

**DETERMINANTS OF FEMALE ENROLMENT IN ENGINEERING
PROGRAMS OF PUBLIC TECHNICAL VOCATIONAL EDUCATION AND
TRAINING INSTITUTIONS IN NANDI COUNTY, KENYA.**

BY

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DECLARATION

Declaration by the Candidate

I certify that this research thesis is entirely original with no submissions to other institutions for certification consideration.

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DEDICATION

I dedicate this research thesis to my parents, Mr. and Mrs. Joash Ngetich, my spouse, children, siblings and friends for helping me during the process of writing my thesis.

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ABSTRACT

Significant progress has been made by the Kenyan government and other educational partners to increase the enrolment number of female students in Technical and Vocational Education and Training (TVET) programs, yet the proportion of female students is still low. The purpose of the study was to determine what variables encourage or prevent women in Nandi County from enrolling in TVET engineering programs. The following objectives acted as a guide to achieve the purpose of the study: examine the influence of socioeconomic factors; to examine the influence of policy factors; to evaluate the influence of institutional factors; to assess the extent to which the availability of role models influence female enrolment in TVET engineering programs. The study was carried out in public technical institutions in Nandi County. The study was conducted based on Ruth Pearson's gender relations theory. A mixed method approach was used. Descriptive survey was utilized as the research design in this study. The target population was 210 engineering diploma and certificate students, 60 trainers in engineering, 2 registrars from selected TVET institutions in Nandi County, and one Nandi County TVET director. The study employed the Krejcie and Morgan formulae. It had a sample size of 136 students, 52 trainers, 2 registrars and one county TVET officer. Simple random sampling was used to choose the institutions. Stratified random sampling was used to select students and trainers, and the census method was used for the registrars. Questionnaires and interview schedules were used to collect data. Quantitative data was analyzed using regression while qualitative data was analyzed thematically. Analyzed quantitative data was presented by use of themes, tables, bar graphs and charts. The study found out that the society has a negative attitude towards female students studying in engineering. Furthermore, institutional variables such as outdated technology, students' lack of awareness of the entry requirements and inadequate infrastructure were shown to discourage girls from enrolling in engineering courses. The study also discovered that absence of female trainers to serve as role models for girls influenced their decision to enroll in TVET engineering programs. Regression analysis noted a significant positive relationship ($r > 0$; $p = 0.00$) between low female enrolment and: socioeconomic determinants, institutional determinants and availability of role models determinants. However, there was a negative relationship ($r > 0$; $p = 0.064$) between policy factors and the enrolment of female students in engineering. The study concluded that social factors such as societal perceptions, poverty, and institutional determinants such gender biased curriculum materials, outdated technology and student's lack of awareness of the entry requirements in technical courses were the main barriers to female students' enrolling in TVET engineering courses. However, policy factors do not affect enrolment in engineering. The study recommended that the government leverages technology for remote learning and awareness campaigns to simulate real-world engineering environments and projects as this could provide girls with an immersive experience of what engineering careers entail, fostering excitement and breaking stereotypes about the field. Integrate female-centric case studies in the curriculum to motivate female students and also help reshape societal perceptions about women in engineering.

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ABBREVIATIONS AND ACRONYMS

CDF	Constituency Development Fund
DFID	Department for International Development
EFA	Education for All
HELB	Higher Education Loans Board
ILO	International Labour Organization
KCPE	Kenya Certificate of Primary Education
KCSE	Kenya Certificate of Secondary Education
Kshs	Kenyan Shillings
NGOs	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
SDG's	Sustainable Development Goals
SET	Science, Engineering and Technology
SPSS	Statistical Package for Social Sciences
STEM	Science, Technological, Engineering and Mathematics
TVET	Technical and Vocational Education and Training
UNESCO	United Nations Educational, Scientific and Cultural Organization

CHAPTER ONE

INTRODUCTION OF THE STUDY

1.0 Introduction

This chapter outlines the study's background, problem statement, purpose of the study, study objectives, research questions, theoretical and conceptual framework, justification of the study, significance of the study, and study assumptions. It also defines key operational terms.

1.1 Background of the Study

According to United Nations Educational, Scientific Cultural Organization (UNESCO), Technical and Vocational Education and Training (TVET) is a vital component of Human Resource Development (HRD) and a driver of societal and economic development (UNESCO, 2018). The African Development Bank (AfDB) acknowledges the technical and vocational education and training (TVET) sector's capacity to progress the Sustainable Development Goals (SDGs) on the African continent and implement Agenda 2063. (African Development Bank, 2021). TVET has been described by a number of observers as the missing piece for training and integrating young people into the workforce, as well as the answer to Africa's skills mismatch and shortfall. The ability of TVET to generate jobs, economic expansion, and economic empowerment particularly for young Africans is undeniable.

Science, Technology, Engineering, and Mathematics (STEM) education is a fundamental pillar of the Sustainable Development Goals (SDGs), as it equips students with the knowledge, skills, and attitudes essential for fostering equitable and sustainable communities (United Nations, Department of Economic and Social Affairs, & UN Women, 2024). This emphasizes the importance of eliminating discrimination against

women, recognizing that empowering women through education benefits not only the individuals themselves but also the broader society. Engineering knowledge plays a crucial role in a nation's development, spanning social, economic, political, and cultural dimensions. In this context, women in technical fields, including engineering, bring valuable spatial abilities and perspectives that can be applied in professional settings, contributing to more inclusive and innovative solutions in various sectors.

To harness these benefits, educational systems must actively shape the development of progressive policies and reforms that support women's participation in STEM and technical fields. These reforms are vital in ensuring women's economic empowerment, advancing gender equality, and enabling the full utilization of their talents and abilities across diverse industries and sectors. As highlighted by Cheruiyot and Munyi (2019), this approach is not only beneficial to women but also essential for the sustainable development and progress of nations, as it ensures that all individuals—regardless of gender—can contribute to and benefit from the opportunities in today's rapidly evolving global economy.

Gender disparities in enrollment in Technical Vocational Education and Training (TVET) programs, particularly in engineering, remain a significant issue globally. Although there has been significant progress toward gender equality in primary and secondary education, with enrollment reaching gender parity by 2014, women are still underrepresented in TVET programs, particularly in engineering-related fields (UNESCO, 2014). This underrepresentation is particularly evident in both developed and developing countries, despite the well-documented benefits of increasing female participation in these sectors.

Research on gender and TVET consistently highlights these disparities, with a particular focus on the challenges faced by women entering non-traditional fields such as engineering. These challenges include societal stereotypes, a lack of female role models in technical fields, and gender biases within educational institutions and workplaces. As a result, women are often discouraged from pursuing TVET programs in engineering, contributing to the persistent gender gap. The benefits of increasing female participation in TVET programs, particularly in engineering, are substantial. Not only does this contribute to gender equality, but it also enhances economic development by diversifying the workforce and tapping into the full potential of the population. However, despite these advantages, the enrolment of women in TVET engineering programs remains disproportionately low, signaling the need for targeted interventions to overcome the barriers that women face in these fields (Republic of Kenya, 2017). Promoting gender-responsive policies, offering mentorship programs, and addressing stereotypes within educational and societal structures are some of the key strategies that can help reduce this gender gap and empower more women to pursue and succeed in technical education.

