negative link between government expenditures dedicated to primary education and secondary education, wherein an increase in funding for one sector is matched by a decrease in spending for the other sector. The correlation coefficient of 0.3298, along with a probability value of 0.0193 (which is lower than the specified significance threshold of 0.05), indicates a statistically significant positive relationship between per capita income and expenditure on elementary education. This discovery implies the existence of a positive association between per capita income and the distribution of government expenditure towards primary education. The identified link is consistent with the findings presented by Dauda et al (2016) in their study done in Nigeria. The correlation coefficient of 0.3325, along with a probability value of 0.0183, beyond the standard significance level of 0.05, offers substantial evidence supporting a statistically significant positive association between per capita income and expenditure on

secondary education. This implies that there exists a positive correlation between per capita income and government expenditure on secondary education, which is consistent with the results obtained in Adesiyan's (2017) research conducted in Nigeria.

4.6 Lag length Determination

The determination of an ideal lag length is crucial in VECM model as it entails the incorporation of lagged variables in a series.

Table 4. 8: Standard VAR Lag Order Selection Criteria results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	125.7430	NA	5.91e-08	-5.2932	-5.1342	-5.2336
1	306.6131	322.4208	4.57e-11	-12.4614	-11.6664*	-12.1636
2	328.1793	34.6934	3.65e-11	-12.7035	-11.2723	-12.1674*
3	344.2276	23.0258	3.80e-11	-12.7056	-10.6384	-11.9312
4	367.1560	28.9097*	3.06e-11*	-13.0068*	-10.3036	-11.9942

The analysis of the VAR lag order selection criterion, as presented in Table 4.8, indicates that the prevailing techniques, such as LR, FPE, and AIC, consistently suggest a lag length of 4. The lowest values for LR, FPE and AIC are found in lag 4 as indicated by the asterisk (*) on their co-efficients. According to Gujarati (2008), the determination of the suitable lag period for the Vector Error Correction Model (VECM) is determined by P-1. The current study has determined that the optimal lag duration is three, in contrast to the usual Vector Autoregression (VAR) model. This phenomenon occurs because when the lag is too short, there is a possibility that the model lacks sufficient specification. Conversely, if the lag is excessively lengthy, there is a risk of losing several degrees of freedom (Hanclova, 2011).

4.7 Co-integration Analysis

A co-integration test was performed to ascertain the presence of a sustained link among the variables in the long run. The study involved investigating the null hypothesis, which proposes the lack of any co-integrating interactions, as opposed to the alternative hypothesis, which proposes the existence of one or more co-integrating links.

Table 4. 9: Co-integration analysis results

Unrestricted Co-integration Rank Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.6020	79.8574	47.8561	0.0000
At most 1 *	0.4021	36.5576	29.7971	0.0071
At most 2	0.2049	12.3841	15.4947	0.1394
At most 3	0.0336	1.6085	3.8415	0.2047
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.6020	43.2998	27.5843	0.0002
At most 1 *	0.4021	24.1735	21.1316	0.0181
At most 2	0.2049	10.7757	14.2646	0.1658
At most 3	0.0336	1.6085	3.8415	0.2047
Normalized cointegrating coefficients (standard error in parentheses)				
G	P	S	Y	
1.000000	-2.2900	-8.9400	-0.0075	
	(0.2300)	(1.3900)	(0.0026)	
	[-9.9565]	[-6.4317]	[-2.8846]	

Note: G- Gender parity, P- Expenditure on primary education, S- Expenditure on secondary education, Y-per capita income. Values in ( ) are standard errors while values in [ ] are t-statistics, * implies statistical significance at 5% level of significance.

The results of the Johansen co-integration test, as displayed in Table 4.9, encompassed the trace test and Maximum Eigenvalue. The findings of this study provide evidence of the existence of two co-integrating equations, hence rejecting the null hypothesis that no co-integration is present. The findings indicate that there exists co-integration among the variables, with a statistical significance

level of 5%. This implies that the independent variables, namely primary education spending, secondary education expenditure, and per capita income, have a long-term impact on gender parity. Additionally, the co-integrating coefficients underwent standardization, resulting in the formulation of the long-term relationship models 4.1 and 4.2. The coefficients inside the model were determined based on the specific objectives mentioned in sections 4.7.1 to 4.7.3.

