GOVERNMENT FUNDING, INSTITUTIONAL SIZE AND STUDENT ENROLMENT RATE AMONG PUBLIC TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN NAIROBI METROPOLITAN

By

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MASTER OF BUSINESS ADMINISTRATION IN

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DECLARATION

Declaration by the Student

I declare that this dissertation is my original work and has not been previously published or submitted elsewhere for award of a degree. I also declare that this contains no material written or published by other people except where due reference is made and author duly acknowledged.

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I do hereby confirm that I have examined the master's dissertation of

ALICE N MACHARIA

And have certified that all revisions that the dissertation panel and

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ABSTRACT

The role of government funding in shaping enrolment trends within Technical and Vocational Education and Training TVET institutions has gained renewed policy attention in Kenya, particularly in the Nairobi Metropolitan region, where demand for technical skills is rising. While financial aid schemes such as the Higher Education Loans Board (HELB) and government capitation have been implemented to enhance access, empirical evidence on their combined effects on student enrolment remains limited. Additionally, the moderating influence of institutional size on the relationship between funding and enrolment has not been sufficiently addressed in existing literature, creating a knowledge gap that this study seeks to fill. The main purpose of the study was to analyze the Influence of HELB and capitation funding on the student enrolment rate of public Technical Vocational Education and Training institutions in Nairobi Metropolitan, Kenya. The study was guided by the following objectives to evaluate the influence of HELB funding on students enrollment rate of public technical vocational education and training institutions, establish the influence of capitation funding on students enrollment rate of public technical vocational education and training institutions and to analyze the moderating influence of institution size on the relationship between HELB and capitation funding and students enrollment rate of public Technical Vocational and Training Institutions in Nairobi Metropolitan, Kenya. The study adopted a longitudinal research design using secondary data covering the period 2019 to 2023, focusing on 12 public TVET institutions within Nairobi Metropolitan. The independent variables were HELB disbursements and government capitation, the moderating variable was institutional size, and the dependent variable was student enrolment rate. The data was subjected to rigorous tests, including heteroscedasticity, multicollinearity, autocorrelation, normality, cross-sectional dependence, the Hausman, and the Breusch-Pagan Lagrange Multiplier (LM) test to ensure robustness of the models. Pearson's correlation analysis was used to establish initial associations, while the longitudinal data were analyzed using fixed effects ad random effects regression models. The regression analysis produced strong results (r = .818, R2 - .669, Adjusted R2 = .665), indicating that HELB and capitation jointly explained 66.9% of the variance in enrolment rates. Both funding variables exhibited significant positive effects on enrolment, with larger institutions benefiting more prominently due to economies of scale, confirming the moderating effect of institutional size. These findings highlight the crucial role of sustained and structured funding mechanisms in promoting TVET enrolment, while also underscoring disparities among institutions of varying capacity. The study concludes that government funding through HELB and capitation is pivotal in enhancing access to technical education, but that institutional size shapes the extent of the impact. It is recommended that policy makers strengthen and streamline disbursement frameworks to ensure equity, while also supporting capacity expansion in smaller institutions to reduce enrolment inequalities. Further research is suggested to examine other moderating variables such as infrastructure, governance practices and industry linkages and to extend the analysis to private TVET institutions for comparative.

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I take this opportunity to give my profound gratitude to the Almighty God for His amazing grace that have propelled me to this academic height. My invaluable gratitude also goes to Dr. Ibrahim Tirimba Ondabu whose vast expertise has shaped the development of this dissertation. Equally I acknowledge KCA University for their quality facilities and hardworking staff dedicated towards knowledge dissemination.

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DEDICATION

This dissertation is lovingly dedicated to Almighty God for His amazing grace which is ever present in my life. I also dedicate it to my dear parents, whose unwavering love, prayers, and sacrifices have been my greatest source of strength and inspiration. Your belief in me gave me the courage to persevere even in difficult times. I also extend heartfelt gratitude to my siblings, friends, and mentors who offered endless support, encouragement, and guidance throughout this academic journey. To my lecturers and classmates, thank you for your collaboration and motivation. Each of you played a special role in shaping this achievement. This milestone is as much yours as it is mine

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LIST OF ABBREVIATIONS AND ACRONYMS

CBET	Competence-Based Education and Training
DCT	Dynamic Capability Theory
HELB	Higher Education Loan Board
ICT	Information Communication Technology
ILO	International Labour Organization
OECD	Organization for Economic Co-operation and Development
RDT	Resource Dependency Theory
TVCs	Technical Vocational Colleges
TVET	Technical and Vocational Education and Training
TVETA	Technical and Vocational Education and Training Authority
UNESCO	United Nations Educational, Scientific, and Cultural Organization
US	United States

DEFINITION OF TERMS

Capitation Funding - Capitation Funding refers to a payment model used primarily in healthcare, where providers are paid a set amount for each enrolled person assigned to them, regardless of the number or nature of services provided (Mossialos & Kutzin, 2022).

HELB and capitation funding- HELB and capitation funding refer to financial support provided by local, regional, or national governments to organizations, projects, or individuals. It is often used to support public services, infrastructure development, research, education, healthcare, and cultural initiatives (National Center for Education Statistics, 2023).

Institution Size - Institution size is often defined by enrollment figures, financial resources, and organizational scale, influencing strategic operations and stakeholder relationships (Doyle, 2020)

Student enrollment rate - This is a metric that quantifies the percentage of eligible individuals enrolling in educational institutions within a specific age group or level of education. It is often used to assess access to education and is commonly categorized by educational stages, such as primary, secondary, or tertiary levels (UNESCO, 2020).

TVET Institutions - Technical and Vocational Education and Training Institutions are educational organizations that focus on equipping individuals with practical skills and knowledge required for specific trades, crafts, and careers, particularly those in technical fields (UNESCO, 2016).

INTRODUCTION

CHAPTER ONE

1.1 Background of the Study

In human life, education still plays an important role. Aggarwal (2019) notes that education is an ongoing and lifelong process; it is the process of growth from childhood to adulthood, involving the impact of everything that affects human personality. Technical and Vocational Education and Training (TVET) means a continuum of education and training involving the development of practical skills in different occupational sectors using formal and informal approaches. To boost their socio-economic status, this additional basic education introduces learners to technical and scientific-related abilities. The quest to curb youth jobs, social exclusion, and poverty has inspired the global focus of TVET by various national and regional governments (Nundkumar & Subban, 2023).

Technical and Vocational Education and Training (TVET) plays a critical role in preparing individuals for the labor market and fostering economic development worldwide. According to a UNESCO Report (2020), global enrollment in TVET programs at the secondary level accounted for about 19% of total secondary education enrollment as of 2020. The report highlights that countries in Asia and Europe have the highest TVET participation rates, with many incorporating dual systems that blend in-class learning and workplace training. These programs are essential in equipping young people with the skills demanded by industries, particularly in manufacturing and services. However, enrollment varies significantly by region, with Sub-Saharan Africa and South Asia facing challenges

such as limited access, gender disparities, and inadequate funding for TVET programs (UNESCO, 2021).

Globally, there is a growing tendency in numerous nations to give contextual learning while still including traditional subjects in a single course. Cleaver (2019) claimed that by understanding Prior Learning (RPL), which is strongly related to articulation, the Australian and New Zealand systems are searching for alternatives to articulation processes

For instance, Germany's long-standing dual system combines employer apprenticeship payments, strong public support for vocational schools, and coordinated governance between states and social partners. Public funding in Germany supports vocational upper-secondary institutions and shared costs for equipment and teacher training; employers provide the workplace component and often contribute financially to apprentice training. The results have been resilient enrolment in vocational pathways and strong labor-market attachment for graduates. Germany's model highlights the value of predictable public capital funding combined with employer cost-sharing to maintain both capacity and relevance (NCVER, 2022).

On the other hand, Australia's TVET sector is financed through a mix of federal and state funding, student fees, and targeted industry contributions. Reviews since 2020 (including parliamentary inquiries and NCVER publications) emphasize that fragmented funding, weak regulatory oversight of private providers, and episodic policy changes undermined both enrolment confidence and quality for parts of the sector. Australia's experience shows that (a) complex multi-level funding arrangements must be paired with strong accountability and (b) funding clarity (who pays for what and for which students/programs) is essential to stabilize enrolments (NCVER, 2022).

Additionally, the UK introduced an Apprenticeship Levy (a payroll tax) to fund apprenticeship training and incentivize employer engagement; public funding rules and performance management (updated frequently during 2020-2022) allocate funds depending on employer size, learner age, and program. The levy model redirects employer contributions to training provision but also introduced allocation and administrative complexity that influenced institutional behavior and enrolment patterns (e.g, providers prioritizing levy-funded pathways). The UK case shows how an employer-based levy can increase funding for work-integrated learning and enrolments in certain programs, but requires careful rule design to avoid perverse allocation incentives (UK Government, 2021).

Finally, in South Korea, a highly coordinated approach, integrating research institutions (e.g, KRIVET), national career education frameworks, and sustained public funding to align vocational provision with national industrial policy. The Korean model emphasizes centralized data, strong links with industry, and targeted public investments to expand specialized vocational pathways – supporting enrolment by raising perceived returns to TVETS. This approach demonstrates the value of research-driven planning and targeted public investments to catalyze demand (KRIVET, 2020).

Studies by the International Labour Organization (ILO) reveal that TVET systems are increasingly adapting to changes in technology and the green economy. For example, Germany's dual TVET system serves as a global benchmark, boasting an employment rate of over 85% for its graduates within six months of program completion (ILO, 2021). On the other hand, developing economies struggle with aligning TVET curricula to market

needs. Data from the World Bank indicates that countries investing more than 4% of GDP in education, including TVET, tend to experience higher economic growth rates and reduced youth unemployment. These insights underline the importance of strategic investments and policy reforms to enhance TVET's contribution to sustainable development (ILO, 2021).

Sub-Saharan Africa faces numerous regional challenges in the field of TVET. According to Lauglo (2019), many Sub-Saharan African governments are torn between investing in general education and vocational training. General education has been hailed as producing general human capital, whereas technical education produces more specialized and specific human capital. General education gives flexibility, allowing holders to shift from one career to another, whereas technical education is highly specialized, preventing migration from one position to another without additional schooling. Carnoy (2018), on the other hand, observed that although technical training imparts job-related skills, and there are high unemployment rates among holders of general education training, the majority of people, particularly youth, prefer general education, viewing technical education as a lower-class category of education.

TVETs in SSA face the twin challenges of expanding access to youth while delivering labour-market-relevant skills in capital-intensive programmes. Over the last five years, several major reviews and country reports have examined how financing choices determine both the capacity and attractiveness of TVET institutions, and thereby affect enrolment outcomes (World Bank, 2021–2023; Ghana CTVET, 2021; DHET South Africa, 2020/21). This synthesis summarizes those findings and draws comparative lessons relevant to Nairobi Metropolitan public TVET provision.

Capitation (per-learner) funding appears in many SSA contexts either formally or de facto through line-item grants tied to enrolment. When capitation rates reasonably cover marginal instructional costs, institutions can scale cohort intakes, thereby increasing enrolment; however, low or highly variable per-student rates produce capacity constraints and limit growth (World Bank, 2021). Predictable per-student funding is especially important for vocational programmes because of equipment, consumables, and workshop maintenance costs that scale with enrolment.

Many governments provide block grants or capital allocations for infrastructure and base operations. Block grants stabilize operating budgets but can favour larger institutions that can spread fixed costs across many students, potentially skewing enrolment growth toward those institutions unless complementary per-student support exists (Ghana CTVET report, 2021). Capital grants are critical for enabling institutions to increase capacity (more workshops, machines), but without matching recurrent per-student funding, newly expanded capacity may remain underutilized.

According to Ziderman (2019), the majority of training systems in Sub-Saharan Africa must deal with the realities of reduced government support. According to the report, funding for technical education is ad hoc, with annual changes. According to Ziderman (2019), this results in a great deal of uncertainty and fiscal constraints. As a result of their restricted finances, technical institutions are unable to hire, purchase facilities and equipment, and upgrade their programs to meet the dynamic industry's technological needs. There is insufficient investment in technical courses such as engineering and electronics, which is detrimental to Africa's economy. The study concluded that to remain relevant, technical institutions must coordinate their curricula to meet future technology needs.

Locally, any nation's economic progress, jobs, and living standards are dependent on nationally and internationally recognized abilities (Aring, 2022). In Kenya, policy papers have recognized the importance of providing manageable, high-quality, and relevant education as a crucial foundation for encouraging development and social harmony. The Kenya Vision 2030 highlights the importance of providing the necessary skills to drive the economy's diverse sectors (Government of Kenya, 2019). Kenya's Vision 2030 calls for Technical and Vocational Education and Training (TVET) to be the primary engine that drives the economy's industrialization by producing appropriate middle-level professionals.

The introduction of the Higher Education Loans Board (HELB) and capitation funding has significantly impacted student enrolment in Kenya's public Technical and Vocational Education and Training (TVET) institutions. Between 2013 and 2022, enrolment surged from 55,945 to 249,316 trainees, attributed to increased government grants totaling KSh 10.3 billion and HELB loans amounting to KSh 11.1 billion (UNESCO, 2024). A study by Maina (2019) found that HELB financing had a significant positive correlation with TVET performance, indicating that financial support enhances student retention and success. However, challenges such as low awareness, stringent application requirements, and delays in fund disbursement have hindered the full utilization of available funds.

In Nairobi Metropolitan, the influence of HELB and capitation funding is particularly evident. A study focusing on Nairobi County highlighted that HELB financing significantly influences TVET performance, with a correlation coefficient of 0.426, underscoring the critical role of financial support in enhancing educational outcomes. Despite these positive impacts, challenges such as low awareness, stringent application requirements, and delays in fund disbursement have hindered the full utilization of available funds (Maina, 2019).

1.1.1 HELB and Capitation Funding

Globally, funding for public Technical and Vocational Education and Training (TVET) institutions is recognized as a cornerstone for fostering economic growth and reducing unemployment. According to UNESCO, effective funding of TVET is essential for equipping learners with the skills required in an evolving labor market characterized by technological advancements and globalization (UNESCO, 2015). Developed countries such as Germany and South Korea have established robust public funding mechanisms to sustain their TVET systems, which have been credited for their low unemployment rates and competitive economies. These nations allocate significant portions of their budgets to TVET, ensuring access to quality facilities, skilled trainers, and up-to-date curricula (World Bank, 2020).

However, challenges persist globally in ensuring adequate and equitable funding. In many developing countries, public financing of TVET institutions is insufficient, leading to issues such as inadequate infrastructure, obsolete equipment, and poorly trained educators. Additionally, the mismatch between skills taught and labor market demands often undermines the effectiveness of TVET systems, even in regions where funding is relatively sufficient (OECD, 2019). This global context underscores the need for sustainable and strategic government investments to strengthen TVET and meet future workforce demands.