Recent studies by the International Labour Organization (ILO, 2019) highlight that female enrollment in Technical Vocational Education and Training (TVET) continues to lag behind male enrolment in 24 countries across the African continent. This disparity is particularly evident in technical fields traditionally dominated by men, such as electricity, construction, welding, and plumbing. In contrast, women in TVET programs often gravitate toward courses that lead to low-paying, service-oriented sectors, such as secretarial work, beauty, and childcare (UNESCO, 2012 & 2013). This gendered pattern in vocational choices reflects broader societal norms and stereotypes that encourage women to pursue “feminine” or “helping” professions, while

discouraging them from entering technical and skilled trades. Moreover, women are disproportionately represented in informal sectors in many African countries, where informal employment is widespread. In these environments, women's access to further education and training is severely limited. For example, women often have fewer opportunities to engage in apprenticeships or work-integrated learning with experienced artisans, which are critical for gaining the practical skills needed in technical fields (ILO, 2018; ILO, 2020). This lack of access to vocational training and work experience further exacerbates gender inequality in TVET, limiting women's career advancement and economic opportunities.

Several African nations, however, have implemented focused policy efforts to increase women's participation in TVET, particularly in male-dominated fields. Countries such as Mauritius, Kenya, Malawi, Tanzania, Rwanda, Seychelles, Uganda, and South Africa have made significant strides in addressing these gender gaps through targeted initiatives aimed at encouraging female enrollment in technical and vocational education (Prendergast, 2020; Rubagiza, 2010; Leyaro, V., and Joseph, C., 2019; UNESCO, 2020). These efforts include offering scholarships, creating mentorship programs, and promoting gender-sensitive curricula that challenge traditional stereotypes about women's roles in the workforce. While these policies show promise, much work remains to be done to ensure that women have equal access to all sectors of TVET and the opportunities they provide for social and economic mobility.

Despite some progress in female participation in Technical Vocational Education and Training (TVET) and the presence of policy statements aimed at promoting gender equality, significant gaps remain in both research and the practical implementation of gender-responsive measures within TVET systems. Research on gender equality in

TVET is still limited, and the application and oversight of gender-responsive initiatives in TVET practices remain inadequate. As a result, men continue to dominate the TVET sector in many African countries, including Kenya (International Development Research Centre, 2019). Session Paper No. 14 of 2012 in Kenya highlights the critical role of TVET in boosting economic growth and reducing poverty (Republic of Kenya, 2012). As part of the United Nations Sustainable Development Agenda, ensuring equal access to quality education, including TVET, for both women and men by 2030 is a key target. This includes offering affordable and accessible TVET programs that equip women with the relevant skills for employment, entrepreneurship, and job creation. However, despite these global and national goals, challenges persist in ensuring that women are fully represented in TVET, especially in technical fields like engineering.

In West Pokot County, for instance, data from the Department of Technical and Vocational Education reveals that female enrollment in TVET institutions has remained consistently low over the past five years (TVET Authority, 2019). Although overall TVET enrollment in Kenya increased by 19.7%, from 359,852 students in 2018 to 430,598 in 2019, however, the gender disparity remains pronounced. Fewer girls continue to participate in TVET engineering programs compared to boys, indicating that significant barriers still exist for women in accessing these crucial educational opportunities. This disparity reflects broader societal and institutional challenges, such as cultural stereotypes, lack of role models, and inadequate support systems within TVET institutions, which discourage women from pursuing careers in technical fields. While national efforts are underway to close these gaps, such as policy reforms and targeted programs, these challenges highlight the need for more effective strategies, stronger enforcement of gender-responsive policies, and ongoing research to understand the underlying factors preventing women from fully participating in TVET.

1.2 Statement of the Problem

In recent years, the Kenyan government has placed a strong emphasis on reforming and rebranding the Technical and Vocational Education and Training (TVET) sector as a key driver for socioeconomic development, with a focus on aligning the sector's objectives with the Sustainable Development Goals (SDGs) and Vision 2030 (Republic of Kenya, 2024). Recognizing the vital role that TVET can play in fostering economic growth and reducing poverty, the government has made significant efforts to improve the accessibility and quality of TVET education, particularly for women. One of the central documents guiding these reforms is *Sessional Paper No. 14 of 2012*, which outlines essential strategies for increasing women's participation in TVET (Republic of Kenya, 2012). The paper highlights several key steps, including gender mainstreaming strategies, aimed at reducing gender disparities in technical education. These strategies include expanding women's access to TVET programs through targeted outreach and support systems. Additionally, the introduction of bursaries and loan grants for TVET students is a significant policy measure that aims to reduce financial barriers that often hinder women from enrolling in technical courses.

Furthermore, the government has actively worked to promote the importance of women's participation in TVET, with particular emphasis on fields traditionally dominated by men, such as STEM (Science, Technology, Engineering, and Mathematics) subjects. This effort seeks to challenge societal stereotypes and encourage more women to pursue careers in engineering, technology, and other technical sectors, thus contributing to closing the gender gap in these high-demand fields. These efforts are part of a broader national commitment to ensuring that women have equal access to quality education and training, which is seen as a critical component of empowering women economically and socially. By promoting gender

equality in TVET, the Kenyan government aims to build a more inclusive workforce that can contribute to the country's economic development and the achievement of Vision 2030's goals (Republic of Kenya, 2024). However, despite these policy interventions, there is still a need for continuous monitoring, support, and effective implementation to ensure that these measures reach their full potential and create lasting change for women in the TVET sector.

According to statistics from the TVET Authority (2019), Kenya witnessed a notable 19.7% increase in total enrollment in TVET programs, rising from 359,852 students in 2018 to 430,598 in 2019. This growth is largely attributed to the registration of additional TVET institutions across the country, thereby expanding access to vocational education and training. While these efforts reflect a positive trend toward increasing the reach of TVET education, the gender gap remains a significant challenge.

Despite these advancements, the Economic Survey of 2019 revealed that the gender gap in TVET in Kenya remained at 14.4% (Kenya National Bureau of Statistics, 2019). This disparity highlights the ongoing challenges women face in accessing and succeeding in TVET programs, especially in fields that are traditionally male-dominated, such as engineering and technology. Even though the Kenyan government has made substantial policy commitments aimed at promoting access and equity in TVET for all marginalized groups—including women—these intentions have yet to fully translate into substantial increases in female enrollment.

The persistence of low female enrollment in TVET institutions, despite policy efforts, suggests that there are deeper barriers at play. These could include socio-cultural factors, such as gender stereotypes, that discourage women from pursuing technical education; financial constraints that limit women's access to TVET programs; and a

lack of adequate support systems within institutions to help women succeed in male-dominated fields. Additionally, there may be a need for more effective implementation of policies and better-targeted interventions to encourage and support women's participation in TVET. In order to bridge the gender gap in TVET, there is a pressing need for continued focus on the practical application of policies that promote gender equity. This includes providing more scholarships, creating mentorship programs, offering gender-responsive curricula, and addressing societal attitudes that hinder women's participation in technical and vocational education. Such measures would ensure that more women can benefit from the opportunities offered by TVET and contribute to the socioeconomic development goals of the country.