$$G_t - 2.29P_t - 8.94S_t - 0.0075Y_t = 0 \quad (4.1)$$

$$G_t = 2.29P_t + 8.94S_t + 0.0075Y_t \quad (4.2)$$

4.7.1 Expenditure on secondary education and gender parity

The first objective of this study was to evaluate the impact of financial resources allocated to secondary education on the achievement of gender parity in the context of Kenya. The co-integration coefficient of 8.94, along with a t-statistic of 6.4317>2, indicates a statistically significant positive association between expenditure on secondary education and gender parity in Kenya over an extended period of time. The allocation of funds for secondary education witnessed a rise in percentage, resulting in a subsequent enhancement of gender parity by 8.94%. The null hypothesis, positing that there is no statistically significant impact of public education expenditure on secondary school on gender parity, was thus rejected. The results align with the previously recognized concept that there is a direct correlation between investment in secondary education and the achievement of gender equality. The findings of this study align with the empirical studies conducted by Mendis and Ichihashi (2014) in Sri Lanka, Carsamer and Ekyem(2015) in 20 African countries excluding Kenya, and Anyanwo and Erhijakpor (2007) in four African nations (South Africa, Algeria, Nigeria, and Egypt).

4.7.2 Expenditure on primary education and gender parity

The second objective of this study was to investigate the influence of expenditure on elementary education on gender parity within the specific setting of Kenya. The co-integration coefficient of 2.29 for expenditure on basic education, accompanied by a t-statistic of 9.9565 that surpasses the threshold of 2, indicates a statistically significant and favorable long-term influence of primary education investment on gender parity in Kenya. The percentage increase in funding allocated to elementary education resulted in a corresponding gain of 2.29% in gender equality. Therefore, the null hypothesis, which posits that there is no statistically significant impact of public education expenditure on gender parity in primary schools, was determined to be rejected. The results align with the initial premise that there exists a positive correlation between investment in elementary education and gender equality in Kenya. The findings of this inquiry align with the empirical studies undertaken by Obi et al (2016), Dauda (2011), and Adesiyan (2017) in Nigeria, as well as the study conducted by Baldacci et al encompassing 94 developing nations.

4.7.3 Effect of per capita income on gender parity

The third purpose of this research was to examine the influence of per capita income on gender parity within the specific setting of Kenya. The estimated co-integration coefficient of 0.0075, along with a t-statistic of 2.8846 over the threshold of 2, presents empirical support for a statistically significant positive association between per capita income and gender parity in Kenya in the long term. The observed increase in per capita income corresponded to a commensurate enhancement of 0.0075% in gender parity. As a result, the null hypothesis, which posits the lack of a statistically meaningful correlation between per capita income and gender parity, was found to be invalid. The results align with the previously established hypothesis that there is a positive correlation between per capita income and gender equality in Kenya. The findings of this inquiry

align with the empirical research undertaken by Dauda (2011) and Adesiyan (2017) in Nigeria, as well as the multinational study conducted by Okodua et al spanning 58 nations.

4.8 Vector Error correction mechanism

Economic agents typically require a period of time to adapt to the flow of information and respond accordingly. Following Granger representation theorem which states that if two (or more) variables Y and X(s) are co-integrated, then the relationship between (or among) them can be expressed as error correction mechanism. Existence of co-integration among the variables of the model necessitated the need for the VECM to capture the short run dynamics of the model. The Error Correction Model (ECM) is a statistical framework that combines both long-run and short-run relationships in order to address deviations from the long-run equilibrium.

Table 4. 10: Error correction mechanism results

Error Correction:	D(G)	D(P)	D(S)	D(Y)
ECT	-0.1061	0.1687	0.2828	-53.0310
	(0.0516)	(0.2331)	(0.1499)	(19.1304)
	[-2.0572]	[0.7239]	[1.8866]	[-2.7721]
D(G(-1))	-0.6981	0.4002	0.5565	39.2316
	(0.1287)	(0.5816)	(0.3741)	(47.7329)
	[-5.4250]	[0.6881]	[1.4877]	[0.8219]
D(G(-2))	-0.0150	0.4595	0.5487	-22.2037
	(0.1609)	(0.7272)	(0.4677)	(59.6837)
	[-0.0933]	[0.6319]	[1.1730]	[-0.3720]
D(G(-3))	0.3158	-0.0176	0.1746	-97.2788
	(0.1316)	(0.5948)	(0.3826)	(48.8188)
	[2.3999]	[-0.0295]	[0.4564]	[-1.9927]
D(P(-1))	0.0333	0.0255	-0.0761	5.1949
	(0.0454)	(0.2051)	(0.1319)	(16.8291)
	[0.7350]	[0.1243]	[-0.5766]	[0.3087]
D(P(-2))	0.0460	0.2046	-0.2941	-15.8372
	(0.0404)	(0.1825)	(0.1174)	(14.9746)
	[1.1403]	[1.1211]	[-2.5060]	[-1.0576]