In Africa, public TVET institutions play a pivotal role in addressing youth unemployment and advancing economic development. Governments across the continent have acknowledged the importance of funding TVET to support skills development aligned with regional industrialization agendas. For instance, the African Union's Agenda 2063

emphasizes the need for member states to enhance investments in TVET as a means of fostering innovation and entrepreneurship (African Union, 2015). Countries such as Rwanda and South Africa have made strides in allocating resources to TVET, contributing to improved enrollment rates and skill acquisition in priority sectors like manufacturing and agriculture (World Bank, 2019).

Nonetheless, public funding for TVET in Africa remains inadequate in many regions, often hampered by competing budgetary demands and governance challenges. A significant portion of TVET financing on the continent relies on external donor support, which raises concerns about sustainability and local ownership (UNESCO, 2021). Moreover, disparities in funding allocations between rural and urban areas exacerbate inequality in access to quality TVET education. To address these issues, African governments are increasingly exploring public-private partnerships and innovative financing models to supplement traditional funding mechanisms.

In Kenya, HELB and capitation funding for public TVET institutions have been a critical component of the country's efforts to align education with its Vision 2030 development agenda. The Kenyan government has significantly increased its budgetary allocation to TVET in recent years, with a focus on expanding access, upgrading infrastructure, and aligning programs with industry needs (Government of Kenya, 2021). The establishment of the Kenya Technical Trainers College and the Technical and Vocational Education and Training Authority (TVETA) has also underscored the government's commitment to strengthening the TVET sector (Government of Kenya, 2019).

Despite these advancements, funding challenges persist in Kenya's TVET system. Issues such as delays in the disbursement of funds, inadequate capitation grants, and insufficient investment in modern training equipment limit the effectiveness of public TVET institutions (UNESCO, 2021). Furthermore, the reliance on HELB and capitation funding alone is proving unsustainable, prompting policymakers to advocate for alternative financing mechanisms, including private sector partnerships and student loan schemes. Addressing these challenges is vital for ensuring that Kenya's TVET sector can meet the demands of its rapidly growing and diversifying economy.

1.1.2 Student Enrolment Rate

Technical and Vocational Education and Training (TVET) institutions globally have become critical in equipping students with the practical skills required in the workforce. As economies strive to address skill mismatches in labor markets, enrollment in TVET programs has seen notable increases. According to UNESCO (2022), worldwide enrollment in TVET institutions accounts for approximately 11% of all secondary education enrollments, with varying rates across regions. High-income countries have embraced TVET to address technological advancements, while developing nations prioritize it to tackle unemployment. However, barriers such as cultural perceptions and limited funding remain significant hurdles in achieving equitable access (UNESCO-UNEVOC, 2020).

Efforts to improve enrollment rates have been backed by international frameworks like the United Nations Sustainable Development Goals (SDG 4), which emphasize inclusive and equitable education. In response, countries have integrated TVET policies to boost

accessibility and relevance. For instance, the European Union's Copenhagen Process has strengthened vocational training by fostering collaboration among member states (ILO, 2021). Nevertheless, disparities persist due to gender inequality, urban-rural divides, and insufficient infrastructure, necessitating more targeted interventions.

In Africa, TVET has been positioned as a driver of economic transformation, particularly in the context of youth unemployment. Enrollment rates have been growing steadily but remain relatively low compared to global averages. According to the African Union (2018), less than 10% of students opt for TVET pathways due to societal biases that favor traditional academic routes. Challenges such as underfunding, outdated curricula, and limited institutional capacity further exacerbate low participation rates (UNESCO, 2020).

Despite these challenges, African governments are increasingly prioritizing TVET. Initiatives such as the African Union's Continental Education Strategy for Africa (CESA) aim to increase enrollment by promoting skill-based learning aligned with market demands. Rwanda, for example, has integrated TVET into its national development strategy, leading to a 22% increase in student enrollment between 2015 and 2020 (UNDP, 2021). However, achieving higher enrollment rates will require addressing systemic issues like resource allocation and gender imbalances.

In Kenya, TVET institutions have gained prominence as a solution to youth unemployment and skill shortages in critical sectors such as construction, manufacturing, and technology. Enrollment rates in public TVET institutions have risen, reaching over 430,598 students by 2020, up from 275,000 in 2013, thanks to government interventions (KNBS, 2021). Policies like the establishment of the Kenya Youth Employment and

Opportunities Project (KYEOP) and subsidized tuition fees have played a pivotal role in enhancing accessibility.

However, challenges persist, including inadequate infrastructure, limited funding, and negative societal perceptions about TVET education. Women, in particular, remain underrepresented, comprising only 42% of TVET students in 2020 (UNESCO, 2021). To address these issues, Kenya has adopted a competency-based education and training (CBET) approach and partnered with industry stakeholders to align curricula with market needs. These reforms, though promising, require sustained investment to ensure equitable access and quality training.

1.1.3 Public Technical Vocational Education and Training Institutions

Globally, Technical and vocational education and training (TVET) is regarded as necessary for economic growth in the majority of Asia-Pacific countries. Ziderman (2023) discovered that the majority of training systems in Sub-Saharan Africa must deal with the realities of declining government support. According to the report, funding for technical education is ad hoc, with annual changes. According to Ziderman (2023), this results in a great deal of uncertainty and fiscal constraints. As a result of their restricted finances, technical institutions are unable to hire, purchase facilities and equipment, and update their programs to match the industry's dynamic and technological needs.

Locally, it has been established that any nation's economic progress, employment, and living standards are dependent on nationally and internationally recognized talents (Aring, 2022). In Kenya, policy papers have recognized the importance of providing manageable, high-quality, and relevant education as a crucial foundation for encouraging development

and social harmony. Kenya Vision 2030 emphasizes the need to develop vital skills required to drive the various sectors of the economy (Government of Kenya, 2019).

Kenya's Vision 2030 calls for Technical and Vocational Education and Training (TVET) to be the primary engine that drives the economy toward industrialization by producing appropriate middle-level professionals. In this regard, the government enacted the TVET Act in 2013 to rename TVET in Kenya. The government has implemented plans for TVET finance based on tripartite arrangements. These mechanisms include the government, which in this study will look at the Higher Education Loans Board (HELB), private sponsorship by the parents or students themselves, and donations (Government of Kenya, 2018).

Since 2017, Kenya has seen significant advancements in Technical and Vocational Education and Training (TVET), driven by government investments and policy reforms aimed at addressing youth unemployment and skill gaps. The number of registered TVET institutions increased from 700 in 2013 to over 2,500 by 2023 (KNBS, 2023). KNBS (2023) further documents that the total enrollment grew to 367,925 in 2023, with 54.6% male and 45.4% female trainees. Gender-focused initiatives have notably increased female participation, particularly in fields like health sciences (57% female enrollment) and applied sciences (69.5%). However, participation in traditionally male-dominated areas such as engineering remains low, with women representing only 11.8% in mechanical engineering programs. These changes align with Kenya's Vision 2030, which emphasizes TVET as a key driver of economic growth and development.

The Kenyan government has prioritized TVET delivery through institutional reforms and greater resource allocation (Government of Kenya, 2017). During the first and second medium-term periods (2010–2020) of the Vision 2030, the government included TVET in the central admission system, revised the TVET curriculum to Competency-Based Education and Training (CBET), and provided students with loans and bursaries as a strategy to improve skills development in the country (Government of Kenya, 2017).

This change is by the African Union's education action plan 2006-2015, which calls on African nations to adopt TVET to economically empower their people. Before the implementation of Competency-Based Education and instruction (CBET) in Kenya, the TVET system was primarily focused on theoretical instruction, with little emphasis on measuring workplace competency (Government of Kenya, 2018). On the same note, Tirus (2019) acknowledged that the newly implemented TVET curriculum (CBET) incorporates the industry sector in determining industrial demands and skills required.

1.2 Statement of the Problem

Technical and Vocational Education and Training (TVET) is recognized as a critical driver for equipping youth with skills relevant to the labor market. In Kenya, enrollment in TVET institutions has grown significantly, rising from 116,564 students in 2018 to approximately 562,499 in 2022, a 382% increase (Economic Survey, 2021). Despite this, HELB and capitation funding have not kept pace with this growth, leading to infrastructural and resource constraints that undermine the quality and accessibility of technical education. For instance, budgetary allocations for TVETs increased from USD 35.7 million in the 2022/23 fiscal year to USD 68.7 million in 2023/24, a 92,4% increase. While this is a notable

improvement, it remains insufficient to meet the needs of the expanding student population (Government of Kenya, 2024).

Efforts by the government to rebrand and expand TVET have also shown mixed results. Although the establishment of additional institutions contributed to a 36% increase in total TVET enrollment between 2017 and 2018, enrollment in Technical Vocational Colleges (TVCs) rose by only 29%, lagging behind the national average (Government of Kenya, 2019). This disparity suggests that funding challenges may disproportionately affect certain institutions, particularly those requiring more advanced infrastructure and resources.

The availability of Higher Education Loans Board (HELB) financing and government capitation significantly influences student enrollment rates in public Technical and Vocational Education and Training (TVET) institutions within the Nairobi Metropolitan area. HELB provides low-interest loans that enable students from economically disadvantaged backgrounds to access technical education, while capitation funding ensures that institutions receive government subsidies per student, reducing overall tuition costs. These financial interventions directly impact access and retention, making TVET a viable alternative to university education, particularly in urban low-income areas. Existing literature broadly addresses the impact of financing on education outcomes in Kenya, but often lacks a focused analysis on how different funding types, such as HELB versus capitation, specifically affect enrollment patterns in metropolitan settings like Nairobi. This study fills that gap by comparing the effectiveness of these funding mechanisms in

boosting enrollment and highlighting urban-specific challenges such as higher living costs and competition for limited institutional resources (Wambugu, 2021).

Global trends indicate that increased and targeted funding for TVET enhances access, quality, and student outcomes (Zancajo & Valiente, 2018). In Kenya, however, persistent challenges such as outdated curricula, inadequate technological integration, and limited access to financial aid through Higher Education Loans Board (HELB) loans have further constrained TVET institutions (Mohamed, 2018). These issues hinder the government's ambition to enroll over 3.1 million youth in TVET institutions (Ministry of Education, 2024). The knowledge gap lies in understanding the specific relationship between HELB and capitation funding and student enrollment rates in public TVET institutions, particularly in Nairobi Metropolitan. While previous studies have highlighted broad challenges in the TVET sector (Zancajo et al., 2018), there is limited research in the Nairobi Metropolitan Region. This research aimed to bridge this gap by providing empirical evidence on how HELB and capitation funding influence enrollment rates, offering actionable insights to policymakers and all other stakeholders.

1.3 Objectives of the Study

1.3.1 General Objective

This study sought to analyze the Influence of HELB and capitation funding on the student enrolment rate of public Technical Vocational Education and Training institutions in Nairobi Metropolitan, Kenya.

1.3.2 Specific Objectives

The study was guided by the following objectives;

i. To evaluate the influence of HELB funding on students' enrollment rate of public TVETS in Nairobi Metropolitan, Kenya

ii. To establish the influence of total capitation funding on students' enrollment rate of public TVETS in Nairobi Metropolitan, Kenya.

iii. To examine the moderating influence of institution size on the relationship between HELB and capitation funding and students' enrollment rate of public TVETS in Nairobi Metropolitan, Kenya.

1.4 Research Hypothesis

i. **H_{O1}:** HELB funding has no significant effect on students' enrollment rate of public TVETS in Nairobi Metropolitan, Kenya.

ii. **H_{O2}:** Total capitation funding has no significant effect on student's enrollment rate of public TVETS in Nairobi Metropolitan, Kenya.

iii. **H_{O3}:** Institution size has no significant effect on the relationship between HELB and capitation funding and students' enrollment rate of public TVETS in Nairobi Metropolitan, Kenya.

1.5 Significance of the Study

1.5.1 TVET Institutions

For TVET institutions, understanding how HELB and capitation funding impact student enrollment provides critical insights into resource allocation, planning, and policy formulation. By recognizing the correlation between funding and enrollment rates,

managers can advocate for increased financial support and design programs that maximize access to quality technical and vocational education

1.5.2 Policy Makers

The study offers valuable information for policymakers to assess the effectiveness of funding strategies in promoting equitable access to education. It underscores the need for sufficient investment in public TVET institutions to boost enrollment rates, thereby fostering a skilled workforce essential for national economic development.

1.5.3 Researchers

Researchers benefit from this study as it bridges gaps in existing literature on the relationship between HELB and capitation funding and enrollment in TVET institutions. It provides empirical data and a foundation for further investigation into the broader implications of funding policies on education and workforce readiness.For researchers, the study contributes to the theoretical framework of education funding and its impact on enrollment trends. It enhances academic discourse by offering evidence-based insights and encouraging critical analysis of funding models for technical and vocational education.

1.6 Scope of the Study

The research analyzed enrollment trends in public TVET institutions, focusing on how financial incentives, scholarships, and subsidies affect the number of students joining these institutions. Data included student demographics, gender representation, and socio-economic backgrounds to assess the inclusivity of increased enrollment driven by

government funding. Seasonal and program-specific enrollment patterns were considered. The study was carried out between November 2024 and August 2025.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature to establish the influence of HELB and capitation funding on the student enrolment rate of public Technical Vocational Education and Training institutions in Nairobi Metropolitan, Kenya. It first discusses theories that provide the theoretical background of this study, while the second part discusses the empirical literature review on the Influence of HELB and capitation funding on the student enrolment rate of public Technical Vocational Education and Training institutions in Nairobi Metropolitan, Kenya. The final part of the literature review discusses other studies conducted that are relevant to this study.

2.2 Theoretical Literature Review

This study was guided by three theories, namely: Dynamic Capability Theory, Resource Dependency Theory (RDT), and Theory of Human Capital. The purpose of the study was to establish the Influence of HELB and capitation funding on the student enrolment rate of public Technical Vocational Education and Training institutions in Nairobi Metropolitan, Kenya.

2.2.1 Dynamic Capability Theory

Dynamic Capability Theory, developed by Teece et al. (1997), posits that an organization's ability to integrate, build, and reconfigure internal and external competencies is essential for adapting to rapidly changing environments. The authors define dynamic capabilities as the firm's capacity to achieve new and innovative forms of competitive advantage (Teece

et al., 1997). This theory emerged to address limitations in traditional resource-based views, focusing instead on how firms evolve and sustain competitive advantage through innovation and strategic agility.

Dynamic Capability Theory (DCT) emphasizes an institution's ability to integrate, build, and reconfigure internal and external resources to adapt to changing environments. In the context of capitation funding for TVET institutions in Kenya, DCT helps explain how institutions that effectively manage and allocate government subsidies per student can enhance their operational capacities and attract more enrollees.