Only 45.4% (167,032) of the 367,925 students enrolled in Technical and Vocational Education and Training (TVET) institutes run by Kenya's Ministry of Education as of October 2023 were female (Kenya National Bureau of Statistics, 2023). This gender gap draws attention to a notable lack of female participation in technical and vocational education and training (TVET), especially in engineering and other technical professions where female presence is still worryingly low. For example, in mechanical engineering, only 11.8% of enrollees were female, with just 4,862 women out of 41,194 students. Similarly, female enrollment in electrical engineering was 15.8%, with 8,163 women out of 51,676 students, while civil engineering had a slightly higher female enrollment at 22.7%, with 18,653 women out of 82,141 students (Kenya National Bureau of Statistics, 2023). These figures point to a consistent trend where women remain underrepresented in TVET engineering programs, especially in traditionally male-dominated disciplines.

This gender gap in TVET engineering programs is alarming given the increasing demand for skilled professionals in technical fields, which are critical to economic development. Women's underrepresentation in these programs not only limit their access to well-paying and stable careers but also increase gender inequality in the workforce. To address this issue, targeted efforts are needed to enhance female participation in TVET, particularly in engineering. These efforts could include offering more scholarships and financial support for female students, creating mentorship programs to encourage women in technical fields, and implementing gender-responsive policies within TVET institutions. Additionally, shifting societal perceptions about gender roles in education and work, particularly in STEM fields, is crucial to encouraging more women to pursue technical and vocational education. To remove the obstacles keeping women from enrolling in and succeeding in TVET programs, the government, educational institutions, and other stakeholders must continue to cooperate.

This disparity raises several important questions regarding the underlying factors contributing to the low enrollment of women in TVET engineering courses. These factors may include socioeconomic barriers, such as financial constraints or household responsibilities, which disproportionately affect women's ability to pursue education. In addition, policy-related issues, such as the adequacy of gender-responsive initiatives or the lack of specific incentives for female students, may also play a role. Institutional factors, such as the gender climate within TVET institutions, support systems, and the availability of female role models, can also significantly influence female participation.

The aim of this study was to investigate these key factors; socioeconomic, policy, institutional, and the role of role models, that affect female enrollment in TVET

engineering courses, specifically in Nandi County, Kenya. By examining these determinants, the research intends to uncover the root causes behind the gender disparities and provide valuable insights for formulating effective strategies. These strategies could include tailored interventions to address the barriers that women face, such as scholarships, mentorship programs, and creating a more gender-responsive learning environment within TVET institutions.

Ultimately, the findings of this study aim to contribute to the broader goal of enhancing female participation in TVET. By promoting greater gender equity in technical education and employment, these efforts will not only benefit individual women but also support broader societal and economic development by empowering women to contribute fully to the workforce in fields that are critical to national growth and sustainability.

1.3 Purpose of the Study

This study aimed to investigate the impact of socioeconomic, policy, and institutional factors, as well as the availability of role models, on female enrollment in engineering programs at public technical institutions in Nandi County, Kenya. Given the persistent gender disparity in TVET enrollment, where only 45.4% of TVET students are female and even fewer are enrolled in engineering programs, this research sought to uncover the underlying barriers that hinder women's participation in these critical fields (Kenya National Bureau of Statistics, 2023). The study explored how socioeconomic factors, such as financial constraints, household responsibilities, and access to resources, impact women's ability to enroll and succeed in engineering programs. Additionally, the research examined policy factors, including the effectiveness of government initiatives, such as scholarships, gender-responsive policies, and institutional support, in

promoting female participation in technical education. Institutional factors, such as the learning environment, gender biases, and the availability of support systems within TVET institutions, was also analyzed to understand their influence on female students' decisions to pursue engineering courses.

Moreover, the availability of female role models in engineering programs was explored, as the presence of role models can inspire and motivate young women to overcome societal barriers and pursue careers in male-dominated fields. Identifying and understanding these various factors, the study aimed to provide actionable recommendations to increase female enrollment in engineering programs at public technical institutions in Nandi County. These recommendations would help inform policies, institutional practices, and support mechanisms that can enhance gender equity in technical education, ultimately contributing to the broader goal of empowering women and promoting equal opportunities in the workforce.

1.4 Objectives of the Study

The study was guided by the following objectives:

1.4.1 General objective

The general objective for this study was to identify the determinants of female enrollment in TVET institutions in Nandi County, Kenya.

1.4.2 Specific objectives

- i. Examine the influence of socioeconomic factors on female enrolment in TVET engineering programs in Nandi County public TVET institutions.
- ii. Examine the influence of policy factors on female enrolment in TVET engineering programs in public TVET institutions in Nandi County.
- iii. Evaluate the influence of institutional factors on female enrolment in TVET

engineering programs in public TVET institutions in Nandi County.

- iv. Assess the extent to which the availability of role models influences female enrolment in TVET engineering programs in public TVET institutions in Nandi County.

1.5 Research Questions

The study sought to answer the following questions

- i. What is the influence of socioeconomic factors on the enrolment of female students in engineering courses in Nandi County's public TVET institutions?
- ii. What influence do policy factors have on female students' enrolment in engineering programs in public TVET institutions in Nandi County?
- iii. What is the influence of institutional factors on the enrolment of female students in engineering programs in public TVET institutions in Nandi County?
- iv. To what extent does the availability of role models influence the enrolment of female students in engineering programs in public TVET institutions in Nandi County?

1.6 Justification of the Study

At global, regional, and local levels, there is a strong emphasis on promoting female participation in STEM (Science, Technology, Engineering, and Mathematics) within Technical and Vocational Education and Training (TVET). Historically, Nandi County has exhibited significant gender disparities in technical training, highlighting the urgent need for research in this area. This study aimed to provide valuable insights that can inform stakeholders about the educational requirements necessary to enhance female enrolment in TVET programs. While the findings of this research may not be universally applicable, they can offer relevant insights for similar contexts and

contribute to broader discussions about gender equity in technical education.

1.7 Significance of the Study

The findings of this study would significantly contribute to the existing body of knowledge by providing valuable insights that can be used to raise awareness about the progression structures within Kenyan Technical and Vocational Education and Training (TVET) institutions. This awareness can play a crucial role in addressing and minimizing the institutional barriers that often hinder the enrolment of female students in TVET programs. The data gathered in this study can also be instrumental for the Ministry of Education and the State Department of TVET in developing and implementing effective strategies aimed at increasing the enrolment of girls in TVET engineering programs, an area where gender disparity remains prominent. Additionally, the findings will serve as a resource for other key education stakeholders, including school administrators, trainers, and students. By utilizing these insights, they will work collectively to create an environment that is inclusive and supportive, ultimately encouraging more girls to enroll in TVET engineering programs, thereby narrowing the gender gap in this important field.

1.8 Scope and Limitations of the Study

This study focused on examining the determinants of female enrolment in TVET engineering programs in public TVET institutions within Nandi County, Kenya. It specifically investigated how socioeconomic factors, policy factors, institutional factors, and the availability of role models influence female participation in engineering courses. The study targeted female students currently enrolled in engineering programs, as well as TVET administrators, trainers, and policy implementers who play a role in promoting gender equity within these institutions.