D(P(-3))	-0.0475	-0.1989	0.0573	1.4896
	(0.0416)	(0.1879)	(0.1209)	(15.4205)
	.[-1.1419]	[-1.0586]	[0.4738]	[0.0966]
D(S(-1))	-0.1081	-0.3598	0.2162	0.4466
	(0.0680)	(0.3074)	(0.1977)	(25.2268)
	[-1.5889]	[-1.1704]	[1.0938]	[0.0177]
D(S(-2))	0.0397	-0.1546	0.0740	1.9301
	(0.0617)	(0.2789)	(0.1794)	(22.8898)
	[0.6432]	[-0.5543]	[0.4123]	[0.0843]
D(S(-3))	0.0618	-0.1755	-0.0112	-13.7462
	(0.0621)	(0.2809)	(0.1807)	(23.0507)
	[0.9949]	[-0.6248]	[-0.0618]	[-0.5963]
D(Y(-1))	0.0016	0.0007	-5.22E-05	0.5756
	(0.0006)	(0.0028)	(0.0018)	(0.2291)
	[2.6667]	[0.2566]	[-0.0291]	[2.5126]
D(Y(-2))	0.0001	0.0007	-0.0020	0.2263
	(0.0006)	(0.0025)	(0.0016)	(0.2080)
	[0.1838]	[0.2751]	[-1.2290]	[1.0882]
D(Y(-3))	-0.0006	-0.0008	-0.0006	0.3688
	(0.0004)	(0.0019)	(0.0012)	(0.1586)
	[-1.3802]	[-0.4365]	[-0.4541]	[2.3252]
C	0.0040	-0.0059	-0.0034	0.7600
	(0.0017)	(0.0076)	(0.0049)	(0.6262)
	[2.3881]	[-0.7673]	[-0.6986]	[1.2138]
R-squared	0.7229	0.3294	0.4642	0.6239
Adj. R-squared	0.5978	0.0266	0.2222	0.4540
Sum sq. resids	0.0009	0.01873	0.0077	126.1554
S.E. equation	0.0054	0.0246	0.0158	2.0173
F-statistic	5.7768	1.0879	1.9187	3.6730
Log likelihood	183.6639	114.2737	134.5744	-88.4753
Akaike AIC	-7.3332	-4.3162	-5.1989	4.4989
Schwarz SC	-6.7369	-3.7200	-4.6026	5.0952
Mean dependent	0.0030	-0.0045	0.0039	0.1712
S.D. dependent	0.0086	0.0249	0.0179	2.7302

Note: G- Gender parity, P- Expenditure on primary education, S- Expenditure on secondary education, Y- per capita income. Values in ( ) are std errors while values in [ ] are t-statistics, * implies statistical significance at 5% level of significance.

The results summarized in table 4.10 by examining the F- statistics and the R^2 indicate that the variables in VECM significantly explained short – run changes in only G_t (Gender parity) and Y_t (per capita income) at 5% level of significance and not those of $S_t(secondary\ education\ expenditure)\ and\ F_t$ (expenditure on primary education) accounting for 72.29 % and 62.39 % of the variations in the two series of gender parity and per capita income respectively.

When employing gender parity as the dependent variable, the coefficient of the Error Correction Term (ECT) is -0.1061. The observed coefficient demonstrates the anticipated negative direction, consistent with a priori economic projections. Moreover, the statistical significance of this finding is established at a level of significance of 5%. The results of this study offer empirical support for the existence of a long run relationship between the variables of secondary education spending, elementary education expenditure, per capita income, and gender parity within the context of Kenya. This analysis showcases the dynamic nature of gender equality in Kenya, which is influenced by several factors such as changes in secondary education expenditure, primary education expenditure, per capita income, and their historical patterns. These factors contribute to noticeable adjustments in the pursuit of gender equality in the country.

The aforementioned number suggests that any temporary imbalance in gender parity in the immediate term is rectified at a rate of 10.61% in the subsequent year. The coefficient of determination, denoted as 0.7229, suggests that approximately 72.29% of the observed fluctuations in gender parity in Kenya can be accounted for by alterations in per capita income and expenditures on primary and secondary education.

Gender parity at the first and third lags had a significant effect on the current year's gender parity in Kenya. A coefficient of -0.6981 in lag 1 and 0.3158 in lag 3 indicated that a percentage increase in gender parity at lag 1 decreases the gender parity in the current year by-0.6981% but a percentage increase at lag 3 increases the gender parity in the current period by 0.3158%.

Per capita income at lag 1 had a significant effect on the current year's gender parity in Kenya as indicated by a coefficient of 0.0016. This indicated that a percentage increase in per capita income at lag 1 increased gender parity by 0.0016% in the current year. Per capita income at lags 2 and 3 had no significant effect on the current year's gender parity as indicated by the coefficients 0.0001 & -0.0006 with $|t|$ statistic values of 0.1838 & -1.3802 respectively which less than 2 were.