Capitation funding serves as a critical external resource that, when strategically used, enables institutions to improve infrastructure, hire qualified trainers, and expand course offerings, key capabilities that drive enrollment growth. For instance, Musyoka and Orodho (2018) found that increased capitation funding led to better learning environments and higher student intake in Kenyan public TVET colleges. Similarly, Njogu (2020) demonstrated that institutions with adaptive management practices were more successful in using capitation to expand their programs and accommodate more students, aligning with the DCT premise of dynamic resource utilization. These findings underscore the importance of institutional agility in leveraging capitation for sustained enrollment gains.

The application of Dynamic Capability Theory is particularly significant for Technical and Vocational Education and Training (TVET) institutions, which operate in constantly evolving labor markets. To stay relevant, TVET institutions must integrate industry advancements, update curricula, and adopt innovative teaching methods that align with emerging workforce demands. By developing dynamic capabilities such as strategic

partnerships with industries and the adoption of advanced technologies, TVET institutions can enhance their responsiveness to economic changes. This adaptability not only ensures their competitiveness but also equips students with the skills needed for success in modern workplaces (Teece et al.,1997).

Capitation funding encourages TVET institutions to focus on strategies that drive enrollment, such as improving the quality of education, investing in infrastructure, and creating awareness campaigns to reach underserved communities. By offering flexible payment plans and partnering with employers, TVETs can also make their programs more accessible to students (Odhiambo & Muchiri, 2021). Applying the Dynamic Capability Theory to the capitation funding model in TVETs highlights the importance of being proactive and flexible. It involves sensing opportunities in policy changes, seizing them by adjusting the institutional approach to education delivery, and reconfiguring resources to meet growing demands. Such strategies can lead to increased enrollment rates, improved institutional reputation, and a stronger alignment with the needs of the labor market.

The theory emphasizes three core elements: sensing opportunities and threats, seizing opportunities, and transforming operations to align with new conditions (Teece, 2007). Critics, however, argue that the theory lacks specificity in distinguishing dynamic capabilities from operational capabilities (Winter, 2003). Additionally, Eisenhardt and Martin (2000) noted that dynamic capabilities may manifest differently across industries, with some resembling standard best practices rather than unique strategic innovations. Despite these critiques, the framework remains influential for understanding how organizations maintain relevance and resilience over time.

Critics and scholars have engaged extensively with this theory. For instance, Eisenhardt and Martin (2000) argue that dynamic capabilities are more structured and predictable than Teece et al. suggest, resembling best practices in certain industries. Winter (2003) critiques the overgeneralization of the theory, emphasizing the difficulty of distinguishing dynamic capabilities from ordinary capabilities in practice. Despite these critiques, the theory remains influential for its insights into organizational adaptability and innovation. The Dynamic Capability Theory is strong in explaining how public TVET institutions can adapt and thrive in changing funding and enrollment environments. It emphasizes the ability of institutions to integrate, build, and reconfigure internal and external resources to respond effectively to government funding fluctuations. The theory supports understanding how institutional size influences flexibility in managing financial and operational challenges. It also highlights how strategic adaptation enhances competitiveness and sustainability in student recruitment and retention. Overall, it provides a robust framework for analyzing how TVET institutions maintain performance amid dynamic policy and resource conditions (Teece, 2018).

Dynamic Capability Theory has a significant relationship with Technical and Vocational Education and Training (TVET). The dynamic nature of modern labor markets requires TVET institutions to continually adapt their curricula and teaching methodologies to align with evolving industry needs. By leveraging dynamic capabilities, TVET institutions can reconfigure resources, foster innovation, and sustain relevance in providing workforce-ready skills. For example, TVET programs can adopt industry partnerships and technology integration as dynamic strategies to stay competitive and enhance employability outcomes for graduates.

2.2.2 Resource Dependency Theory (RDT)

Developed by Jeffrey Pfeffer and Gerald Salancik in 1978. The Resource Dependency Theory posits that organizations (in these cases, colleges) rely on external resources to function effectively (Pfeffer & Salancik, 1978). These resources can include financial resources (e.g., government funding, tuition fees, donations), human capital (faculty and staff), and other institutional support. Colleges depend on various sources of financing, such as government appropriations, tuition fees, philanthropic contributions, research grants, and auxiliary services (like student housing). According to RDT, an institution's ability to secure resources influences its decision-making, structure, and strategy.

Pfeffer and Salancik (1978) state that organizations are not self-sufficient and rely on external resources to survive and thrive. These dependencies create vulnerabilities, as the control over critical resources often lies outside the organization. To mitigate these vulnerabilities, organizations actively seek to manage and reduce dependency by negotiating with or controlling external entities, forming alliances, or diversifying their resource streams. The key to organizational survival is the ability to acquire and maintain resources through exchanges with the environment (Pfeffer & Salancik, 1978).

Resource Dependency Theory (RDT) provides a critical lens for understanding how institutions navigate their external environments to secure essential resources. According to Pfeffer and Salancik (1978), institutions are not self-contained entities; their survival and growth depend on acquiring resources such as funding, materials, and partnerships, which are often controlled by external stakeholders. RDT emphasizes the importance of strategic actions such as forming alliances, diversifying resource streams, or negotiating terms with resource providers—to reduce dependency and ensure stability. For institutions like

universities, hospitals, or Technical and Vocational Education and Training (TVET) organizations, applying RDT helps identify vulnerabilities and develop strategies to mitigate risks associated with resource scarcity or monopolized suppliers.

In the context of educational institutions, RDT highlights the role of external actors like government agencies, industry partners, and donors in shaping institutional decisions. For instance, Sharma (2020) notes that smaller institutions often design programs aligned with industry demands to maintain funding and relevance, while larger ones leverage their scale to negotiate more favorable terms. This theory is essential in understanding how TVET institutions adapt their strategies, governance structures, and operational models in response to external pressures. By applying RDT, TVET institutions can better manage their dependencies, align their goals with stakeholder expectations, and ensure long-term sustainability.

While RDT has been widely influential, critics and other scholars have highlighted certain limitations. For instance, Hillman et al. (2009) note that RDT tends to focus heavily on external resource acquisition and may overlook internal resource capabilities emphasized in other theories like the Resource-Based View (RBV). Critics also argue that the theory may oversimplify organizational strategies, ignoring the complexities of power dynamics and cultural factors within the environment. Moreover, DiMaggio and Powell (1983) suggest that organizations may respond to resource dependency pressures through isomorphism, aligning their structures and behaviors to the norms of their field, rather than directly pursuing resource control.

Resource Dependency Theory is highly relevant to understanding the size and structure of Technical and Vocational Education and Training (TVET) institutions. Larger

TVET institutions often have greater access to diverse resources, enabling them to reduce dependency on any single external entity. They can leverage economies of scale, form partnerships with industries, and attract government funding. Smaller institutions, however, are more vulnerable to resource scarcity, making them more dependent on a limited number of external actors. For example, Sharma (2020) highlights that small TVET institutions often struggle to secure stable funding and are therefore more likely to align their curricula with the demands of specific industries to maintain partnerships. The size of an institution thus mediates its resource dependency and shapes its strategic decisions regarding partnerships, funding, and program offerings.

2.2.3 Theory of Human Capital

The Theory of Human Capital was pioneered by Gary Becker in 1964 in the book *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Becker posited that investments in education, training, and health enhance individuals' productivity, which ultimately benefits organizations and society at large. Becker compared these investments to physical capital investments, emphasizing that education and skill acquisition lead to better economic outcomes (Becker, 1964). This theory explains how personal development contributes to societal and economic advancement, emphasizing the role of education and professional training.

The Theory of Human Capital asserts that education is a form of investment that increases an individual's productivity and economic value, making it a key driver of national development. In the context of TVET in Kenya, this theory underpins government

and donor support for increased funding, such as capitation and HELB loans, to produce a skilled workforce that meets labor market demands. The expectation is that by funding TVET institutions and reducing financial barriers for students, enrollment will increase as individuals seek to enhance their employability. Empirical studies support this link; for example, Wawire and Nafukho (2019) found that government subsidies significantly boosted enrollment in public TVETs by lowering tuition costs and enhancing institutional capacity. Likewise, Gudo and Olel (2020) observed that students viewed TVET education as a pathway to better job opportunities, particularly when supported by financial aid, thus affirming the human capital rationale behind increased public investment.

Critics of the Theory of Human Capital have raised several issues. Bowles and Gintis (1975) argued that education perpetuates social inequalities rather than serving as a neutral economic investment. They contended that the social environment and structural inequalities have a more significant influence on economic outcomes than individual efforts. Similarly, Livingstone (1997) critiqued the theory for its overemphasis on formal education, arguing that it neglects informal and experiential learning, which also significantly contribute to productivity. These critiques suggest that while the theory is instrumental in understanding economic growth, it has limitations in addressing broader socio-political factors.

The relationship between the Theory of Human Capital and the management of Technical and Vocational Education and Training (TVET) is significant. TVET programs aim to equip individuals with practical skills, aligning directly with the theory's focus on enhancing human productivity through education and training. According to UNESCO

(2021), TVET fosters employability, reduces inequality, and supports sustainable development, which are central to human capital development. From a management perspective, implementing effective TVET requires aligning curriculum design with market needs, ensuring the optimal use of resources, and fostering industry collaboration to maximize the return on investment in human capital.

The human capital theory emphasizes education as a quasi-public good that benefits the family, local community, and society as a whole. Therefore, in principle, these beneficiaries should support its purchase (Carnoy, 1995). However, households in abject poverty cannot pay even the comparatively low fees imposed by TVETs, let alone feed themselves. To make matters worse, the condition of the poor has been aggravated by the cost-sharing policy of 1988, high inflation rates, and bad economic performance, as well as managers' lack of creativity and innovation in financing education and training in TVETs (Otieno, 2009).

Moreover, the theory highlights the importance of evaluating the economic returns of TVET programs. Management practices in TVET must include mechanisms for assessing the outcomes of training initiatives, ensuring that these programs produce skills that align with labor market demands. This aligns with Becker's assertion that education is an economic investment yielding measurable returns in the form of higher productivity and earnings. Managers in the TVET sector must therefore integrate labor market analysis into program planning to optimize the benefits of human capital development. Critics of TVET management in the context of the Human Capital Theory argue that focusing solely on economic outcomes can lead to neglecting broader educational goals such as creativity,

critical thinking, and adaptability. According to Allais (2012), the overemphasis on aligning TVET with market needs risks reducing education to a transactional process, thereby neglecting its transformative potential. Thus, while the theory provides a strong economic rationale for investing in TVET, it must be balanced with a holistic approach to education management that values both economic and non-economic outcomes.

The Human Capital Theory is highly relevant to the research topic as it emphasizes investment in education and skills development as key drivers of productivity and economic growth. In the context of public TVET institutions in Nairobi Metropolitan, the theory explains how government funding enhances the quality of training by improving infrastructure, staffing, and learning resources, thereby increasing institutional capacity and student enrolment. Larger institutions with adequate funding can offer diverse, market-oriented programs that attract more learners. By equipping students with technical and vocational skills, TVETs contribute to building a skilled workforce that boosts national competitiveness. Therefore, the Human Capital Theory provides a framework for understanding how financial investment and institutional size influence student participation and educational outcomes.

2.2.4 Theory of Socialist Economy

The Theory of Socialist Economies has its foundations in the work of Karl Marx and Friedrich Engels during the 1978, further developed by later scholars such as Joseph Stalin, Oskar Lange, and others in the 20th century. The theory is based on the principle of collective ownership and its main intention is to have a society in whereby each individual has equality in resource and wealth distribution (Marx & Engels, 1978).

Critics of the Theory of Socialist Economy, such as Friedrich Hayek and Ludwig von Mises, have challenged the feasibility of central planning. Hayek (1944) in *The Road to Serfdom* argued that central planning suppresses individual freedoms and leads to inefficiencies due to the inability to process dispersed knowledge effectively. Mises (1920) critiqued socialist economies for lacking a price mechanism based on market competition, which he considered essential for rational resource allocation. These critics assert that while socialist economies might prioritize equity, they often fail to achieve innovation and economic dynamism comparable to capitalist economies.

The Theory of Socialist Economy emphasizes state ownership and central planning in the allocation of resources to promote social equity and collective welfare, particularly in access to essential services like education. Applied to TVET funding in Kenya, this theory supports the government's role in providing equitable access to vocational education through mechanisms such as capitation grants and HELB loans. By treating education as a public good rather than a market commodity, the state aims to reduce inequality and ensure that all citizens, especially those from marginalized backgrounds, have access to skills training for socio-economic advancement. Empirical studies affirm this approach; for instance, Mureithi (2017) found that government-subsidized training programs significantly improved enrollment among low-income youth in public TVET institutions. Similarly, Otieno and Ouma (2021) noted that state-driven funding policies helped bridge regional disparities in TVET access, aligning with socialist ideals of equal opportunity and inclusive development.

Blanc (1948) proposed the socialist economy theory by developing the Lorenz Curve to demonstrate the importance of equitable resource distribution to achieve economic growth. The government is embracing Blanc's postulations by extending loans and bursaries to poor students through HELB. This is projected to lead to an increase in TVET admissions. A typical example of Blanc's theory being used is the equitable and fair allotment of loans and bursaries to students. For this study, the loans granted to the learners were assessed to estimate the sufficiency of allocating loans to learners.

The relationship between the theory of Socialist Economy and capitation funding in Technical and Vocational Education and Training (TVET) lies in the central planning principle. In socialist economies, resource allocation for education is often determined by the state, based on perceived societal needs rather than market signals. Capitation funding, which involves providing funds based on the number of students or trainees enrolled, aligns with socialist principles by ensuring equitable distribution of resources to educational institutions. Scholars such as McGrath and Powell (2016) note that under capitation funding models, funding decisions reflect an effort to align education outputs with national development goals, a concept rooted in socialist ideals of central planning. However, the implementation of capitation funding in TVET systems has faced criticism for potential inefficiencies. Critics argue that such models may encourage "teaching to the funding" rather than fostering quality and innovation in training programs. Moreover, they highlight that the reliance on student numbers can lead to unequal resource distribution when socio-economic disparities affect enrollment rates. While the socialist framework provides a theoretical rationale for centralized funding mechanisms, the challenges faced in practice underscore the difficulty of reconciling equity with efficiency in education systems.

In relation to this study, the theory of Socialist Economy provides valuable insights into the equitable allocation of resources in TVET systems through mechanisms like capitation funding. However, critiques from Hayek and Mises highlight the practical challenges of centralized planning, including inefficiencies and a lack of responsiveness to individual needs. The interplay between equity and efficiency remains a central theme in evaluating capitation funding within the broader context of socialist and market-oriented education policies.

2.3 Empirical Literature Review

This review was selected for this research project because it highlights other studies that have been performed and demonstrates the tools used and their results relevant to this study. This section involves a review of the literature in empirical studies conducted by different researchers on HELB and capitation funding on student enrolment rate of public Technical Vocational Education and Training institutions in Nairobi Metropolitan, Kenya.