The study's geographical scope was confined to Nandi County to allow for an in-depth exploration of contextual factors influencing female enrollment in technical programs. The findings, while context-specific, may provide insights applicable to similar regions and inform national strategies aimed at improving gender balance in TVET institutions. The study period focused on recent enrolment data and policy developments from 2018 to 2024, providing a current perspective on the issue.

Although the study was carefully designed, several limitations were anticipated. First, the research relied on self-reported data from respondents, which may be subject to bias or inaccuracies due to personal perceptions or social desirability. Second, the study was limited to public TVET institutions in Nandi County and did not include private institutions, which may have different dynamics affecting female enrolment. Third, time and resource constraints limited the sample size and scope of data collection, potentially affecting the generalizability of the findings to other counties or national contexts.

Additionally, cultural and social sensitivities surrounding gender roles in education may have influenced the openness of some participants, particularly in discussing issues related to stereotypes and institutional practices. Despite these limitations, the researcher ensured validity and reliability through careful instrument design, ethical data collection, and triangulation of information from multiple sources.

1.9 Assumptions of the Study

It was assumed that the respondents would provide accurate, truthful, and candid responses throughout the study, as their input was crucial for obtaining reliable data that contributed to the overall research findings. The researcher made this assumption based on the belief that the respondents, being individuals who are directly involved or

have knowledge of the TVET system, would approach the survey or interview process with a sense of responsibility and a commitment to providing honest answers. Additionally, it was presumed that the respondents possessed a clear understanding of the various factors that influence and determine female enrollment in TVET institutions. This included assessing awareness of the barriers and opportunities related to gender participation in vocational education, alongside understanding of the broader social, cultural, and institutional factors that may either facilitate or hinder the enrollment of female students in these programs. Therefore, the accuracy of the study's findings was, to a certain extent, upon the respondents' awareness and knowledge of these determinants, which the researcher assumed to be present.

1.10 Theoretical Framework of the Study

This study was guided by gender relations theory as articulated by Ruth Pearson, which examines how societal interactions between men and women are shaped by their pre-existing roles and connections (Orodho, 2012). By applying this theoretical framework, the study aimed to explore the dynamics influencing female enrolment in engineering courses at public TVET institutions in Nandi County, Kenya. Understanding these gender relations helped identify barriers to women's participation and give recommendations for increasing enrolment in these critical fields. According to the paradigm, ideologies are the significant source of gender roles and behaviors. However, laws and policies reflect idealized views of gender role rather than actual acts undertaken by women and men. According to Pearson (1992), discrimination against women persists because society has the last say over the precise nature of what women and men are capable of achieving and their actual contributions to production. These misconceptions hinder women's possibilities for achievement and participation in society on an equal basis. Given the significance of gender roles in establishing

professional and educational trajectories, Pearson's hypothesis is an ideal fit for this study.

The principles of this theory have significant implications for career and higher education choices. The gender gap in TVET engineering may be traced back to societal gender stereotypes. Women raised to be nurturing family members should enroll in courses that would better equip them for these responsibilities. According to Gathitu (1995) as cited in Doris (2021), a person's sexual orientation impacts professional performance. Women who pursue engineering programs via TVET institutions are frequently ridiculed since their primary role in society is supposed to be caring for children and the elderly. A difficulty with this idea is that people's attitudes alter when cultures are passed down from generation to generation. Culture determines the capabilities of men and women and consequently, concepts from the traditional liberal ideal of equal opportunity apply to the investigation.

1.11 Conceptual Frame work of the Study

Independent variables

Determinants of low enrollment

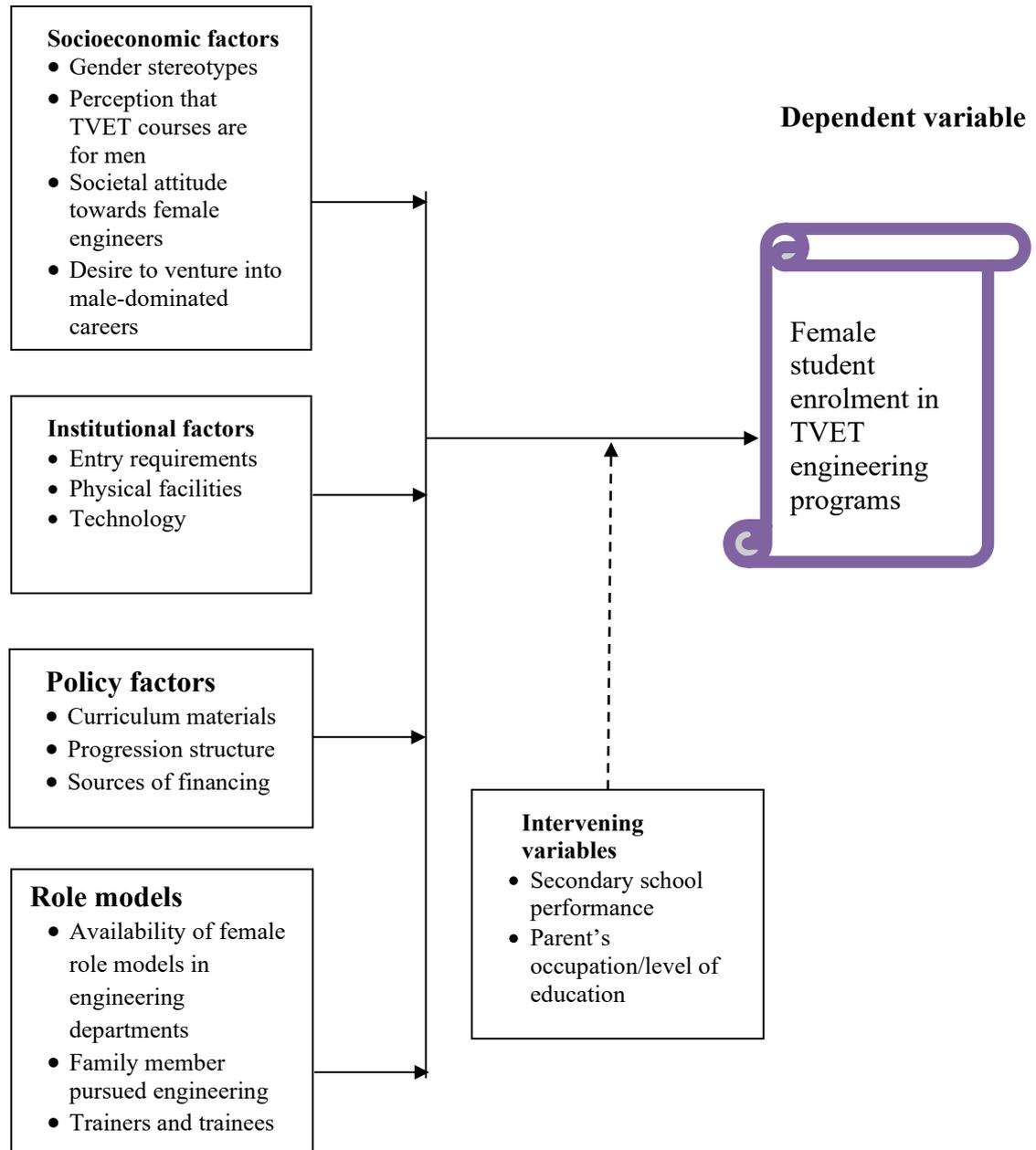


Figure 1: Conceptual framework

This conceptual framework explains how the independent variables influence the dependent variable. The dependent variable is female enrolment in TVET engineering programs. The independent variables are the socioeconomic factors, policy factors, institutional factors and the availability of role models. Secondary school academic