Expenditure on primary education at lags 1, 2 and 3 had no significant effect on the current year's gender parity as indicated by the coefficients 0.0333, 0.0460 and -0.0475 with $|t|$ statistic values of 0.7350, 1.1403 and 1.1419 respectively which were less than 2. Similarly, expenditure on secondary education at lags 1, 2 and 3 an insignificant effect on the current year's gender parity as indicated by the coefficients -0.1081, 0.0397, and 0.0618 with $|t|$ statistic values of 1.5889, 0.6437, 0.9949 respectively which were less than 2.This assertion suggests that the present augmentation in government spending on primary education can alone contribute to the advancement of gender equality over an extended period of time.

From the results in table 4.6 models (3.2), (3.3), (3.4) and (3.5) are represented as models (4.3), (4.4), (4.5) and (4.6) respectively with 3 lags and t-statistics in parentheses.

$$G_t = 0.0040 - 0.6981G_{t-1} - 0.0150G_{t-2} + 0.3158G_{t-3} + 0.0333P_{t-1} + 0.0460P_{t-2} - 0.0475P_{t-3} - 0.1081S_{t-1} + 0.0397S_{t-2} + 0.0618S_{t-3} + 0.0016Y_{t-1} + 0.0001Y_{t-2} - 0.0006Y_{t-3} - 0.1061\mu_{t-1} \quad (4.3)$$

$$P_t = -0.0059 + 0.4002G_{t-1} + 0.4595G_{t-2} - 0.0176G_{t-3} + 0.0255P_{t-1} + 0.2045P_{t-2} - 0.1989P_{t-3} - 0.1989S_{t-1} - 0.3598S_{t-2} - 0.1546S_{t-3} - 0.0007Y_{t-1} - 0.0007Y_{t-2} - 0.0008Y_{t-3} - 0.1687\mu_{t-1} \quad (4.4)$$

$$S_t = 0.0034 - 0.5565G_{t-1} + 0.5487G_{t-2} + 0.1746G_{t-3} - 0.0761P_{t-1} - 0.2941P_{t-2} - 0.0573P_{t-3} + 0.2162S_{t-1} + 0.0740S_{t-2} - 0.0112S_{t-3} - 5.22Y_{t-1} - 0.0020Y_{t-2} - 0.0006Y_{t-3} + 0.2828\mu_{t-1} \quad (4.5)$$

$$Y_t = 0.7600 + 39.2316G_{t-1} - 22.2037G_{t-2} - 97.2788G_{t-3} + 5.1949P_{t-1} - 15.8372P_{t-2} + 1.4896P_{t-3} 0.4466S_{t-1} + 1.9301S_{t-2} - 13.7462S_{t-3} + 0.5756Y_{t-1} + 0.2263Y_{t-2} + 0.3688Y_{t-3} - 53.0310\mu_{t-1} \quad (4.6)$$

4.9 Granger causality test results

The Granger causality test was employed in this study to ascertain the nature of the causal relationship between the dependent and independent variables.

Table 4. 11: Pair wise Granger Causality Tests results

Null Hypothesis:	Obs	F-Statistic	Prob.
P does not Granger Cause G	47	4.67638	0.0174
G does not Granger Cause P		0.34680	0.7916
S does not Granger Cause G	47	3.31607	0.0137
G does not Granger Cause S		1.77455	0.1675
Y does not Granger Cause G	47	2.46439	0.0387
G does not Granger Cause Y		0.10596	0.9561

Note: G- Gender parity, P- Expenditure on primary education, S- Expenditure on secondary education, Y-per capita income

The findings presented in Table 4.11 resulted in the rejection of the null hypothesis with a significance level of 5 percent. The null hypothesis posits that there is no statistically significant causal relationship between the financial investment in primary education and the level of gender equality. The decision was chosen by evaluating a probability value of 0.0174, which falls below

the predetermined threshold of 0.05. This observation suggests that altering the amount of spending in primary education has a noticeable impact on achieving gender equality. However, the probability value of 0.7916 above the predetermined significance level of 0.05, suggesting that the null hypothesis, which asserts no causal relationship between gender equality and spending on primary education, is supported. The aforementioned data suggests that the allocation of resources towards basic education in Kenya does not yield a substantial impact on achieving gender parity. This suggests the existence of a one-way causal connection, in which the allocation of resources towards foundational education has an impact on the attainment of gender equality.