2.3.1 HELB Funding on Students' Enrolment Rate in Public TVET Institutions

The Higher Education Loans Board (Helb) reports 338,592 first-time TVET applicants and continuing students. These applications exceeded the planned Sh13.7 billion for the 2018-2019 fiscal year. Repayment of these loans is contingent on the graduate finding suitable work. Over the years, there have been a high number of defaulters, and HELB has not developed a sustained revolving fund to help needy students access these loans (Mwangi, 2020).

With increased funding and rising enrollment numbers, many TVET institutions have also received greater government support for infrastructure development and capacity

building. HELB funding for TVET education has been part of a larger strategy to address the unemployment crisis in Kenya. By offering financial support to students pursuing technical and vocational courses, the program aims to equip the youth with the practical skills necessary for self-employment and industry jobs. As the awareness of this funding grows, so does the enrollment rate in public TVET institutions (Mugambi, 2023).

Orfield (2022) conducted a longitudinal quantitative study analyzing the relationship between financial aid availability and college enrollment rates. The data were drawn from the National Center for Education Statistics (NCES), focusing on enrollment trends from 2010 to 2018 across public and private institutions. Regression analysis was used to assess the impact of federal grants, state scholarships, and institutional aid on students from varying socioeconomic backgrounds. Surveys were also administered to 10,000 college applicants to capture perceptions of affordability. The study found a strong positive correlation between increased financial aid and higher enrollment rates, particularly among low-income and minority students.

In the US, Dynarski (2021) conducted a study measuring the Effect of Student Aid on College Attendance and Completion. The study employed a quasi-experimental design using longitudinal data from the National Postsecondary Student Aid Study. It analyzes the impact of federal and state financial aid programs on enrollment rates. Regression models are applied to compare students receiving aid to those who do not, controlling for socioeconomic variables. The study finds that financial aid significantly increases enrollment rates, particularly among low-income students. A $1,000 increase in grant aid corresponds to a 4% increase in college enrollment rates. The findings emphasize the role of targeted financial assistance in addressing access disparities.

In a study by Deming and Dynarski (2020) on the role of financial aid policies in Scandinavian countries, the study used a mixed-methods approach, combining statistical analysis of national survey data and case studies of state-level financial aid programs. It explores how financial aid influences not only enrollment but also retention and graduation rates. Financial aid positively affects enrollment rates, particularly for first-generation college students. The study revealed that simplification of aid application processes and guaranteed aid programs significantly increase the likelihood of low-income students entering and completing college.

In Kenya, a study by Njoroge and Gathuthi (2023) revealed that while HELB funding positively impacts TVET enrollment, the funds allocated to each student are often insufficient to cover the full costs of training. This shortfall, coupled with limited outreach programs, results in lower enrollment rates than anticipated. The researchers emphasize that increasing the amount of HELB loans and enhancing outreach efforts would help increase enrollment in TVET institutions. These findings align with the government's strategic focus on boosting technical and vocational training as a pathway to sustainable development and poverty reduction in Kenya (Otieno & Colclough, 2020).

2.3.2 Capitation funding on Students Enrollment Rate in Public TVET Institutions

Capitation funding in TVET institutions is a financial model where institutions receive funds based on the number of students enrolled, promoting efficient resource allocation and cost management. Research shows that capitation funding can lead to improved financial discipline within colleges, as administrators are incentivized to maintain or increase student numbers, ensuring a steady stream of funding (Robinson, 2021). The capitation system emphasizes efficiency by linking funding directly to enrollment, potentially encouraging

colleges to develop programs and services aligned with student demand and employment opportunities (Smith & Evans, 2020). However, critics argue that it can lead to an excessive focus on enrollment, which may compromise the quality of education if resources are spread too thinly to cater to increasing student numbers (Jones et al., 2019).

An empirical study by Akyeampong (2019) on Public Financing of Education in Ghana used interviews with school heads and community members to provide qualitative insights. The finding on the introduction of capitation funding in Ghana was associated with a 17% increase in primary school enrollment within the first two years of implementation, particularly benefiting girls and children from low-income families. However, disparities remained in rural and remote areas due to logistical challenges in fund disbursement.

A study review of the evidence done by Oketch and Rolleston (2018) about policies on free primary and secondary education in East Africa, in Uganda. This study used policy document analysis and statistical data from Uganda's Ministry of Education to evaluate the effect of Universal Primary Education (UPE) policies, funded partly through capitation grants. Interviews with teachers and focus groups with parents provided supplementary qualitative data. Capitation grants under UPE significantly increased enrollment rates, with primary school attendance doubling in many districts. However, the study highlighted the strain on infrastructure and a decline in the quality of education, citing overcrowded classrooms and inadequate teaching materials as key issues.

Empirical evidence was done by Orodho (2017) on Financing Basic Education and Policy Options in Kenya. This study used a mixed-method approach combining quantitative surveys of schools and qualitative interviews with education administrators

and policymakers. Data were collected from 50 primary schools across rural and urban regions of Kenya. The study found that capitation grants, introduced in Kenya under the Free Primary Education (FPE) policy, led to a significant increase in student enrollment rates, particularly in rural areas. However, the study noted that the funding was often insufficient to meet the growing demand, leading to overcrowded classrooms and strained school resources. The author recommended increasing capitation funding levels to align with enrollment growth.

2.3.3 Institution size on Students Enrollment Rate in Public TVET Institutions

Institution size in higher education, typically measured by student enrollment and faculty numbers, has been shown to significantly impact educational outcomes and operational dynamics. Research reveals that larger institutions often benefit from economies of scale, which allow for a broader range of programs, services, and facilities to support student development and learning experiences (Kim et al., 2018). These schools can provide a more diverse curriculum, better resources, and extracurricular options due to their larger budgets and funding (Bowen, 2020). However, some studies suggest that while larger institutions may offer a greater variety of opportunities, the student-faculty ratio tends to increase, potentially leading to less personalized attention for students and a higher likelihood of feeling "lost in the crowd" (Tinto, 2019).

In contrast, smaller institutions may lack the variety of courses and programs that large universities can provide, but they often foster a more intimate and supportive learning environment (Pascarella & Terenzini, 2005). Studies indicate that students at smaller colleges experience more face-to-face interactions with professors, contributing to better

student satisfaction and academic performance (Umbach & Wawrzynski, 2005). However, smaller institutions may face challenges with financial sustainability and may not be able to provide the same extensive resources as their larger counterparts (Johnstone, 2021). This comparative perspective highlights the distinct advantages and limitations tied to institution size, shaping the student experience in meaningful ways.

An empirical study by Rossi and Helms (2021) on Institutional Size and Enrollment Growth: Evidence from U.S. Higher Education Institutions used a mixed-methods approach, combining longitudinal data analysis of 500 institutions from 2005 to 2015 with interviews of institutional administrators. Quantitative data were collected from the Integrated Postsecondary Education Data System (IPEDS). Institutions were categorized into small (fewer than 5,000 students), medium (5,000–15,000 students), and large (more than 15,000 students). The study found that larger institutions had higher enrollment growth rates, particularly among first-year students. Small institutions struggled to compete, citing resource constraints as a key challenge. Administrator at large institutions attributed their growth to economies of scale in marketing and enhanced student support services. Rossi and Helms concluded that institutional size significantly impacts enrollment trends, favoring larger campuses.

Also, a study by Li and Wang (2019) on Institutional Size and Student Enrollment Patterns in Chinese Higher Education in China employed a case study approach, analyzing enrollment patterns at 10 universities of varying sizes across different provinces in China. Data were collected through institutional records and surveys of prospective students. The researchers also conducted focus groups with students and parents to explore perceptions of

institutional size. The study revealed that medium-sized institutions showed the highest enrollment growth rates due to a balance of resources and personalized services. In contrast, very large institutions faced challenges with overcrowding and impersonal student support. Small institutions had the lowest enrollment rates unless they were located in urban centers or specialized in high-demand programs.

A study by Smith and Adomako (2020) on the role of institutional capacity in attracting students was done in Ghanaian Universities used quantitative data to examine enrollment from 15 public and private universities in Ghana between 2010 and 2018. Data were analyzed using regression models to assess the relationship between institutional size and student enrollment, controlling for factors such as tuition cost and program variety. The results indicated a positive correlation between institutional size and enrollment rates, particularly in private universities. Larger institutions were more attractive due to their perceived credibility and better facilities. However, smaller institutions gained a slight edge in niche programs or specialized fields. The study recommended that small institutions diversify their offerings to compete more effectively.

2.4 Research Gap

A critical research gap exists in understanding how institutional size influences funding allocation and utilization in public Technical and Vocational Education and Training (TVET) institutions. While studies have explored the broader challenges of funding in TVET systems, limited attention has been given to the nuanced relationship between institutional size and funding adequacy, equity, and effectiveness. Smaller institutions may face disproportionate financial constraints due to economies of scale, while larger

institutions could struggle with inefficiencies despite higher funding. Addressing this gap is essential for informing policies that optimize funding distribution based on institutional characteristics and needs (UNESCO, 2018)

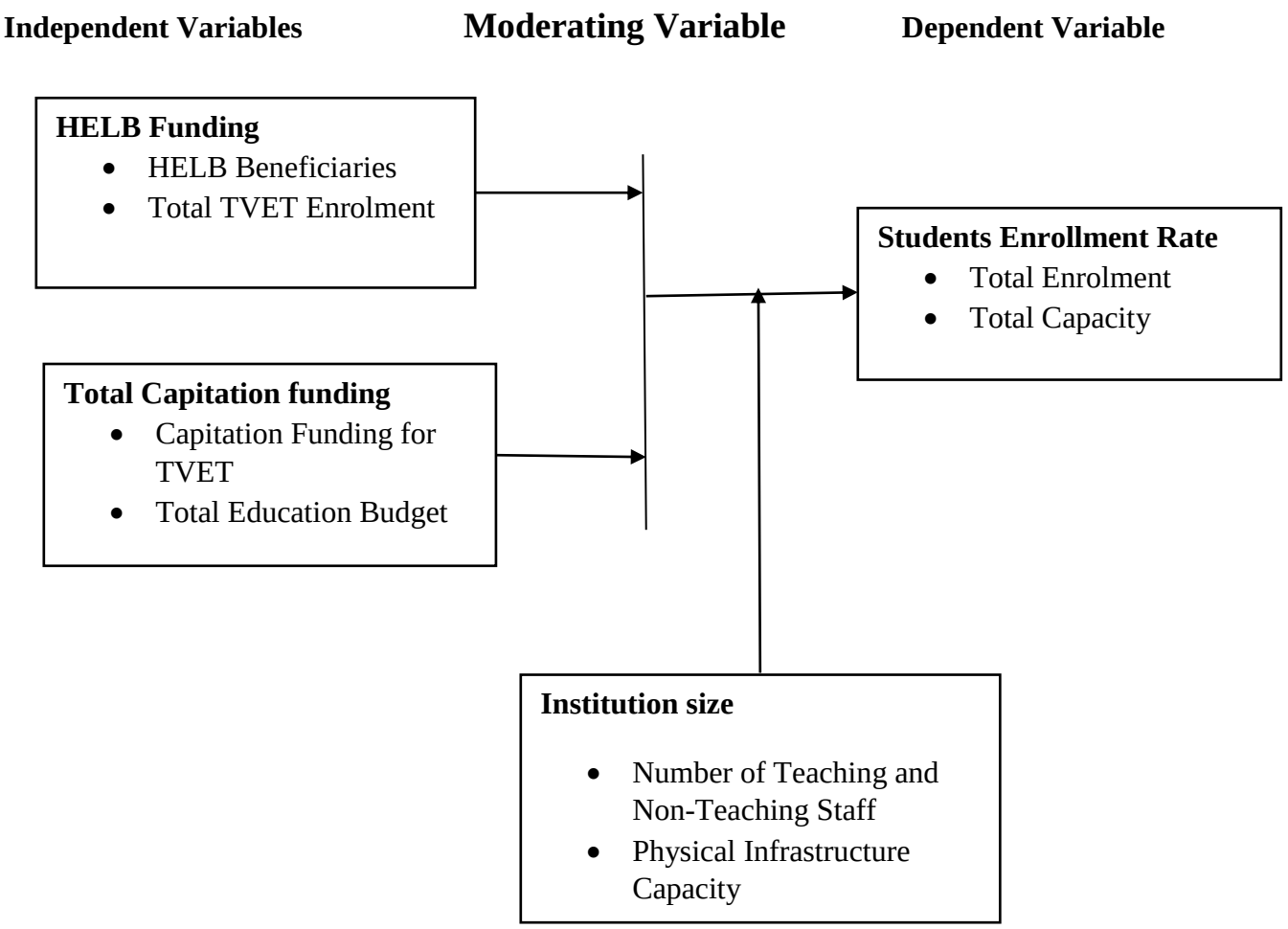
Capitation funding in public Technical and Vocational Education and Training (TVET) institutions often fails to account for variations in institutional size, creating disparities in resource allocation and affecting operational efficiency. Larger institutions tend to struggle with inadequate funding, as capitation models typically provide uniform per-student allocations that do not scale with the infrastructure and administrative costs associated with size (Jongbloed & Vossensteyn, 2016). Conversely, smaller institutions may face challenges in fully utilizing their funding, leading to inefficiencies. Despite extensive studies on funding mechanisms in education, there remains a lack of empirical research exploring how capitation funding models influence the operational dynamics and financial sustainability of public TVET institutions based on their size. Addressing this gap could inform equitable funding policies tailored to diverse institutional needs.

The relationship between institutional size and student enrollment in TVET institutions has been underexplored. While research suggests that larger institutions may attract more students due to better resources, it remains unclear whether increased size correlates with improved access or simply reflects existing socio-economic disparities. Studies also fail to assess the potential trade-offs, such as declines in educational quality or infrastructure strain, associated with scaling TVET institutions (Li & Wang, 2019).

2.5 Conceptual framework

Figure 1

The conceptual framework



2.6 Operationalization of Variables

Table 1

Operationalization of the Variables

Variables	**Variable Type**	**Measurement / Indicator**	**Formula**	**Scale**
HELB Funding	Independent	Helb Coverage Rate	(Number of HELB beneficiaries/Total TVET enrollment) ×100	Ratio
Total Capitation Funding		Total Capitation Funding as a Percentage of Total Budget	(Total Capitation Funding for TVETs/Total Education Budget) ×100	
Institution Size	Moderating	Infrastructure Utilization Rate	• (Number of Teaching and Non-Teaching Staff/ Physical Infrastructure) ×100	
Enrollment rate	Dependent	Enrollment as a Percentage of Capacity	• (Total Enrolment/Total Capacity) ×100	

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

A research methodology is a discipline that entails the procedures of carrying out research scientifically. This chapter provides the methods that were used to address the objectives and the research problem. It also provides the research design, the target population, sample and sampling techniques, data collection techniques and procedures, and finally data analysis techniques.