performance and parent's occupation level are the intervening variables of the study. Socioeconomic variables such as gender stereotypes, societal attitudes, and negative opinions influence female enrolment. Female students believe that TVET programs are only for the poor and that parental influences may influence their choice of TVET programs in gendered and low-income ways. Institutional determinants can include variables such as admission requirements and physical facilities, thus female students may find it challenging to enroll in engineering courses. Government regulations such as user fees, cost-sharing formulae, and a lack of understanding of the progression structure. Availability of female role models in engineering, having a family member who has pursued engineering and number of female trainers and trainees in engineering influence enrolment.

1.12 Operational Definition of Terms

Enrolment: the capacity of students to sign up for and regularly attend classes in a technical and vocational education and training program.

Institutional factors: These refer to school-related aspects, such as technology, physical infrastructure, and entry requirements that impact female students' decisions to pursue engineering.

Policy factors: Government decisions, including user fees, curriculum materials, and progression structures that influence enrolment in TVET engineering courses in Nandi County.

Social factors: Experiences that shape a woman's personality, attitudes, and lifestyle, thereby affecting her choice of course.

Technical Vocational, Education and Training Institution: An organization in the county that offers diploma-level technical and vocational education and training

Technical Vocational Education and Training: refers to the study of technologies and allied disciplines, as well as the development of knowledge and practical skills relevant to engineering fields.

Female-centric case studies: Case studies highlighting female engineers' contributions to the field.

1.13 Summary of the Chapter

In summary, Chapter One has laid the groundwork for the study by presenting the background, problem statement, purpose, objectives, research questions, and theoretical foundation. The chapter established that despite global and national initiatives to promote gender equality in education, female enrolment in TVET engineering programs in Kenya remains disproportionately low. This persistent disparity is attributed to multiple factors, including socioeconomic constraints, institutional challenges, limited policy implementation, and a lack of female role models in technical fields.

The discussion underscores that enhancing women's participation in TVET, particularly in engineering, is essential for achieving gender equity, economic empowerment, and sustainable national development as envisioned in Kenya's Vision 2030 and the Sustainable Development Goals (SDGs). The study, therefore, seeks to identify and analyze the key determinants influencing female enrollment in TVET engineering programs within Nandi County, with the ultimate goal of providing practical recommendations to bridge the gender gap.

The insights drawn from this research are expected to inform policymakers, educators, and other stakeholders in developing gender-responsive strategies that foster inclusivity and equitable access to technical education.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter focuses on reviewing literature on socioeconomic factors, policy factors, institutional factors and availability of role models and how they influence enrolment of female students in TVET courses.

2.1 Socioeconomic Factors

To effectively advance the empowerment of girls and women across Africa, particularly within Technical and Vocational Education and Training (TVET), it is imperative to adopt a comprehensive understanding of gender inequality as a deeply rooted and systemic issue shaped by long-standing cultural norms. These norms significantly influence societal perceptions, attitudes, and behaviors towards both men and women, often dictating what is considered appropriate or acceptable for each gender. In many African contexts, women and girls face disproportionate disadvantages due to intersecting challenges, including poverty, pandemics, food insecurity, climate change, and economic instability. These structural issues are further exacerbated by the pervasive influence of gender-biased social, cultural, political, economic, and environmental systems that systematically limit the opportunities for women and girls.

The impact of these dynamics is particularly evident in the education and employment sectors, where access to opportunities is often mediated by deeply entrenched gender norms. In the context of TVET, these external inequalities are mirrored and reinforced within institutional structures. The gendered nature of power relations within TVET systems frequently manifests through unequal access to programs, lack of support mechanisms for women, underrepresentation in leadership and instructional roles, and

curricular content that fails to challenge gender stereotypes. Such internal dynamics reflect and perpetuate broader societal inequities, ultimately constraining the full participation and success of women and girls within vocational and technical education. Therefore, achieving meaningful gender equality in the TVET sector requires a dual approach. It is essential not only to reform societal attitudes and systems that devalue women's roles and capabilities but also to critically examine and transform the institutional cultures, policies, and practices within TVET institutions themselves. Addressing both external and internal barriers would be key to creating inclusive, equitable, and empowering educational environments that enable women and girls to thrive and fully contribute to national development efforts. Only through such an integrated approach can the TVET sector become a transformative space for gender empowerment in Africa.

The decision of trainees to pursue Technical and Vocational Education and Training (TVET) is deeply shaped by the financial situation and environment of their families. Socioeconomic status plays a significant role in influencing whether students choose to enroll in TVET programs. Research has shown that students from less affluent backgrounds, particularly those from rural or economically disadvantaged areas, are more likely to pursue TVET compared to their counterparts in urban areas, where higher incomes, better housing, and greater access to academic qualifications are prevalent (Arregle & Mari, 2019). In Nigeria, for example, a study by Akarue and Obavwunuto (2019) found that individuals' socioeconomic status, as well as their community and cultural context, significantly impact their decisions regarding educational choices and career paths. People in Nigeria often choose careers based not only on their personal interests or aptitudes but also on their social standing and position within society. This decision-making process is frequently influenced by the desire to

conform to societal expectations, or to gain the approval of friends and acquaintances, which can limit an individual true potential. Moreover, the vocations and educational levels of one's parents play a crucial role in shaping career choices. Many individuals tend to follow the career paths and educational pursuits modeled by their parents, perpetuating cycles of opportunity or limitation based on family backgrounds. These societal pressures and familial influences can often overshadow personal interests and aspirations, further limiting the range of career possibilities and educational choices for individuals, especially in the context of TVET.

2.1.1 Parents

In examining the factors influencing enrolment in Technical and Vocational Education and Training (TVET) programs, several studies have underscored the significant role of socioeconomic status (SES). Arregle, Mari, Madhavani, and Sisodia (2019), in their study on TVET trainee enrollment in Malaysia, found that the income levels of parents and guardians play a critical role in shaping trainees' decisions to pursue vocational education. Their findings revealed that most TVET participants came from families with low socioeconomic backgrounds, limited formal education, and minimal or no professional experience. This indicates that socioeconomic background is not only a determinant of access but also a reflection of broader issues such as privilege, power, and inequality in resource distribution. Supporting this perspective, Gemechu (2018), in a study conducted at Haramaya University in Eastern Ethiopia, demonstrated that low SES significantly affects academic performance and school achievement, particularly concerning enrolment and completion rates. These findings highlight how socioeconomic disadvantages can hinder both entry into and progression through educational programs. Similarly, Marcus and Fonseca (2019), Akarue and Obavwunuto (2019), and Gemechu (2018) emphasize that SES is a crucial individual variable

influencing whether trainees enroll in and complete TVET courses. Collectively, these studies underscore the pervasive and multifaceted impact of socioeconomic background on participation in vocational education, suggesting that addressing SES-related barriers is essential for improving equity and access within TVET systems.