The second specific objective involved doing an examination of the Granger causality findings with regards to the null hypothesis that the expenditure on secondary education does not exert a causal influence on gender parity. The null hypothesis was rejected due to a p-value of 0.0137, which is lower than the commonly accepted significance criterion of 0.05. This suggests that the redistribution of financial resources towards secondary education will have an impact on the achievement of gender equality. However, it is crucial to recognize the dearth of empirical evidence that substantiates a causal relationship between gender equality and the allocation of resources for secondary education. The likelihood value of 0.1675 suggests that there is not enough evidence to reject the null hypothesis, which states that gender parity does not have a significant effect on the allocation of expenditure to secondary education. Therefore, it is evident that a definitive and unidirectional causal relationship exists, wherein the allocation of resources towards secondary education in Kenya influences the achievement of gender equality.

The probability value derived from the third goal was found to be 0.0387, suggesting a degree of significance that falls below the commonly recognized criterion of 0.05. Based on the aforementioned data, it can be inferred that the null hypothesis, which states that there is no causal

relationship between per capita income and gender parity, was rejected at a significance level of 5 percent. This suggests that a modification in per capita would lead to a corresponding adjustment in gender parity. On the contrary, in cases when the calculated probability value exceeds the preset significance level of 0.05, specifically when it reaches 0.9561, this indicates the acceptance of the null hypothesis. The null hypothesis suggests that there is no identifiable causal relationship between gender parity and per capita income, as determined by the implementation of the Granger causality test. The empirical research conducted in this study indicates that the implementation of gender parity measures did not demonstrate any noticeable impact on per capita income.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a thorough examination of the research findings about the impact of public education investment and per capita income on the gender parity index. Additionally, the report encompasses a concise overview of the derived conclusions from the aforementioned discoveries, along with suggestions for policy implications and prospective directions for future investigation.

5.2 Summary of findings.

The main objective of this study was to examine the impact of public investment on education and per capita income on gender parity. The study specifically sought to investigate the impact of expenditure on secondary education on the attainment of gender equality, to investigate the influence of investment in primary education on achieving gender parity, as well as to examine the effect of per capita income on gender parity. To achieve these objectives, the study utilized annual time series data covering a period of 50 years, specifically from 1972 to 2021. The study employed the Augmented Dickey Fuller (ADF) test to assess the stationarity of several variables, including primary education expenditures, secondary education expenditures, per capita income, and gender parity.

This study investigates the relationship between primary education expenditure, secondary education expenditure, per capita income, and gender parity through the application of various statistical techniques including correlation coefficients, the Johansen Co-integration test, the Vector Error Correction Model (VECM), and the pairwise Granger causality test. This facilitated the investigation's incorporation of both extended and immediate trends, enabling an analysis of

the relationship between expenditures on primary education, expenditures on secondary education, per capita income, and gender equality, as outlined in sections 5.2.1, 5.2.2, and 5.2.3, respectively. The identification of a sustained relationship can be deduced from the results derived from the trace test and maximum eigenvalue test, which provide evidence of the presence of two co-integrating equations. Moreover, the inclusion of an error correction term, as indicated by a coefficient of -0.1061, indicates that any deviation from gender parity equilibrium in the foreseeable future will be corrected at a rate of 10.61% during the next year.

5.2.1 Expenditure on secondary education on gender parity

The first objective of the study was to evaluate the influence of expenditure on secondary education on achieving gender parity. The analysis of the data was conducted under the assumption of the null hypothesis, which posits that there is no statistically significant relationship between expenditure on secondary education and gender parity. Firstly, a correlation coefficient of 0.1960, indicated a statistically significant and positive relationship between the expenditure on secondary education and gender parity at 5 % level of significance. Secondly the data underwent analysis via the Johansen co-integration technique. The trace test and the maximal eigenvalue test were conducted, indicating the presence of two co-integrating equations at a significance level of 5%. The normalized co-integrating coefficient of 8.94 with a t-statistic value of 6.4317>2 implied that a 1% increase in expenditure at the secondary level of education resulted in 8.94% increase in gender parity. Thirdly, the results obtained from the application of the Vector Error Correction Mechanism (VECM) analysis reveal that there is no statistically significant influence of expenditure on secondary education on gender parity in Kenya in the short run at a significance level of 5%. The findings derived from the paired Granger causality test reveal the existence of a

unidirectional causal association, specifically from investment in secondary education to the achievement of gender parity($S_t \rightarrow G_t$) at 10% level of significance.