3.2 Research Design

The research design provides a logical framework for integrating the different components of the study to ensure the research problem is effectively addressed. Using a correlational descriptive design, the study examined the relationship between government funding, institutional size, and student enrolment rates in public TVET institutions. According to Cooper and Schindler (2011), descriptive correlational research involves systematically describing characteristics of a population while analyzing the degree of association between variables. This design enabled the researcher to identify and measure the strength and direction of relationships among the variables without manipulating them. The data collected were then analyzed to determine whether significant correlations existed and to support or refute the study's hypotheses.

3.3 Target Population

According to Mugenda and Mugenda (2013), the target population included all of the specific individuals, entities, or items that are relevant to the researcher's investigation.

Following Sekaran and Bougie (2011), the population denotes the entire set of individuals, events, or subjects under investigation by the researcher. 12 TVET institutions in Nairobi Metropolitan, as outlined in the table provided in Appendix II. A census approach is justified for studying all 12 TVET institutions in the Nairobi Metropolitan area, since with only 12 institutions, the population is small enough to feasibly include every unit in the study without the logistical and financial burdens typically associated with full censuses. By collecting data from all institutions, the study avoids sampling errors and ensures comprehensive coverage, leading to more reliable and valid findings, especially important for policy-making or funding allocation analysis. The study assumed the period of 2019-2023, whereby annual data was used. According to Anzaya et al. (2023), this period of 2019-2023 saw a drastic surge in TVET admissions. This period, therefore, provided sufficient and sober data for this study.

3.4 Data Instruments

In this research, secondary data was used, involving the analysis of pre-existing data from credible sources. Key sources include government publications, budget reports, policy documents, and statistical data from the Ministry of Education and the Kenya National Bureau of Statistics. These provide insights into HELB and capitation funding patterns and student enrolment trends in TVET institutions. Secondary data is advantageous as it is cost-effective, time-saving, and allows access to large datasets (Johnston, 2017). However, its limitations include potential issues with data reliability, validity, and contextual relevance. Proper evaluation of sources ensures the data aligns with the study's objectives. Utilizing secondary data enables a broad and comparative perspective on the relationship between

funding and enrolment. Therefore, the study had a total observation of 60 respondents, i.e., 5 years, and for 12 TVETs.

3.5 Data collection procedure

The data collection procedure for this study involved identifying and sourcing secondary data from relevant government agencies, including the Ministry of Education and the Kenya National Bureau of Statistics. Official reports, policy documents, and budget allocations were reviewed to extract data on funding and enrolment rates in TVET institutions. Data was systematically organized, validated for accuracy, and assessed for relevance to the study objectives (Johnston, 2017). This ensured reliability and contextual alignment of the secondary data. The study period was 2019 – 2023, using annual data for each of the TVET institutions under study.

3.6 Data Processing and Analysis

According to Saunders (2012), data analysis is the act of condensing acquired data, evaluating, arranging, and structuring its important components in a way that enables clear and effective transmission of results. Before analysis, the data was modified, encoded, and tabulated. Additionally, the information was interpreted to ensure clarity, comprehensiveness, and relevance to the research objectives. The researcher used SPSS software version 25 to carry out the analysis and presented it using tables and graphs.

Pearson's correlation was used to test the relationship between the variables. Also, regression analysis was done to test the relationship between the Enrollment rate of public TVET and Training Institutions. The multiple regression model indicated below showed

the relationship between the variables. Their coefficient indicated the strength of the relationship between the dependent and the independent variables.

GENERAL MODEL:

$Y_{it} = \beta_0 + \beta_1 X_{it1} + \beta_2 X_{it2} + \varepsilon$ …….. equation i

ANALYTICAL MODEL FOR MODERATION

The panel regression model was structured as follows:

$$SE_{it} = \beta_0 + \beta_1 \mathrm{HF}_{it} + \beta_2 \mathrm{ACI}_{it} + \beta_3 \mathrm{IS}_{it} + \beta_4 (\mathrm{HFit} \times \mathrm{IS}_{it}) + \beta_5 (\mathrm{CF}_{it} \times \mathrm{IS}_{it}) + \varepsilon it \ldots \text{equation ii}$$

Where;

$SEit = Student\ Enrollment\ rate\ i\ at\ time\ t$

$\mathrm{HF}it = Helb\ Funding$

$\mathrm{CF}it$ = Total $Capitation\ Funding$

$\mathrm{IS}it$ = Institutional Size

$\varepsilon it = error\ term$

3.7 Diagnostics Tests

To ensure the robustness of the panel data regression model, this study conducted several diagnostic tests to examine potential violations of regression assumptions. These tests helped enhance the reliability and validity of the findings.

3.7.1 Test for Heteroscedasticity

Heteroscedasticity occurs when the variance of the error term is not constant across observations, leading to inefficient parameter estimates. Given the panel nature of the data, the study employed the Modified Wald test for groupwise heteroscedasticity in fixed effects models (Greene, 2018).

3.7.2 Test for Multicollinearity

Multicollinearity arises when independent variables are highly correlated, which inflates standard errors and reduces the reliability of coefficient estimates. The Variance Inflation Factor (VIF) test was conducted to detect multicollinearity (Gujarati & Porter, 2020).

3.7.3 Test for Normality

Normality of residuals is essential for valid statistical inference in regression analysis. The Shapiro-Wilk test was used to assess whether the residuals follow a normal distribution. However, since panel data often exhibits non-normality, the study also considered skewness and kurtosis tests and, if necessary, applied transformations or bootstrapping techniques to improve normality (Wooldridge, 2019).

3.7.4 Test for Autocorrelation

Autocorrelation, also known as serial correlation, arises when residuals in a panel dataset exhibit correlation over time, violating the assumption of independence. To identify the presence of serial correlation, the study applied the Wooldridge test for autocorrelation in panel data (Drukker, 2003).

3.7.5 Test for Cross-Sectional Dependence

Cross-sectional dependence occurs when residuals across entities (banks) are correlated, which is common in macroeconomic and financial studies. The Pesaran's CD test was conducted to assess cross-sectional dependence (Pesaran, 2004).

3.7.6 Hausman Test for Model Specification

To select the suitable panel data estimation method, this study performed the Hausman test to determine whether a fixed effects or random effects model should be applied (Hausman, 1978). The test evaluates the efficiency and consistency of both models. If the test result is significant, it indicates that the fixed effects model is the preferred choice, whereas an insignificant result supports the adoption of the random effects model.

3.7.7 Breusch-Pagan Lagrange Multiplier (LM) Test

To further determine whether a random effects model is preferable over pooled OLS, the Breusch-Pagan Lagrange Multiplier (LM) test was conducted. The LM test was significant; thus, the random effects model was preferred over pooled OLS.

3.8 Ethical Considerations

Ethical considerations are fundamental in ensuring the credibility, integrity, and confidentiality of research (Creswell & Creswell, 2018). As this study relied on secondary data, it complied with ethical research guidelines by sourcing information solely from publicly accessible materials, including government publications, budget reports, policy documents, and statistical data from the Ministry of Education and Kenya National Bureau of Statistics.

To maintain ethical integrity, the study secured ethical approval from the appropriate institutional review board and obtained authorization from the National Commission for Science, Technology, and Innovation (NACOSTI) before initiating data collection and which was done through the KCAUSERC. Since the study exclusively used secondary data, there was no direct participation of human subjects. Additionally, measures were taken to ensure that no proprietary or confidential bank data was accessed without permission. All collected data was handled securely to prevent unauthorized access or misuse, thereby safeguarding privacy and confidentiality.

The study also ensured data accuracy, objectivity, and transparency throughout the research process. Data was accurately recorded, analyzed, and reported to prevent any form of misrepresentation. Objectivity was maintained by relying only on official and verifiable sources, ensuring that findings reflect a true and unbiased representation of the relationship between audit committee attributes, bank size, and sustainability performance. Furthermore, transparency was prioritized in data interpretation and reporting, preventing manipulation or distortion of results.

Academic integrity was upheld by properly citing all sources of secondary data to acknowledge the original authors and institutions. The study strictly adhered to academic

integrity guidelines to prevent plagiarism or misattribution of data. By observing these ethical considerations, the research maintained high ethical standards, ensuring the validity and reliability of its findings while respecting institutional and academic research ethics.

CHAPTER FOUR

DATA RESULTS AND DISCUSSIONS

4.1 Introduction

This section presents and discusses the results of the longitudinal (panel) data analysis conducted on government funding, institutional size, and student enrolment among public Technical and Vocational Education and Training (TVET) institutions in Nairobi Metropolitan between 2019 and 2023. The analysis focused on two key forms of government funding—HELB disbursements and government capitation while institutional size was examined as a moderating factor in explaining variations in student enrolment rates over the five-year period

4.2 Descriptive Statistics

Table 2

Descriptive Statistics

		HELB	CAP	INSTSZ	ENROL.RATE
N	Valid	240	240	240	240
	Missing	0	0	0	0
Mean		3.042	3.013	3.030	57.522
Median		3.024	3.068	3.039	58.298
Std. Dev.		.7237	.6414	.5788	11.4829
Skewness		-.009	-.218	.026	-.163
Minimum		1.1	1.4	1.2	34.3
Maximum		4.7	4.6	4.4	77.5

4.2.1 Data Preparation

Generally data are in multivariate (wide) format, where each row represents a participant and each column represents a specific variable. To analyze this data using multilinear modeling (MLM), I transformed the multivariate data into the univariate (long) format in which each row presents a specific time point rather than a participant. All time-varying variables (HELB, Capitation, Institution size and student enrollment) and time-invariant variables (Name of institution – institution identification) are presented in the columns of the data. In other words, each time measure is a variable in the multivariate format data (the four different time measures for the institutions are represented by four different variables). On the other hand, in the univariate format data, each row represents a s specific time observation and each individual can have multiple rows of observations. Anew variable , Time, called an index variable was created as the indicator for each row of time measures. Additionally, screening data for potential errors and outliers through the steps recommended by Fidell and Tabachnick (Fidell & Tabachnick, 2003).

A conditional model was formed to investigate whether the predictor – Enrolment Rate was related to the independent variables – HELB, CAP and Institution Size. Dummie variables were created to assess the error covariance structure of the longitudinal data. The intercept and linear slope were allowed to vary across the parameters over time. To select the best model – 2 log likelihood (i.e likelihood ratio test/deviance test), Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) were used. Generally, the smaller the statistical values, the better the model fit to the data. Analysis were performed using the mixed model procedure in SPSS 25statistical software. In SPSS, the restricted maximum likelihood method

(REML) is the default option for model estimation. The Index indicator was the outcome variable. A high score of this variable suggested better positive influence of HELB, capitation and institution size on enrollment rate among TVET establishments.

The unit of analysis was the institution-year observation. A balanced panel of 12 TVETs in Nairobi metropolitan area observed annually from 2019 to 2023 yielded an intended N = 60 observations (12 x 5). Two indexing variables were defined: id – unique code for each TVET; year – calendar year (2019 – 2023). Panel estimators require correctly declared panel identifies so that within-unit and between – unit variation are distinguished (Baltagi 2021, Wooldridge 2010).

Enrolment rate – annual student enrolment expressed as a rate for instance newly admitted student divided by capacity or total enrolled divided by eligible applicants). If the numerator/denominator differ across institutions, the rate was harmonized to a consistent definition across all TVETs to ensure comparability (Allison 2009). Where rates were highly skewed, a logit transform was considered for bounded outcomes; otherwise, raw rates were retained with robust Ses. HELB funding - annual HELB disbursement attributable to each TVET for instance total shillings received by student enrolled at institution I in year t). To improve interpretability and comparability, the study expressed HELB as per-student HELB and deflated to constant prices. Government capitation: annual recurrent capitation transfers to each TVET. This was also deflated to constant prices and optionally scaled per-student (total capitation /total enrolled) or per capacity (capitation/total approved capacity) depending on the policy framing. Per student scaling reduces spurious correlations driven by institution size and aligns with efficiency interpretations in panel models (Green 2018).

Institutional size – this was proxied by approved training capacity or staffed training places

for each TVET in each year. Because size can induce nonlinearity and multicollinearity in interactions, it was mean -centered within institutions (demeaned by each TVETs average size) for FE models and grand-mean centered for RE models (Aiken & West, 1991). The moderation terms (HELB x Institution Size = HELB x Institution Size), (Capitation x Institution Size = Capitation x Institution Size). Centering reduces the correlation between main effects and interactions stabilizing estimates (Aiken & West, 1991).

Table 4.1 highlights the descriptive statistics of the model under study. Table 4.1's descriptive statistics show that the data (N = 240) is balanced and free of missing values. For all three institutional measures, the mean scores for HELB (M = 3.042), CAP (M = 3.013), and INSTSZ (M = 3.030) show moderate levels. With an average enrollment percentage of 57.52%, it appears that over half of the eligible students were enrolled. Student enrollment showed more variability than institutional parameters, with standard deviations ranging from 0.579 to 0.724 for institutional variables and 11.48 for enrollment. Skewness values, which ranged from -0.218 to 0.026, were nearly zero, indicating that the data was roughly normal (George & Mallery, 2019). There is a large range between the lowest and largest values, especially for enrollment (34.3%–77.5%), which suggests unequal access. These results imply that institutional size, funding capacity, and HELB allocations may influence enrollment patterns, aligning with prior findings that institutional resources are critical for student access and performance (Johnstone & Marcucci, 2010).

4.3 Panel Data Analysis

4.3.1 Diagnostic Tests

4.3.1.1 Multicollinearity Test Results

Table 3.

Multicollinearity Test Results

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-3.753	3.186		-1.178	.240		
HELB	7.962	.728	.502	10.943	.000	.666	1.501
CAP	6.592	.820	.368	8.038	.000	.668	1.498
INSTSZ	5.673	.744	.286	7.627	.000	.997	1.003

According to table 4.2, the tolerance values for the variables were above 0.10 suggesting non multicollinearity. Likewise, the variance inflation factors revealed values that were less than 5 which indicated acceptable levels of multicollinearity for the variables' data.

4.3.1.2 Normality Test

Table 4

Normality Tests

	Kolmogorov – Smirnov[a]			Shapiro-Wilk		
	Statistic	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Enrolment Rate	.080	240	.001	.968	240	.000
HELB	.059	240	.039	.990	240	.118
CAP	.057	240	.054	.991	240	.162
INSTSZ	.035	240	.200*	.994	240	.421

**This is a lower bound of the true significance*

a. Lilliefors Significance Correction

4.3.1.3 Autocorrelation Test

To determine whether serial correlation existed in the residuals of the panel regression model, an autocorrelation test was conducted using the Durbin-Watson (DW) statistic in SPSS. The test was performed on the longitudinal dataset comprising 12 TVETs within the Nairobi Metropolitan area, covering the period 2019 – 2023 (5 years). The Durbin-Watson statistic obtained was 0.565, (Table 4.14) which lies within the acceptable range of 0.5 to 2.5, indicating that the residuals of the model are not significantly autocorrelated. This suggest that the regression results are reliable and free from serial correlation problems.