According to UNESCO's (2017) Education for All report, approximately 66% of students who enrolled in various educational programs at specialized institutions in Bangladesh and Sub-Saharan Africa withdrew before completing the technical training cycle. This high dropout rate was largely attributed to the low income of their parents or guardians, who were unable to afford the associated training expenses. In many cases, low-income families struggle to meet even basic needs, making the financial burden of technical and vocational education unattainable. As a result, parents from low socioeconomic backgrounds often view post-secondary education, particularly after obtaining the Kenya Certificate of Secondary Education (KCSE), as impractical or unnecessary. Instead, they may prefer their children to enter the workforce immediately to help support the household financially. Supporting this view, Kyungu and Macharia (2017), in their study on the impact of socioeconomic status on enrollment in specialized education programs, found that trainees from low SES backgrounds were significantly more likely to miss training sessions or withdraw entirely due to inability to afford institutional costs. These findings reinforce the critical role of socioeconomic status in shaping both access to and persistence within technical and vocational education programs.

2.1.2 Early Marriages and Pregnancy

Socioeconomic status (SES) plays a central role in shaping access to, and success within Technical and Vocational Education and Training (TVET) systems across various

regions. Arregle, Mari, Madhavani, and Sisodia (2019), in their study on TVET trainee enrolment in Malaysia, revealed that the income levels of parents and guardians significantly influenced a trainee's decision to pursue vocational education. Their findings indicated that most TVET students came from families with low SES, limited formal education, and minimal professional background. These socioeconomic barriers often reflect broader structural inequalities, including disparities in privilege, power, and access to educational resources. Gemechu (2018), in a research conducted at Haramaya University in Eastern Ethiopia, similarly found that low SES negatively affected students' academic performance, enrollment, and completion rates. Marcus and Fonseca (2019), along with Akarue and Obavwunuto (2019), also emphasized SES as a critical determinant in shaping not only access to TVET programs but also trainees' capacity to complete them successfully. Collectively, these studies underscore the pervasive influence of socioeconomic background on vocational education outcomes.

Further emphasizing the impact of SES, UNESCO's *Education for All* report (2017) noted that 66% of students enrolled in specialized institutions in Bangladesh and Sub-Saharan Africa dropped out before completing the technical instruction cycle. This high attrition rate was largely attributed to the inability of low-income families to afford training-related expenses. Parents from economically disadvantaged backgrounds often face daily financial constraints that force them to prioritize immediate survival over long-term educational investments. In Kenya, for example, some families regard further education beyond the Kenya Certificate of Secondary Education (KCSE) as a financial burden rather than a developmental opportunity. Consequently, they encourage their children to seek employment immediately after secondary school to contribute to household income. Kyungu and Macharia (2017) found that trainees from low-SES families were more likely to miss training sessions or withdraw entirely due to financial

difficulties. These findings reflect how deeply SES influences both access to and persistence in specialized education programs like TVET. Moreover, poverty's impact on education is particularly severe for females, especially in low-income regions such as Sub-Saharan Africa. Research consistently shows that high poverty rates, early marriage, and economic hardship present substantial barriers to female participation in education, including TVET (UNESCO, 2020; ILO, 2020). Approximately 37% of girls in Sub-Saharan Africa are married before the age of eighteen, and 11% are married before fifteen, according to UNICEF (2021). Alarming, fifteen of the twenty countries with the highest rates of child marriage globally are located in Africa, with child marriage rates as high as 76% in Niger, 68% in the Central African Republic, and 67% in Chad. Early marriage, driven by both cultural norms and economic desperation, often interrupts girls' education permanently. These challenges are further compounded by health crises, such as the transmission of diseases from mothers to children, which strain under-resourced healthcare systems and exacerbate vulnerabilities in access to education. As a result, the combination of poverty, gender inequality, and health insecurity severely limits the educational and economic opportunities available to young females, reinforcing a generational cycle of poverty and marginalization.

According to various studies, the inability of young mothers to delay childbearing significantly impacts their chances of completing high school and college education (Van den Bergh Collier, 2017; UNESCO, 2020). Researchers, including Mbelle, N, Mabaso, M, Setswe, G, & Sifunda, S. (2018), UNESCO (2020), and the South African Government (2020), have identified that a major contributing factor to the disproportionately high frequency of unplanned pregnancies among female college students is the substandard quality of reproductive health care offered by TVET (Technical and Vocational Education and Training) institutions. These researchers

argue that the lack of adequate reproductive health services and support systems for young women in these educational settings exacerbates the problem. In response, they advocate for the implementation of gender-responsive life skills education, comprehensive sexual and reproductive health and rights education, and gender-aware counseling services within TVET institutions. These measures, they suggest, are crucial for empowering young women, providing them with the knowledge and resources necessary to make informed decisions, and ultimately improving their chances of successfully completing their education.

In many African countries, girls and women remain disproportionately at risk of experiencing gender-based violence (GBV) and sexual harassment, particularly in contexts where access to vocational education and training is limited. This lack of access not only hinders their socioeconomic advancement but also increases their exposure to abuse and exploitation. Vulnerability is further compounded for young women and girls who face early pregnancy and child marriage, both of which significantly reduce their opportunities to pursue education or economic independence. The absence of educational and vocational pathways contributes to systemic gender inequalities, thereby reinforcing cycles of marginalization and poverty. GBV, in this context, presents a critical barrier to human, social, and economic development. It impairs the capacity of women and girls to contribute fully to their communities and poses severe risks to their physical and psychological well-being. As Beyene, A., Chojenta, C., Roba, H.S., Melka, A.S. & Loxton, D. (2019) note, the persistence of gender-based violence not only endangers the health and safety of women and children but also undermines broader development efforts aimed at achieving equity and sustainable growth. Within the context of education, a concerning trend emerges: those enrolled in TVET programs experience a 30% higher lifetime frequency of GBV

compared to their peers in university programs. This alarming statistic underscores the heightened vulnerability of female students in these institutions. Despite the prevalence of this issue, TVET institutions often fail to adequately address or mitigate GBV, leaving a significant gap in the protection and support of their students (Beyene et al., 2019). This failure to respond effectively not only exposes women to greater risks but also hinders their educational and personal development, further entrenching cycles of inequality and violence.

2.2 Institutional Factors

In Kenya, the growth of public Technical and Vocational Education and Training (TVET) institutions has been notable over the past seven years, marked by a significant increase in both the number of training centers and student enrollment figures. This upward trend is largely attributed to the enactment and implementation of the TVET Act of 2013, a legislative milestone that has played a transformative role in expanding the infrastructure, regulatory frameworks, and capacity of TVET institutions nationwide (Republic of Kenya, 2017). The Act laid the groundwork for standardized training, institutional accreditation, and enhanced access, thereby elevating the profile of vocational education as a viable and respected pathway to employment and economic mobility. Despite these commendable advancements, a persistent gender gap remains in enrollment patterns, particularly in fields that are traditionally male-dominated, such as engineering, construction, and information technology. Female participation in these areas continue to lag, raising concerns about equitable access to technical skills development and long-term career opportunities for women.