The findings of the study have successfully rejected the null hypothesis, which posits that there is no statistically significant relationship between education expenditure on secondary education and gender parity in Kenya at 5% level of significance. The results of this study indicate a notable association between investment in secondary education and the advancement of gender parity which align with well-established economic theory and are corroborated by prior investigations carried out by Mendis and Ichihashi (2014), Baldacci et al. (2003), and Carsamer and Ekyem (2015) across different geographic regions. In their study, Mendis and Ichihashi (2014) conducted an examination of nine provinces inside Sri Lanka. Similarly, Baldacci et al. (2003) conducted an investigation on 94 developing nations, omitting Kenya. Furthermore, Carsamer and Ekyem (2015) directed their focus towards 20 African countries, excluding Kenya.

5.2.2 Expenditure primary education on gender parity

The second objective of the study involved analyzing the effect of expenditure on primary education on gender parity. The analysis pertaining to this objective involved the application of the null hypothesis, which posits that there is no statistically significant effect of primary education expenditure on gender parity. The study produced a computed correlation coefficient of 0.1329, indicating a statistically significant and positive relationship between spending on primary education and gender parity at 5% of significance level. Furthermore, the trace test and maximum eigenvalue test, which are employed in the Johansen process, successfully identified two co-integrating vectors at a significance level of 5%. The normalized co-integrating coefficient of 2.29 with a t-statistic value of 9.9565>2 indicated that in the long run, a percentage increase in

expenditure at the primary level of education increased gender parity by 2.29% at 5% level of significance. This suggests that the allocation of resources towards primary education has a substantial and favourable impact on the pursuit of gender parity in Kenya over an extended period, aligning with economic reasoning. Furthermore, the findings derived from the Vector Error Correction Model suggest that, within a designated time period, there is no statistically significant impact of expenditure on primary education on gender parity in Kenya in the short run at 5% level of significance. Moreover, the results obtained from the pair-wise Granger causality test provide evidence of a unidirectional causality relationship, specifically from expenditure on primary education to gender parity ($P_t \rightarrow G_t$) at a 5% level of significance.

The findings of the study have successfully rejected the null hypothesis, which suggests that there is no statistically significant impact of primary education on gender parity in Kenya at a significance level of 5%. The results indicate a positive and significant impact of allocating resources towards primary education in Kenya with regards to promoting gender parity. The results of this study align with economic theory and support the findings of previous research conducted by Obi et al (2016), Okodua et al (2014), and Anyanwo & Erhijakpor (2007) within the Nigerian setting. Furthermore, these findings are consistent with previous research conducted in 58 low- and middle-income countries, except for Kenya, as well as in countries classified as SANE (South Asia, Africa, and the Middle East)..

5.2.3 Per capita income on the gender parity

The third objective of this study was to examine the influence of per capita income on gender parity within the particular context of Kenya. The data analysis for this research objective was carried out based on the null hypothesis, which suggests that there is no statistically significant

relationship between per capita income and gender parity in Kenya. The correlation value of 0.3221, calculated from the data analysis, suggests a statistically significant positive correlation between per capita income and gender parity in the specific context of Kenya at a significance level of 5%. The research utilized the Johansen methodology to investigate the correlation between per capita income and gender parity in the context of Kenya. At a significance level of 5%, both the trace test and maximal eigenvalue test detected the existence of two co-integrating equations. The findings of this study indicate that the variables exhibit a statistically significant and advantageous effect over an extended period of time, consistent with prevailing economic predictions. The normalized co-integrating coefficient of 0.0075 from the Johansen co-integration procedure with a t- statistic of 2.8846 > 2 indicated that a percentage increase in per capita income resulted in approximately 0.01 increase in gender parity in the long run at 5% level of significance. Moreover, the results obtained from the Vector Error Correction Model indicate that, in the short run, there is a statistically significant positive relationship between per capita income and gender parity in the specific context of Kenya. The aforementioned influence is discovered to have a time delay of one unit and is shown to be statistically significant at a significance level of 5%. The results obtained from the paired Granger Causality test indicate the presence of a unidirectional causal link from per capita income to gender parity ($Y_t \rightarrow G_t$) in Kenya at a 5% level of significance.

The study findings have effectively rejected the null hypothesis, which proposed that there is no statistically significant relationship between per capita income and gender parity in Kenya at a 5% level of significance. The findings of this study demonstrate a statistically significant and positive relationship between per capita income and gender parity in Kenya. These findings align with economic principles and support the conclusions drawn by previous researchers such as Dauda

(2011), Mbaya (2016), Adesiyan (2017), and Anyanwo & Erhijakpor (2007) in their respective studies conducted in Nigeria, Kenya, Nigeria, and SANE nations.

5.3 Conclusion

The study's results demonstrate a notable positive correlation and a consistent long-term equilibrium relationship among the time series variables that were examined, namely gender parity, primary education expenditure, secondary education expenditure, and per capita income. The identification of a unidirectional causal link may be observed in the connections between secondary education expenditure and gender parity, primary education expenditure and gender parity, as well as per capita income and gender parity. The Johansen technique, which incorporates the maximum eigenvalue test and the trace test, provides empirical support for the significance of human capital. The human capital hypothesis asserts that persons can be seen as a valuable asset for a nation's economic advancement, underscoring the significance of education and skill enhancement as crucial factors in enhancing the productivity and income potential of individuals.