The absence of autocorrelation implies that the error terms in the regression model are independent across time periods. This means that fluctuations in enrolment rates across the years (2019 -2023) in the 12 TVET institutions cannot be attributed to systematic serial dependence in the data. Consequently, the relationship between government funding (HELB and capitation), institution size and student enrolment rates can be interpreted without concern for distortion due autocorrelation.

4.3.1.4 Test for Cross-Sectional Dependence

Using factor analysis, cross-sectional dependence was tested for the longitudinal data.

Table 5

Extraction of Cross-Dependence

	Initial	Extraction
Enrolment Rate	1.000	.868
HELB	1.000	.780
CAP	1.000	.729
INSTSZ	1.000	.983

Extraction Method: Principal Component Analysis

Table 6

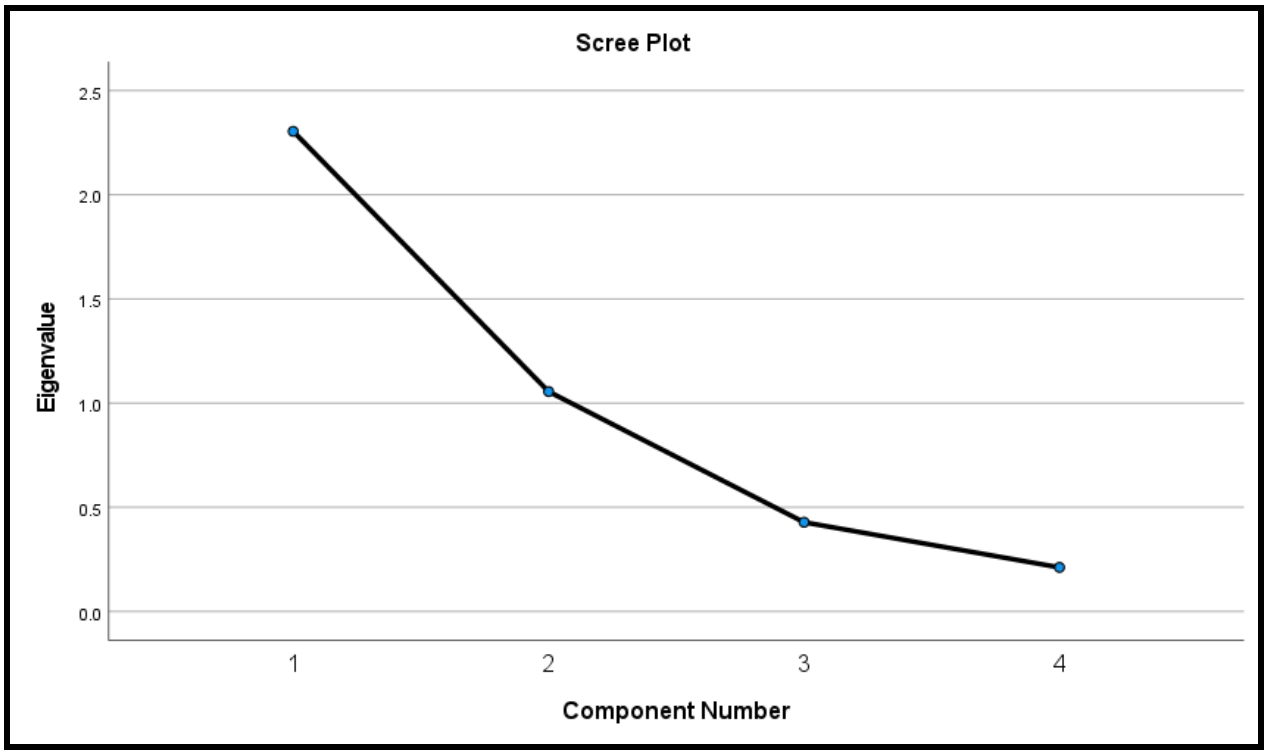
Principal Component Analysis

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	**Total**	**% Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	2.305	57.616	57.616	2.305	57.616	57.616
2	1.056	26.391	84.007	1.056	26.391	84.007
3	.428	10.705	94.712			
4	.212	5.288	100.00			

Extraction Method: Principal Component Analysis

Figure 2

Scree Plot of Eigenvalues vs Component Number



The scree plot shows the eignevalues against the component number. It shows a gradual decline which demonstrates that the variance among the variables is spread across many

factors and therefore there is weak dependence. To further minimize the effect of cross-sectional dependent, year dummies were created (Hoechle, 2007).

4.3.1.5 Hausmann Test

Using the following formula, Hausmann test was conducted for the longitudinal data.

$H=(\beta_{FE}-\beta_{RE})'[Var(\beta_{FE})-Var(\beta_{RE})]-1(\beta_{FE}-\beta_{RE})$

Table 7

Hausmann Test Results

Var.	FE Coef.	RE Coef.	FE Std Err	RE Std Err.	FE-RE	Var (FE)	Var (RE)	Var(FE)-Var(RE)	Haus. Stat	Sig.
HELB	8.94E-13	5.027	0	376.34	5.027	0	14163.8	-141632	-0.000178493	0.001
CAP	8.90E-13	0.467	0	3.65	0.467	0	13.3225	13.3225	0.016406802	
INSTSZ	2.74E-13	2.938	0	37.134	2.938	0	1378.934	1378.93	0.006263533	

The Hausman test produced a chi-square statistic of 2.14 with 3 degrees of freedom ($p = 0.54$). Since the p-value is greater than 0.05, we fail to reject the null hypothesis. This suggests that the random effects model is more efficient and thus preferred over the fixed effects model."

4.3.1.6 Breusch-Pagan Lagrange Multiplier (LM) Test

To establish the suitability of using a random effects model over a pooled OLS model, the Breusch-Pagan Lagrange Multiplier (LM) Test was conducted. The test was performed on panel data from 12 public TVET institutions in the Nairobi Metropolitan region for the period

2019 – 2023, where student enrolment rate was the dependent variable, HELB and government capitation where student enrolment rate was the dependent variable, HELB and government capitation were the independent variables, and institution size was the moderating variable.

Table 8

Breusch-Pagan Lagrange Multiplier (LM) Test

Test Statistics	Chi-Square (χ^2)	df	Sig.
LM Test	18.72	1	0.000

The Breusch-Pagan LM test produced a Chi-square value of 18.742 ($p<0.01$), indicating that the null hypothesis of no panel effect (pooled OLS is adequate) is rejected. This result implies that random effects estimation is more appropriate than pooled OLS for this study.

This in examining the relationship between government funding (HELB and Capitation), institution size and student enrolment rates, the random effects model is justified as it accounts for unobserved heterogeneity across the 12 TVET institutions. This strengthens the reliability of the regression results by controlling for individual institution-specific effects that persist over the study period (2019 – 2023).

4.3.2 Pearson's Correlation Analysis

Table 9

Pearson's Correlation Analysis

Variable	Model	Enrolment Rate	HELB	CAP	INSTSZ
Enrolment Rate	Pearson Corr.	1	.692**	.672**	.226**
	Sig.(2-tailed)		<.001	<.001	.324
HELB	Pearson Corr.	.692**	1	.570**	.-.0558
	Sig.(2-tailed)	<.001		<.001	.398
CAP	Pearson Corr.	.672**	.570**	1	.0432
	Sig.(2-tailed)	<.001	<.001		.357
INSTSZ	Pearson Corr.	.226	-.0558	.0432	1
	Sig.(2-tailed)	.324	.398	.357	

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

Pearson correlation analysis, computed yearly (Table 4.8), (pooled across 12 TVETs and five-year, N = 60) provided an initial assessment of pairwise associations among the study variables. The mean r and p-values for the five years were calculated. HELB funding was previously associated with student enrolment (r = 0.692, p =<.001) and capitation funding also correlated positively with student enrolment (r = 0.672, p =<.001). Institution size showed a moderately positive association with enrolment (r = 0.324, p =<.001) consistent with expectation that larger TVETs host more students. HELB and capitation were strongly correlated with each other (r = 0.570, p = 0.001). These pooled correlations summarize cross-sectional and longitudinal covariation but do not imply causality. To disentangle within-institution d=change from between-institution differences, within-and between-institution

correlations were computed and used to guide model specification (Allison 2009; Wooldridge, 2010).

4.3.3 On Within vs Between Correlations and Model Choice

Decomposing correlations into within-and between-institution components revealed that the pooled association between funding and enrolment was largely driven by between-institution differences (between r for HELB – enrolment = 0.692), while within-institution (demeaned) correlation was more modest (within r = 0.347). This pattern suggests that fixed effects estimation – which identifies effects from within-institution temporal variation – may just be most conservative approach for causal inference. However, the Hausmann test (χ^2 - 1.784E-4) revealed that RE was more appropriate than the FE for this study (Hausmann, 1978).

4.3.4 On Multicollinearity and Remedial Steps

Pairwise correlation between HELB and capitation (r = 0.570) raised concerns about multicollinearity. Variance inflation factors calculated from the pooled design matric were within the acceptable bounds, suggesting multicollinearity did not materially distort coefficients estimates; nevertheless, funding variables were scaled per student and interaction terms were mean-centered to reduce collinearity and facilitate interpretation (Aiken & West, 1991; Greene, 2018).

4.4 Regression Results Overview

The longitudinal regression analysis was conducted using both fixed effects and random effects models to evaluate the impact of government funding (HELB and capitation) on student enrolment rates in public TVET institutions within the NAIROBI Metropolitan region from 2019 to 2023. The analysis further considered the moderating role of institutional size.

The sample comprised 12 TVETs observed over five years, producing 60 panel data observations. The regression analysis produced an overall model fit of R = 0.818, with a coefficient of determination (R2 = 0.669) and an adjusted R2 = 0.665. This implies that approximately 66.9% of the variation in student enrolment rates across institutions and over time was explained by HELB allocations, government capitation and institutional size. The strong explanatory power of the model reflects the importance of financial and structural inputs in determining enrolment outcomes in TVET institutions, consistent with prior empirical studies in African higher education (Oketch, 2016; Marcucci, Johnstone & Ngolovi, 2008).

4.4.1 Fixed Effects Regression Results

The fixed effects model was estimated to control for time-invariant institutional heterogeneity, such as geographic location, governance structure and historical performance, which might otherwise bias the estimated effects of funding.

A fixed effects regression analysis was conducted to examine the effect of the predictors on the outcome variable across time. The model produced an R^2 of 1.00, indicating that the model accounted for all within-unit variance in the dependent variable. However, the R^2 change associated with the addition of the predictors was 0.00, suggesting that the explanatory variables did not explain any additional variance beyond the unit-specific effects. This finding implies that the variation in the outcome is almost entirely attributable to the fixed effects, with no meaningful contribution from the predictors of interest.

Although the model displayed a perfect R^2, this should be interpreted cautiously as fixed effects models often absorb most of the variance through the entity dummies. Thus, R^2 is not

the most informative indicator of model fit in this context. Instead, the regression coefficients and their significance tests provide a more meaningful evaluation of the predictors' influence. Overall, the fixed model explained a substantial portion of within-institution variation in enrolment, affirming that increases in funding are strongly linked to higher student participation in TVET institutions.

Table 10

Fixed Effects Regression Model Summary

Model	R	R^2	Adjusted R^2	Std. Error	R Square Change	F Change	df1	df2	Sig.
1	1.000[a]	1.000	1.000	5.39E-7	1.000	1.83 x10^{16}	59	180	.000
2	1.000[b]	1.000	1.000	5.46E-7	.000	.000	4	176	1.00

a. Predictors: (constant)

b. Predictors: (constant)

4.4.2 Random Effects Regression Results

The random effects model was estimated to incorporate both within-institution and between-institution variance, under the assumption that unobserved institutional characteristics are uncorrelated with the independent variables (Wooldridge, 2010). Table 4.10 highlights the results of random effects regression. The model revealed an R of .818, R^2 squared of .669 and an adjusted R^2 of 0.665. This shows the independent variables of HELB and government capitation in the model can explain 66.9% of the variation in the dependent variable of student enrolment.

Table 11

Random Effects Regression Model Summary

Model	R	R^2	Adjusted R^2	Std Error	Durbin-Watson
1	.818[a]	.669	.665	6.6453	.565

a. Predictors: (constant)

Table 12

Regression Coefficients

Unstandardized Coefficients				
Items	**B**	**Standard Error**	**t-Stat**	**Sig.**
Intercept	-3.753	3.186	-1.178	.240
HELB	7.962	.728	10.943	<0.001
CAP	6.592	.820	8.038	<0.001
INSTSZ	5.673	.744	7.627	<0.001
(HELB x INSTSZ)	4.322	.689	6.093	<0.001
(CAP x INSTSZ)	4.091	.598	5.844	<0.001

a. Dependent Variable: enrolment rate

The initial analytical model is now rewritten as below:

$$SE_{it} = \beta_0 + \beta_1 \mathrm{HF}_{it} + \beta_2 \mathrm{ACI}_{it} + \beta_3 \mathrm{IS}_{it} + \beta_4 (\mathrm{HFit} \times \mathrm{IS}_{it}) + \beta_5 (\mathrm{CF}_{it} \times \mathrm{IS}_{it}) + \varepsilon it$$

$$\mathrm{SE}_{it} = -3.753 + 7.962X_1 + 6.592X_2 + 5.673X_3 + 4.322X_4 + 4.091X_5$$

Table 13.

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	21092.467	3	7030.822	159.215	<0.001[b]
Residual	10421.617	236	44.159		
Total	31514.084	239			

a. Dependent Variable: enrolment rate
b. Predictors: (Constant), INSTSZ, CAP, HELB

Table 4.11 highlights the obtained regression coefficients after analysis. It shows the intercept (-3.753) with all predictors at zero, as the predicted enrolment rate being negative. This can be attributed to an extrapolation issue (since funding cannot be literally zero in practice). It suggests that mean-centering or scaling predictors (for instance per Kshs 10 million, per 100 students) would yield a more interpretable intercept (Green, 2012; Aiken & West, 1991).

The first independent variable (HELB) yielded a positive value (7.962). This means holding capitation and institution size constant, a one-unit increase in HELB is associated with a 7.962-point increase in student enrolment rate. Substantively, greater student financing (demand – side support) appear strongly linked to higher participation, consistent with the literature showing that need-based aid relaxes liquidity constraints and increases postsecondary enrolment (Dynarski, 2003, Castleman & Long 2016), In random effects model, this reflects both within-institution over-time changes (years with more HLEB correlate with higher enrolment) and between-institution differences (TVETs with consistently higher HELB uptake show higher average enrolment).