A major contributing factor to this disparity is the enduring dual burden that many women face, whereby they must juggle their educational ambitions with caregiving

responsibilities at home. Many female students are simultaneously mothers and primary caregivers, and the demands of managing household duties alongside academic commitments often prove overwhelming. This situation significantly undermines their capacity to engage fully in TVET programs, especially those requiring rigorous schedules or on-site training. To mitigate these barriers and promote gender equity within vocational education, it is imperative that training institutions adopt a more inclusive and supportive approach. Practical interventions such as the provision of maternity leave, on-campus childcare services, flexible scheduling, and psychosocial support can substantially enhance the ability of women to participate and succeed in TVET programs. These measures not only ease the conflict between caregiving and academic responsibilities but also signal a broader institutional commitment to gender inclusivity. Ultimately, by creating environments that recognize and accommodate the lived realities of female students, TVET institutions can play a pivotal role in empowering women, expanding their access to education and economic opportunities, and fostering more equitable participation in the workforce.

2.2.1 Teacher Influence on Student's Choice

Vocational choices made by girls are often deeply shaped by the attitudes, beliefs, and behaviors of their educators, particularly those in positions of influence such as teachers and professors (UNESCO, 2017). As highlighted in UNESCO (2017) report on STEM education, a growing body of international research underscores the significant role that educators play in influencing female students' interest, confidence, and performance in subjects like mathematics and science—disciplines that form the foundation for technical fields such as engineering. Educators' perceptions, whether consciously expressed or unconsciously communicated, can reinforce existing gender norms and stereotypes, thereby shaping students' academic self-concept and career aspirations.

For instance, a study conducted in the United Kingdom found that approximately 57% of teachers unintentionally reinforced gender stereotypes related to careers in STEM. These biases, although often subtle, can be transmitted through everyday classroom interactions, the framing of subject matter, or even in the allocation of attention and support to students. Over time, such influences can result in diminished interest or confidence among female students regarding their suitability for STEM-related careers, leading to lower enrollment rates in engineering and similar technical programs.

Given this context, the present study seeks to explore the extent to which teacher attitudes impact the enrollment of female students in TVET (Technical and Vocational Education and Training) engineering programs. By examining the perceptions and behaviors of instructors, as well as how these influence female students' decisions, the research aims to identify key factors contributing to persistent gender disparities in vocational education. Understanding these dynamics is critical for informing interventions that promote more inclusive teaching practices, thereby encouraging greater female participation in technical fields historically dominated by men.

In addition to explicit gender biases, students of both genders may also be discouraged from pursuing STEM fields due to the implicit biases held by professors regarding their potential for success. For example, research from Latin America found that 8–20% of math teachers expressed lower expectations for female students' abilities, believing that boys were naturally better at math (OECD, 2014). These preconceived notions not only affect the way students are taught but also shape how students perceive their own potential in these fields. Furthermore, the gender of the teacher also plays a crucial role in shaping students' attitudes toward STEM. Female students, in particular, are influenced by the confidence their teachers have in their abilities in subjects like math

and science. When female students perceive that their teachers lack confidence in their potential, this can directly impact on their decision to pursue STEM fields.

In this context, the competence and confidence of female teachers become an essential factor in encouraging or discouraging female students from considering STEM as a viable career path. When female students encounter role models who exhibit confidence and expertise in these subjects, they are more likely to believe in their own potential and consider STEM as a future career. Conversely, a lack of confidence or a dearth of female teachers in STEM disciplines can contribute to a decrease in female enrollment and participation in these fields. Ultimately, the attitudes of educators, both implicit and explicit, play a critical role in shaping the choices and aspirations of young women, particularly in vocational education settings like TVET.

2.2.2 Academic Performance

Puyate and Nanjoli (2019) as cited in Wasike (2021) revealed that female students outnumbered male students at TVET institutes. According to Puyate (2017), one of the critical reasons female students may not be interested in participating in technical-vocational education and training programs is their poor performance in science-related O'level courses. Because of the masculine connotations teachers and society have attributed to science disciplines in high school, girls struggle to perform in these courses, which are required for admission to engineering programs (Muthima, 2017). Nanjoli (2019) observed, on the other hand, that socio-cultural difficulties, cultural preconceptions, and a lack of role models were the most significant barriers to women enrolling in and performing well in STEM courses. However, because Puyate (2017) and Nanjoli (2019) focused on women's engagement and excluded male counterparts, their findings needed to be more generalizable, which is the gap the current study sought

to fill. The findings are further supported by the Kenya Economic Survey 2019 (KNBS 2019), which revealed a gender disparity in TVET institutions in Kenya. In Kenya's public TVET institutions, for example, there were 114,745 female students and 163,519 male students in 2018.

2.3 Government Policy

Globally, the United Nations has been a key player in promoting gender equality and women's empowerment. In a historic move to raise awareness of women's position and rights worldwide, the United Nations declared 1975 to be International Women's Year. The United Nations General Assembly accelerated this trend by designating 1976–1985 as the United Nations Decade for Women (United Nations, 1975). This decade provided a vital forum for advancing worldwide collaboration on women's rights, policy debates, and legislative changes. It culminated in the 1985 World Conference on Women held in Nairobi, Kenya, where participants from around the globe convened to examine the multifaceted forms of discrimination facing women and to propose actionable strategies for improving their social, economic, and political status.

Since then, global efforts to advance gender equality have continued through various frameworks and initiatives. Notably, the United Nations has hosted numerous seminars and consultations to support the Millennium Development Goals (MDGs) and the Education for All (EFA) agenda (United Nations, 2015). These efforts emphasized the elimination of gender disparities in education and the promotion of equal access to learning opportunities for both girls and boys (UNESCO, 2015). A key focus within these global initiatives has been the diversification and expansion of technical and vocational education, particularly in STEM (science, technology, engineering, and mathematics) fields, where female participation has historically been low.

One of the specific goals outlined by the United Nations was to promote equitable access to and retention in technical and vocational education and training (TVET) for women and girls, especially in STEM-related disciplines (United Nations, 2008). This policy emphasis seeks to address systemic barriers that inhibit female enrollment, such as gender stereotypes, lack of institutional support, and limited access to gender-responsive facilities. This study, therefore, aimed to examine how such policy frameworks—or the lack thereof—impact the enrollment of female students in TVET programs. By exploring the intersection between international policy goals and national implementation efforts, the research sought to identify how educational reforms can be better aligned with global gender equity objectives.