The distribution of government finances to primary and secondary education is of utmost significance in enhancing the quality and accessibility of educational opportunities. The supply of financial support is of utmost importance in the recruitment of highly qualified teachers, the improvement of educational infrastructure, and the provision of critical learning materials to students. In order to effectively leverage the benefits of the human capital theory, it is crucial for the government to increase its allocation of resources towards primary and secondary education. The allocation of resources proposed would effectively support the development of educational infrastructure, the elevation of teaching standards, and the availability of additional resources. Consequently, this would contribute to the promotion of gender parity in educational possibilities. The attainment of gender parity in educational opportunities is a crucial determinant in the

augmentation of human capital, as it guarantees equal access to education for all genders, hence maximizing a country's capacity for fostering human capital growth. Over time, this phenomenon will lead to the development of a skilled and diligent workforce, which is essential for promoting economic expansion and sustaining competitiveness in the global market.

In order to enhance human capital, it is also crucial to increase per capita income, as higher income levels enable greater investments in education. As a result, the achievement of gender parity in educational opportunities contributes to the enhancement of human capital among the population. Promoting gender parity in education for a prolonged duration will lead to a well-educated population, thereby fostering an increased ability to contribute to economic progress. The achievement of gender parity aligns with the tenets of human capital theory and offers several socio-economic benefits, such as reduced poverty rates, improved health outcomes, and enhanced overall social well-being.

5.4 Recommendations

The study's findings indicate the existence of a long run equilibrium relationship among the variables of primary education expenditure, secondary education expenditure, per capita income, and gender parity within the specific setting of Kenya. While the immediate impact of investing in primary and secondary education on gender parity in Kenya may not show statistical significance, a longitudinal analysis reveals that a 1% increase in expenditure on secondary education, expenditure on primary education, and per capita income leads to a corresponding increase in gender parity by 2.29%, 8.94%, and 0.0075% respectively. In light of the aforementioned findings, the study proposes the subsequent recommendations;

The allocation of financial resources towards the education sector in Kenya has a substantial and enduring impact on the achievement of gender parity. The deployment of enough financial resources to assist basic and secondary education is of paramount importance for the government. Furthermore, it is crucial that the allocation of these funds be carried out with utmost efficiency in order to enhance the quality of education and infrastructure in educational institutions, hence permitting an increase in student enrollment. The government has the capacity to implement scholarships and incentives that are expressly designed to promote the enrollment and retention of female students in educational institutions. An illustrative instance involves the extension of the provision of sanitary towels to female students in secondary schools, a measure that is already being implemented in primary schools. This expansion can offer further support in facilitating their educational pursuits. Through the implementation of a thorough monitoring and evaluation system, the government can effectively oversee the advancements made in attaining gender parity and determine the appropriate use of resources within the education budget. The government should strive to build collaborations with a broader array of non-governmental organizations (NGOs) and international institutions that prioritize the promotion of girls' education and the attainment of gender equality in educational environments. These alliances would provide substantial resources and specialized expertise to bolster these objectives. The implementation of this intervention is anticipated to address the issue of girls' dropout rates from primary and secondary educational institutions, resulting in an increase in their enrollment rates and subsequently promoting gender equality.

The influence of per capita income on gender parity in Kenya is significant. The achievement of a sustainable per capita income has a pivotal role in enhancing social outcomes. To facilitate the achievement of gender parity in Kenya, it is crucial for the Kenyan government to create

supplementary employment opportunities, hence enhancing per capita income. Potential techniques that the government can adopt to achieve this purpose include diversifying the economy, creating a favorable climate to attract both domestic and international investors, and providing support to small firms. Through the implementation of focused measures designed to alleviate poverty, the government has the potential to augment the accessibility of education, particularly in rural areas where disparities in income impede the availability of educational possibilities. The establishment of a robust data collection and monitoring system by the government is of utmost importance in order to efficiently monitor and track enrollment rates and gender parity. This system has the potential to facilitate evidence-based decision-making processes. The government's focus on the establishment of fiscal policies that effectively boost savings and investment is of utmost importance. This entails implementing measures such as tax incentives and optimizing public expenditure. It is anticipated that the enactment of governmental measures designed to promote job creation, alleviate poverty, and allocate resources towards infrastructure development will lead to an increase in household income. Consequently, it is expected that this will enhance families' capacity to allocate resources towards the education of their offspring.