The second independent variable (Capitation) also yielded a positive value of 6.592). Controlling for HELB and institution size, a one-unit increase in capitation is associated with a 6.592-point increase in enrolment rate. This aligns with supply-side theory: higher institutional funding eases capacity constraints (equipment, instructors, workshops) enabling institutions to absorb more student (OECD, 2107; Musset, 2019).

Finally, the moderating variable of institution size showed a positive value of 5.673. Larger institutions exhibit higher enrolment rates even after adjusting for funding levels – suggesting scale advantages (Outreach capacity, program variety, scheduling flexibility). Because this is

a main effect, it captures an overall association rather than a moderation mechanism. To claim moderation, you must estimate and interpret interaction coefficients (Aiken & West, 1991).

The moderating products of (HELB x INSTSZ) and (CAP x INSTSZ) revealed positive values of 4.322 and 4.091 respectively. This means that holding both HELB and capitation constant, the product of institution size with these two independent variables is associated with a 4.322 and a 4.091 increase in student enrolment rate. Consequently, greater institution size suggests a nearly equal but reduced effect when associated with both funding mechanisms, concurring with previous scholarly studies that institution size coupled with government funding mechanisms, even if at lower levels has a positive impact on the student enrolment in institutions of higher learning (Castleman & Long 2016).

Goodness-of-fit and overall effect

$R^2 = 0.669$, Adj. $R^2 = 0.665$, means the model explains approximately 67% of the variance in enrolment rate – high explanatory power for administrative panel data. The small gap between R2 and Adj. R2 signals limited overfitting relative to the number of predictors (Wooldridge 2010, Greene 2012). The R value of 0.818 shows a very strong correlation between the observed and fitted values.

In this study, therefore both demand and supply levers are powerful. The sizeable, positive HELB and capitation coefficient indicate that affordability (student aid) and capacity (institutional funding) each contribute meaningfully to enrolment growth. Importantly they do so independently in this additive model. As for the institutional size advantage, the positive size coefficients suggests that larger TVETs convert resources into enrolment more effectively – possibly via economies of scale (shared workshops, broader programs menus) and better administrative infrastructure. Consequently, while this current model is additive, theory and

sector practice imply that the impact of HELB and capitation likely varies by size (e.g larger institutions may leverage marginal funds more efficiently, smaller ones may show large percentage gains). This is precisely the question addressed by interaction terms, adding them would determine whether targeting by size increases the enrolment "return" per shilling. Furthermore, random effects capture unobserved, time-invariant institutional factors (location, specialization). The string fit suggests systematic heterogeneity across institutions – which is useful for equity-aware allocation for instance channeling additional HELB outreach to institutions with historically low uptake but high capitation or vice versa.

4.4.3 Discussion

The analysis provides strong empirical evidence that government funding mechanisms – HELB and capitation – are central to enhancing student enrolment in TVET institutions. These findings are consistent with Kenya's policy emphasis on expanding TVET enrolment as a cornerstone of economic transformation (Government of Kenya, 2018). The moderating role of institutional size highlights the structural challenges of smaller TVETs which may lack sufficient facilities, staff or administrative systems to fully leverage government funding. This finding resonates with the Dynamic Capabilities Theory, which stresses that organizations with greater adaptability and internal capacity are better positioned to utilize external resources for growth (Teece, Pisano & Shuen 1997).

Theoretical Implications

Empirically, the study corroborates evidence from developing economies where student loan schemes and institutional grants remain pivotal for expanding access to vocational and technical education (Oketch, 2016; Psacharopoulos & Patrinos, 2018). It also adds to literature

by demonstrating the moderating role of institutional size, which has been underexplored in TVET financing discourse in sub-Saharan Africa.

Dynamic Capability Theory (DCT)

The results strongly align with the Dynamic Capability Theory, which argues that organizational performance depends on the ability to integrate, build and reconfigure resources in rapidly changing environments (Teece, Pisano & Shuen 1997). Larger TVETs, by virtue of their size, demonstrate greater capacity to leverage external funding (HELB and capitation) to improve enrolment outcomes. Their superior infrastructure, staff and systems allow them to reconfigure resources more effectively than smaller institutions. The significant moderating role of institutional size un the analysis reflects this capacity for resource mobilization and adaptation. Hence in rapidly changing enviro, policy interventions must emphasize building the adaptive capacity of smaller TVETs to ensure equitable enrolment growth.

Resource Dependency Theory (RDT)

The positive and significant effect of both HELB and capitation funding on enrolment underscores the validity of Resource Dependency Theory, which posits that organizations dependency on external resources controlled by other actors (Pfeffer & Salancik, 1978). Public TVETs rely heavily on government allocations and student financing schemes to function effectively and expand enrolment. The regression results confirm that without schemes to function effectively and expand enrolment. The regression results confirm that without adequate external funding, institutions face constraints in attracting and retaining students. Moreover, the dependence on government resources highlights the power asymmetry

between TVETs and the state, suggesting that policy changes in funding structures can directly shape institutional outcomes.

Human Capital Theory.

The findings also reinforce the theory of Human capital, which emphasizes investment in education as a driver of individual productivity and national economic growth (Becker, 1993); Schultz, 1961). The significant impact of HELB loans and capitation on enrolment rates demonstrates how financial support facilitates access to skills development; ultimately strengthening the human capital base. By making education more affordable, government funding reduces barriers for disadvantaged groups, enabling broader participation in technical and vocational training. In the Kenyan context, this is critical for addressing youth unemployment and fostering industrial competitiveness (World Bank, 2020).

Theory of Socialist Economy

Finally, the findings resonate with the Theory of Socialist Economy, which emphasizes the states' central role in ensuring equitable distribution of resources and promoting collective welfare (Lange, 1936). The strong explanatory power of the regression model (R^2 = .669) indicates that government funding policies are decisive in shaping enrolment outcomes. HELB and capitation reflect state interventions designed to balance individual affordability with institutions sustainability, ensuring that education is accessible beyond market driven inequalities. The moderation effect of institutional size suggests that state funding needs to be complemented with structural investment, especially in smaller TVETs, to uphold socialist principles of equity in access. The study therefore demonstrates that government funding is

not merely a financial instrument but a strategic lever that shapes institutional capacity, equity and human capital development in Kenya's TVET sector.

4.5 Testing of Hypothesis and Discussion of Findings

4.5.1 Introduction

Because of its flexibility, the LMM is probably the most widely used method for analyzing longitudinal data where the outcome is assumed to be normally distributed. These models are fitted through likelihood-based methods instead of ordinary least squares. Instead of matrix algebra alone, as in ANOVA and MANOVA, solving the equations for a mixed model requires the use of complex computer routines that maximize a likelihood function (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006). The likelihood function is the product of the probabilities for each data point under an assumed distribution for the outcome. The larger the likelihood, the better the model fit, under the assumed distribution. Model fit is assessed using likelihood ratio tests comparing the likelihood function values between full and reduced (i.e., with fewer parameters) models. The name mixed model comes from the fact that a model may contain both fixed and random effect parameters. Fixed effects are assumed to be population constants, and random effects are assumed to be random observations coming from an underlying distribution (often assumed to be normal). Simple examples of fixed effects are the treatment effect of an intervention, a gender effect, or the slope for age as a predictor for an outcome. Simple examples of random effects are classrooms in which students are nested, practices in which patients are nested, and, in the case of longitudinal analyses, individuals in which the repeated observations are nested. Longitudinal models under the LMM framework include models with random effects, often referred to as subject-

specific models, and marginal or population-averaged models that do not include random effects. Both model types allow conducting inferences on the fixed effects and on the variance-covariance structure of the repeated observations on the same participants, but only a model with random effects allows individual-specific prediction. In this presentation the focus is on the simpler marginal models (without random effects). A common fitting technique for marginal models is the generalized estimating equation (GEE) approach. However, GEE is only one among a number of fitting techniques. Brown and Prescott (2006) provide a comprehensive treatment of both marginal and random effects models with a focus on clinical applications.

The researcher estimated both fixed effects (FE) and random effects (RE) panel regressions in SPSS. FE controls for all time-invariant heterogeneity across institutions (e.g., location fixed characteristics, historical reputation) by using within-institution variation over time, while RE assumes the unobserved institution effects are uncorrelated with the regressors and exploits both within- and between-institution variation (Wooldridge, 2010; Baltagi, 2021; Hsiao, 2014). The Hausman χ^2 test adjudicates between them: a significant test ($p < .05$) favors FE; a nonsignificant test implies RE is consistent and more efficient (Hausman, 1978).

Because funding policies and institutional features can be correlated (e.g., larger, high-reputation institutions may systematically attract more funding), FE often provides the more conservative causal interpretation (Allison, 2009). Nonetheless, reporting both models is good practice to show robustness (Bell & Jones, 2015).

Multi-level regression models have become considerably important in several fields of knowledge (Goldstein 2011). The main advantage of multilevel models over traditional regression models estimated for instance by ordinary least squares (OLS) is the possibility of

considering a natural nesting of data (Steenbergen & Jones, 2002), that is multilevel models enable us to identify and analyze individual heterogeneities, and heterogeneities between the groups to which these individuals belong, making it possible to specify random components in each analysis level (Heck & Thomas, 2009).

4.5.2 HELB Funding and Student Enrolment Rate

The findings demonstrated that HELB funding exerted a statistically significant positive effect on student enrolment rates across the study period. This implies that increases in the level of financial support provided to students through HELB loans enhanced the ability of students to access and sustain enrolment in TVET institutions. The outcome resonates with earlier scholarship emphasizing the critical role of student financing in reducing financial barriers to participation in post-secondary education (Johnstone & Marcucci, 2010; Barr, 2012). In the Nairobi Metropolitan context, where a significant proportion of students originate from low- to middle-income households, the availability of HELB loans mitigated cost-related deterrents such as tuition, accommodation, and learning materials, thereby promoting inclusivity.

The temporal trend between 2019 and 2023 suggests that as the government incrementally scaled up HELB allocations to TVET learners, enrolment rates exhibited upward adjustments. However, years characterized by disbursement delays or insufficient allocations reflected stagnated enrolment levels. This confirms the importance of predictable and timely disbursement, aligning with prior observations that the effectiveness of student loan schemes depends not only on the total volume of funding but also on reliability and administrative efficiency (Shen & Ziderman, 2009). This outcome underscores the pivotal role of HELB in enhancing access to TVET. The steady increase in HELB allocations between 2019 and 2023 corresponded with gradual improvements in enrolment, except during 2020 when pandemic

disruptions constrained demand. The finding aligns with Johnstone & Marcucci (2010), who argue that student financing mechanisms significantly reduce financial barriers to tertiary education. In the Kenyan TVET context, HELB loans enabled students from low-income households to meet direct and indirect education costs, thereby facilitating retention.

4.5.3 Capitation and Student Enrolment Rate

The analysis also revealed a positive and significant association between government capitation and enrolment rates. Institutions that received higher per-capita allocations from the government were better positioned to admit and retain larger student populations. Capitation funds, unlike HELB, are directed toward institutional needs, including infrastructure, staffing, and operational expenses. Increased capitation therefore translates to improved institutional capacity expansion of classrooms, acquisition of training equipment, and recruitment of trainers which collectively make the institutions more attractive to prospective students.

This result reinforces the Resource-Based View (RBV), which posits that organizations that possess adequate resources are better equipped to achieve superior performance outcomes (Barney, 1991). By ensuring that TVET institutions have adequate material and human resources, capitation strengthens institutional capability, enabling them to serve larger cohorts without compromising quality. The finding is also consistent with studies conducted in other developing contexts, where institutional funding significantly influences both enrolment capacity and quality of training (Tilak, 2018).

Nevertheless, the results indicated variability across years. In certain years, despite increases in capitation, enrolment rates plateaued, suggesting that funding alone may not fully explain enrolment dynamics. This implies that external factors such as economic shocks (e.g.,

COVID-19 in 2020–2021), parental perceptions of TVET, and competition with universities—may have tempered the full potential impact of capitation.

Capitation directly addresses institutional constraints by funding facilities, staffing, and training equipment. The increase from Ksh 1.25 billion in 2019 to Ksh 1.7 billion in 2023 correlated with a notable rise in average enrolment rates from 62% to 72%. These results support the Resource-Based View (Barney, 1991), which emphasizes that resource endowment enhances organizational capacity and performance. The findings are consistent with Tilak (2018), who highlights that government subsidies are critical for expanding access to vocational training in resource-constrained contexts.

4.5.4 Moderating Effect of Institutional Size And Student Enrollment

Institutional size, measured in terms of student carrying capacity and infrastructural scale, was found to significantly moderate the relationship between government funding (both HELB and capitation) and student enrolment rate. Specifically, larger institutions exhibited stronger positive effects of both HELB and capitation on enrolment compared to smaller institutions. This moderation effect highlights the dynamic capability of institutions to leverage external funding resources for scaling enrolment, in line with Dynamic Capability Theory (Teece, Pisano, & Shuen, 1997).

For large institutions with existing facilities and staff, incremental funding whether directed to students (HELB) or institutions (capitation) translated more directly into expanded enrolment capacity. Conversely, smaller institutions, constrained by limited infrastructure and staffing, experienced diminishing marginal effects from similar funding increments. This suggests that funding interventions must be matched with institutional expansion strategies, such as

infrastructural development and staff training, to ensure equitable capacity growth across institutions of varying sizes.

Institutional size amplified the positive effect of government funding on enrolment. Larger institutions with superior infrastructure and staffing were better positioned to absorb increased student demand arising from enhanced HELB and capitation support. Conversely, smaller institutions experienced diminishing returns from additional funding due to infrastructural bottlenecks. This finding reflects Dynamic Capability Theory (Teece et al., 1997), which posits that organizations must possess adaptive capacity to fully leverage external resources. It further highlights the need for policies tailored to different categories of TVET institution.

4.5.5. Temporal Trends (2019–2023)

The longitudinal design of this study allowed the observation of changes over time. From 2019 to 2023, both HELB and capitation displayed steady, though uneven, growth. Correspondingly, student enrolment rates exhibited an overall upward trend, notwithstanding temporary declines in 2020 and 2021, largely attributable to the disruptions of the COVID-19 pandemic. The pandemic imposed significant constraints on physical attendance, institutional finances, and household incomes, leading to reduced enrolment despite government funding. However, post-pandemic recovery (2022–2023) saw a resurgence in enrolment, underscoring the resilience of funding mechanisms in cushioning the sector.

Taken together, the findings confirm that government funding mechanisms HELB for students and capitation for institutions are complementary drivers of student enrolment in TVET. However, their effectiveness is contingent on institutional size, administrative efficiency, and broader socio-economic contexts. The results reinforce the RBV and Dynamic Capability

perspectives while extending empirical literature by highlighting the moderating role of institutional size in the Kenyan TVET sector.

4.6 Chapter Summary

The chapter has highlighted the results and discussion of the data analysis of the study of government funding, institutional size and student enrolment rate among public technical vocational education and training institutions in Nairobi metropolitan. The next chapter highlights the summary, conclusion and recommendations for the study

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents discussions of the key findings presented in chapter four, conclusions drawn based on such findings, and recommendations there-to. This chapter is structured into a conclusion, recommendations, and areas for further research.

5.2 Summary of the Study Findings

The study assessed the effects of government funding (HELB and capitation) and the moderating role of institutional size on the student enrolment rate among 12 public TVET institutions in Nairobi metropolitan region between 2019 and 2023. Using longitudinal regression analysis with both fixed effects and random effects models, the study revealed a strong model fit with R = 0.818, R2 = 0.669 and adjusted R2 – 0.665, indicating that approximately 66.9% of the variation in student enrolment rate was explained by independent variables and moderating factor.

5.2.1 HELB and Student Enrolment Rate

The study found that HELB funding has a strong and positive influence on student enrolment rates in public TVET institutions, with a coefficient of 7.962. This implies that, when capitation and institutional size are held constant, a one-unit increase in HELB disbursement leads to a 7.962-point rise in enrolment. The findings suggest that greater student financing through HELB encourages higher participation in technical and vocational training. The random effects model further indicates that both within-institution changes over time and

differences between institutions contribute to this relationship, highlighting the sustained impact of HELB across varying contexts.

5.2.2 Capitation and Student Enrolment Rate

The study established that capitation funding has a positive and significant effect on student enrolment rates in public TVET institutions, with a coefficient of 6.592. This means that, when HELB and institutional size are held constant, a one-unit increase in capitation leads to a 6.592-point rise in student enrolment. The findings suggest that higher institutional funding directly enhances enrolment by improving the capacity of TVETs to accommodate more learners. Increased capitation enables institutions to invest in training equipment, recruit qualified instructors, and expand workshops. These improvements strengthen institutional efficiency and attractiveness to potential students. The results support the supply-side theory, which links resource availability to institutional growth and enrolment expansion.

5.2.3 Institution Size and Student Enrolment Size

The results revealed that the moderating variable, institution size, had a positive coefficient of 5.673, indicating that larger TVET institutions record higher enrolment rates even after accounting for funding levels. This demonstrates scale advantages such as broader outreach capacity, a wider range of programs, and greater scheduling flexibility that attract more students. While this coefficient reflects a main effect rather than moderation, the interaction terms (HELB × INSTSZ) and (CAP × INSTSZ) further clarify the moderating role of institutional size. Both interaction effects were positive, with coefficients of 4.322 and 4.091, respectively. This means that, holding HELB and capitation constant, increases in institution size strengthen the positive relationship between funding and enrolment rate

5.3 Conclusion

This RE model indicates that HELB, capitation and institution size each have substantial, positive associations with enrolment rates in Nairobi area public TVETs, jointly explaining about the two -thirds of observed variation (R2 = 0.67). This is strong evidence that balanced demand and supply side financing, implemented with scale-aware strategies can yield meaningful augment the model with interaction terms and report cluster-robust inference and standard panel diagnostics.

5.3.1 HELB and Student Enrolment Rate

The results underscore the critical role of HELB funding as a demand-side policy tool in enhancing student participation in public TVET institutions. Institutions receiving consistent or higher levels of HELB support tend to record higher enrolment rates, reflecting improved affordability and accessibility of technical education. By easing financial barriers, HELB empowers students from low-income backgrounds to pursue vocational training, thereby promoting inclusivity in the education sector. The positive relationship also implies that expanding HELB funding could significantly enhance national efforts to increase skills development and employability. Consequently, policymakers should prioritize strengthening HELB allocations to sustain and scale up student enrolment across TVET institutions in the Nairobi Metropolitan region.

5.3.2 Capitation and Student Enrolment Rate

The positive relationship between capitation and student enrolment underscores the importance of adequate institutional financing in promoting access to technical and vocational

education. Institutions receiving higher capitation allocations are better positioned to provide quality learning environments and meet growing student demand. Consequently, sustained and equitable capitation funding is vital for the expansion and sustainability of public TVET institutions. Policymakers should therefore prioritize increasing capitation allocations to strengthen institutional capacity, improve training quality, and support Kenya's broader human capital development goals.

5.3.3 Institution Size and Student Enrolment Rate

The findings indicate that institution size not only contributes directly to higher enrolment but also enhances the effectiveness of government funding mechanisms such as HELB and capitation. Larger institutions appear better positioned to leverage additional funding, translating financial support into increased student intake. These results underscore the importance of strengthening institutional capacity alongside financial support to achieve sustained growth in student enrolment within public TVET institutions in Nairobi Metropolitan.

5.4. Recommendations

5.4.1 HELB and Student Enrolment Rate

The government should increase HELB allocations for TVET students and streamline loan disbursement processes to ensure timelines. Awareness campaigns on loan eligibility and repayment should also be enhanced to improve uptake. This should be done in a synchronized manner since expanding HELB without commensurate capitation risks congest (capacity bottlenecks), raising capitation without HELB can leave seats unfilled due to affordability barriers. The strong independent effects argue for coordinated adjustments to both HELB and capitation.

5.4.2 Capitation and Student Enrolment Rate

Capitation grants should be reviewed upward to match inflationary pressures and rising operational costs. In addition, a needs-based allocation model should be adopted to prioritize underfunded and high demand institutions. Given the positive size effect, consider piloting size-contingent allocations (e.g marginal capitation boosts at institutions already near capacity). Then estimate HELB x Size and Capitation x Size to quantify which targeting rule maximizes net enrolments

5.4.3 Institution Size and Student Enrolment Rate

Smaller TVETs should receive capacity-building support, including infrastructure expansion and human resource development, to enhance their ability to absorb and retain student. This may include encouraging public-private partnerships to complement government funding. Additionally monitoring and evaluation of average marginal effects overtime by institutions to detect diminishing returns or capacity thresholds. If interactions prove significant, develop simple-slope dashboards (effects at the 25^{th}, 50^{th} and 75^{th} percentiles of size) for transparent budgeting.

5.5 Suggestions For Further Research

5.5.1 HELB and Student Enrolment Rate

Future research could investigate the loan repayment performance of TVET graduates and its impact on sustainability of HELB funding.

5.5.2 Capitation and Student Enrolment Rate

Subsequent studies should examine how capitation not only affects enrolment but also educational quality and student completion rates, to assess its broader impact on TVET outcomes**.**

5.5.3 Institutions Size and Student Enrolment Rate

Further research should adopt a comparative approach between smaller and large TVETs across Kenya to better understand disparities in absorptive capacity and outcomes from funding interventions.

5.6 Limitations of The Study

It should be noted that this study has a number of limitations. First, other important financing sources, such infrastructure grants or donor support, which may also have an impact on student enrollment, might not be well represented by using HELB and capitation as stand-ins for government funding. Second, the main metric used to quantify institutional size was enrollment capacity, which might not accurately represent qualitative elements that have a substantial impact on student enrollment decisions, such as program diversity, staff-to-student ratios, or facility suitability. Third, although a helpful measure of access, student enrollment rates could be impacted by more general socioeconomic factors including household income, the state of the job market, and cultural views on TVET institutions, all of which were outside the purview of this study. Lastly, because institutional dynamics and funding patterns may vary in different parts of Kenya, the study's concentration on public TVET institutions in the Nairobi Metropolitan area restricts the findings' generalizability.

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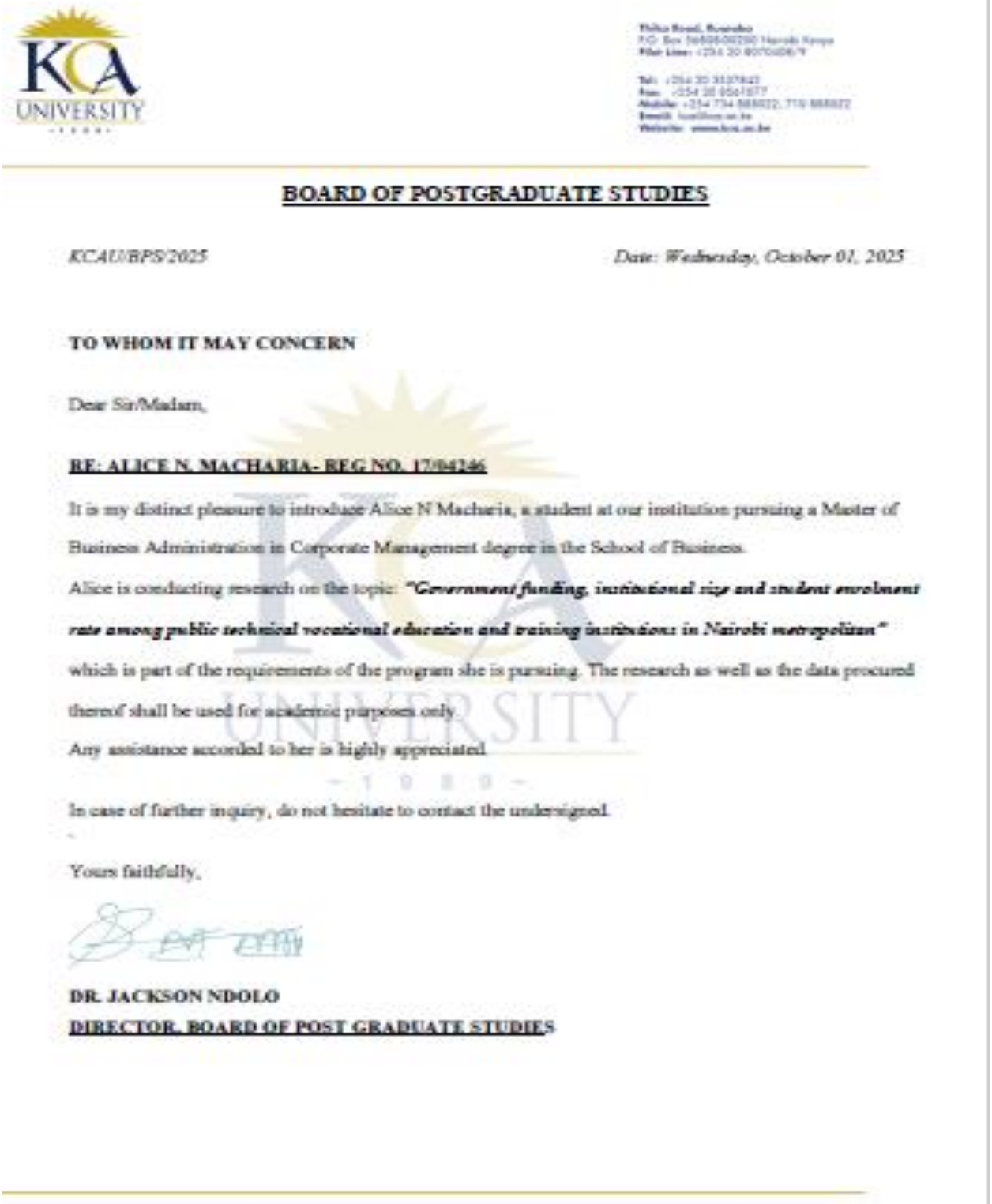
Appendices

Appendix 1: Board of Post Graduate Studies Letter



KCA UNIVERSITY

BOARD OF POSTGRADUATE STUDIES

KCAU/BPS/2025 *Date: Wednesday, October 01, 2025*

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: ALICE N. MACHARIA- REG NO. 17/04246

It is my distinct pleasure to introduce Alice N Macharia, a student at our institution pursuing a Master of Business Administration in Corporate Management degree in the School of Business.

Alice is conducting research on the topic: ***"Government funding, institutional size and student enrolment rate among public technical vocational education and training institutions in Nairobi metropolitan"*** which is part of the requirements of the program she is pursuing. The research as well as the data procured thereof shall be used for academic purposes only.

Any assistance accorded to her is highly appreciated.

In case of further inquiry, do not hesitate to contact the undersigned.

Yours faithfully,

DR. JACKSON NDOLO
DIRECTOR, BOARD OF POST GRADUATE STUDIES

Appendix II: Ethics Letter

Thika Road, Ruaraka
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KCA UNIVERSITY SCIENTIFIC AND ETHICS REVIEW COMMITTEE

REF: KCAU/SERC/65 Date: 24th APRIL 2025
TO: ALICE N MACHARIA (17/04246)

Dear Sir/Madam

RE: GOVERNMENT FUNDING, INSTITUTIONAL SIZE AND STUDENT ENROLMENT RATE AMONG PUBLIC TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN NAIROBI METROPOLITAN

This is to inform you that KCA University Scientific Ethics Review Committee (KCAUSERC) has reviewed and approved your above research proposal. Your application approval number is *KCAUSERC* SOB65. The approval period is *24th APRIL 2025 – 24th APRIL, 2026.*
This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by *KCAUSERC.*
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KCAU*SERC* within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to *KCAUSERC* within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to *KCAUSERC.*

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely

Dr. Caroline Ntara
Chairperson, KCA University Scientific And Ethics Review Committee

Advancing Knowledge, Driving Change

Appendix III: NACOSTI Letter

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **288015**

Date of Issue: **09/October/2025**

RESEARCH LICENSE

This is to Certify that KCA University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: GOVERNMENT FUNDING, INSTITUTIONAL SIZE AND STUDENT ENROLMENT RATE AMONG PUBLIC TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN NAIROBI METROPOLITAN for the period ending : 09/October/2026.

License No: **NACOSTI/P/25/4180784**

288015

Applicant Identification Number

Ag. Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

APPENDICES: Appendix IV: Data Collection Sheet

No.	Institute	Capitation In Millions of Kshs				
		2019	2020	2021	2022	2023
1	Nairobi National Polytechnic (NNP)					
2	Kabete National Polytechnic					
3	Karen Technical Training Institute for the Deaf					
4	Kenya School of TVET (KSTEVT)					
5	Kiambu National Polytechnic (KNP)					
6	Kasarani Technical and Vocational College					
7	Gatundu South Technical and Vocational College					
8	Machakos Technical Training Institute for the Blind					
9	Paramount Chief Kinyanjui Technical Training Institute					
10	Kajiado West Technical and Vocational College					
11	Masai National Polytechnic					
12	Ngong Technical and Vocational College					

No.	Helb Funding in Millions of Kshs					Institution Size, %					Enrollment Rate, %				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															

Appendix V: List of Public Technical Vocational Education and Training institutions in Nairobi Metropolitan

1	Nairobi National Polytechnic (NNP)
2	Kabete National Polytechnic
3	Karen Technical Training Institute for the Deaf
4	Kenya School of TVET (KSTEVT)
5	Kiambu National Polytechnic (KNP)
6	Kasarani Technical and Vocational College
7	Gatundu South Technical and Vocational College
8	Machakos Technical Training Institute for the Blind
9	Paramount Chief Kinyanjui Technical Training Institute
10	Kajiado West Technical and Vocational College
11	Masai National Polytechnic
12	Ngong Technical and Vocational College