5.6: Research contribution

The current research study provides a significant contribution to the extant scholarly literature by presenting empirical evidence that supports the human capital hypothesis. The present theory postulates that the allocation of resources towards the enhancement of human capital leads to favorable outcomes characterized by heightened productivity. The positive impact of government funding allocation towards primary and secondary education, coupled with the rise in per capita income, has been observed in relation to educational accomplishments, specifically in achieving

gender parity in enrollment rates at primary and secondary school levels. This study provides further empirical evidence in support of the theoretical frameworks put forward by Musgrave and Rostow on public expenditure. This analysis specifically underscores the importance of public investment in education and per capita income as key factors influencing the degree of investment in human capital.

5.5 Limitations of the study

The current study exhibits specific limitations that necessitate careful consideration by future researchers doing following examinations. A noteworthy limitation of this study is its exclusive emphasis on public expenditure in primary and secondary education, without taking into account expenditures in other educational tiers. The study only focused on analyzing the influence of public education investment and per capita income on gender parity in the context of Kenya.

5.6 Recommendations for further research

This study advocates for more investigation into the influence of public education expenditure and per capita on gender parity in Kenya. The specific focus of this research is on public education expenditure across all levels of education. Further research might be undertaken to examine the influence of public investment in education and per capita income on gender equality in diverse African countries. This will function as a substantial instrument in influencing policy throughout the entirety of the continent, as a majority of African nations have yet to achieve a gender parity score of 1.

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APPENDICES

Appendix 1: Data presentation

YEAR	G	Y	P	S
1972	0.71267	13.0497	44.5113	31.0693
1973	0.73458	2.26582	45.8279	28.1301
1974	0.78328	0.56987	55.7793	25.42
1975	0.81248	-2.428	57.0867	23.6056
1976	0.82529	-1.1084	63.4403	20.9003
1977	0.8381	5.88668	60.1741	22.0985
1978	0.85092	3.29799	60.038	20.3427
1979	0.86373	3.94192	59.9019	18.5868
1980	0.87654	1.89651	59.7657	16.831
1981	0.88905	0.07143	61.1645	17.0274
1982	0.89386	-2.1403	62.0706	17.3524
1983	0.89343	-2.38	60.164	18.3564
1984	0.90471	-1.9546	62.2172	15.4735
1985	0.89994	0.55267	56.7207	18.2484
1986	0.90716	3.40993	57.4825	18.6502
1987	0.90925	2.27831	58.4166	18.3698
1988	0.91855	2.54936	59.3508	18.0894
1989	0.92252	1.12856	57.0615	20.4916
1990	0.92649	0.70823	55.2072	20.433
1991	0.93046	-1.7677	53.353	20.3743
1992	0.93442	-3.7667	51.4988	20.3156
1993	0.93839	-2.556	49.7448	19.9293
1994	0.94236	-0.2809	55.8988	21.5967
1995	0.94633	1.51388	57.9302	20.8909
1996	0.9503	1.36593	59.9616	20.185
1997	0.95426	-2.1766	61.9929	19.4792
1998	0.95823	0.54959	64.0243	18.7733
1999	0.9622	-0.5207	66.0557	18.0675
2000	0.97041	-2.2909	68.087	17.3617
2001	0.96218	0.68372	66.0845	19.4018
2002	0.94465	-2.4575	64.5186	20.1263
2003	0.9646	-0.0771	62.9527	20.8507
2004	0.93383	2.00869	62.1175	23.4095
2005	0.9517	2.80072	58.1131	22.5437
2006	0.95437	3.35189	54.1088	21.6778
2007	0.94632	3.72826	51.0074	25.8529
2008	0.95429	-2.7095	47.9061	30.028

2009	0.95053	0.29317	44.8048	34.2031
2010	0.95143	5.05639	41.7035	38.3781
2011	0.94250	2.36642	38.6022	42.5532
2012	0.96021	1.9604	34.1896	41.7632
2013	0.95053	1.32629	36.1486	43.0705
2014	0.91512	2.63819	36.0884	43.1242
2015	0.94023	2.68332	39.1328	41.7637
2016	0.95053	1.94367	36.1284	41.2621
2017	0.96010	1.60315	36.3471	42.0632
2018	0.94256	3.52208	37.1338	41.5363
2019	0.95135	3.05496	36.3389	41.7637
2020	0.95758	-2.2348	36.3138	41.1682
2021	0.93025	5.44871	36.0081	40.6743

Source: world development indicators.**Note**: G- Gender parity, P- Expenditure on primary education, S- Expenditure on secondary education, Y-per capita income

Appendix II: Map of Kenya

Source: Japan International Cooperation Agency, (2007)