Despite efforts to expand access to Technical and Vocational Education and Training (TVET) in Kenya, female enrollment in these programs remains disproportionately low compared to other levels of education. According to economic research from 2017, enrollment rates among women in Kenyan TVET institutions continue to lag behind, even as overall participation in the sector increases (Republic of Kenya, 2017). For instance, while the gross enrollment rate in secondary education rose from 63.3% in 2015 to 66.7% in 2016, TVET enrollment increased more sharply—by 32.1%—from 153,314 students in 2015 to 202,556 students in 2016 (Republic of Kenya, 2019). This surge in TVET enrolment is attributed to several government-led initiatives. These include community outreach campaigns aimed at raising awareness and improving public perception of vocational education, as well as the expansion and enhancement of existing training centers.

Further measures have included financial support mechanisms, such as student loans, grants, and scholarships administered through the Higher Education Loans Board

(HELB). These are designed to make vocational training more accessible and appealing to a wider segment of the population (Education Sector Report, 2019). However, despite these substantial gains and consistent governmental advocacy for technical education, a persistent gender gap continues to characterize the sector.

This disparity highlights the need for more targeted interventions and gender-sensitive policy frameworks. While past administrations have made commendable efforts to enhance the attractiveness and accessibility of TVET, particularly by aligning programs with labor market demands, these measures have not adequately addressed the structural and sociocultural barriers that deter female participation. According to UNESCO (2017), long-term transformation requires legislative and policy changes that support women's growth and gender equality. Such policies could help achieve greater gender parity in the vocational training sector by institutionalizing women's and girls' participation in technical education and related career pathways.

A major obstacle to attaining gender equality in education is still gender bias in educational materials, especially in the domains of science, technology, engineering, and mathematics (STEM). A UNESCO (2016) survey that reviewed over 110 national curricula for primary and secondary schools and found that gender stereotypes are deeply embedded in many mathematics and science textbooks. These biases are often subtle yet powerful in shaping students' perceptions of gender roles and their own academic and career aspirations. For example, the analysis revealed that male characters appeared in more than half of the illustrations in primary science textbooks in India, while women were largely underrepresented or entirely absent. Notably, none of the female figures were portrayed in roles such as engineers, chief executive officers, or business professionals, positions critical in influencing girls' aspirations toward

leadership and technical careers. In another striking example, a Grade 9 science textbook in Cambodia depicted a diagram of the central nervous system that associated males with "active and creative brain activities," while females were linked to "passive capabilities." Such representations perpetuate outdated and discriminatory notions of intellectual and professional capacity based on gender.

These curricular and textbook biases not only reinforce traditional gender norms but also contribute to a learning environment that discourages girls from pursuing STEM-related fields. Early exposure to such stereotypes can significantly affect girls' confidence, interest, and participation in subjects critical for technical and vocational education. Addressing these biases through curriculum reform and inclusive pedagogy is essential for creating equitable education systems that empower both girls and boys to pursue their full academic and professional potential.

2.3.1 Gender-Biased Engineering Materials

The curriculum itself frequently discourages female students from pursuing careers in engineering. These issues affect curriculum design, learning materials, and access to tools and resources. According to Muthima and Ngugi (2017), in an essay on female student engagement in TVET, the curriculum's design may hinder female students because it is more geared toward male students. Many laboratories and equipment, for example, need to assess women's physical strength equally, and concepts and ideas are highly rigid and lack any appeal to the individual. Women are natural connectors and social builders. This curriculum should incorporate more social than mechanical elements.

A 2016 review by UNESCO, which examined over 110 national curricular frameworks for primary and secondary education, revealed significant gender bias in mathematics

and science textbooks across multiple countries. The study found that male characters appeared in over half the visuals in key Indian science textbooks, with no women depicted in roles such as engineers, chief executive officers (CEOs), or business professionals (UNESCO, 2016). These omissions reinforce the perception that technical and leadership roles are predominantly male domains. In Cambodia, gender stereotyping was even more explicit: a Grade 9 science textbook included a diagram of the central nervous system that associated active and creative brain functions with males, while attributing passive functions to females (UNESCO, 2016). Such portrayals perpetuate gendered assumptions about intellectual capacity and professional aptitude, which can profoundly influence students' perceptions of their own potential.

These findings raise important questions about whether similar biases exist in Kenya's educational materials, particularly in the context of science and technical education. This study therefore sought to investigate whether gender biases exist in Kenya's curriculum and how such biases may affect female students' academic and career choices specifically their enrollment in TVET engineering programs. Numerous scholars have demonstrated that curriculum-based gender stereotypes can shape students' attitudes, limit their aspirations, and ultimately deter them from pursuing careers in STEM fields such as engineering. Accordingly, this research aimed to explore how curricular and broader policy-related factors contribute to the underrepresentation of women in TVET, with a focus on engineering courses. The study further examined how national policy frameworks and curriculum content can be reformed to support more equitable participation in technical education.

2.4 Role Models

UNESCO (2016) assessment of the global state of education found that female students taught by female teachers tend to perform better in science and are more likely to pursue careers in STEM fields. This suggests that female teachers can have a positive influence on girls' academic development, especially in disciplines traditionally dominated by males, such as science, technology, engineering, and mathematics (STEM). However, a subsequent UNESCO (2017) report presents a more nuanced view. While female professors can play a significant role in shaping their students' success and aspirations in STEM, not all research has consistently demonstrated this correlation. Despite this, several studies have highlighted a positive relationship between the number of female professors and the number of female students enrolling in STEM programs. For example, a UNESCO study in 2017, which analyzed data from over 78 countries, found a negative correlation between the presence of male instructors and the enrollment of female students in fields like engineering, manufacturing, and construction. Conversely, there was a positive correlation between female professors and female enrolment in these same fields (UNESCO, 2017). This finding suggests that the presence of female educators can encourage more women to pursue traditionally male-dominated fields. However, it also highlights that TVET institutions have yet to fully establish or leverage this connection in a way that would systematically increase female participation in STEM, particularly in engineering, which has historically been a male-dominated discipline.

The findings may also indicate that fields like engineering, which are heavily influenced by historical gender biases, are more vulnerable to sexism compared to other STEM disciplines, such as science, often seen as more neutral in terms of gender. This reinforces the importance of female role models in breaking down gender stereotypes

about skills and abilities. Both male and female students benefit from seeing women in leadership positions or as experts in STEM fields, as it helps challenge traditional gender expectations and encourages students to view these subjects as open to everyone, regardless of gender (UNESCO, 2017). By promoting more female representation in these fields, educational institutions can foster a more inclusive and equitable environment that supports the success and aspirations of all students.

2.5 Summary of the chapter

This study this chapter has reviewed relevant literature on the key determinants influencing female enrollment in Technical and Vocational Education and Training (TVET) engineering programs. The review revealed that socioeconomic, institutional, policy-related, and role model factors play a crucial role in shaping women's participation in TVET education.

Socioeconomic barriers, such as poverty, parental education levels, early marriages, and unplanned pregnancies, were shown to significantly limit female students' ability to access and complete vocational training. Institutional challenges, particularly gender-insensitive curricula, limited support services for female learners, and gender bias among educators, further exacerbate the disparity. Similarly, while international and national policy frameworks, including those by the United Nations, UNESCO, and the Government of Kenya, emphasize gender equality in education, the implementation of these policies at the institutional level remains inconsistent and insufficient to bridge the gender gap.

Additionally, the literature highlighted the importance of female role models in influencing girls' educational aspirations and career choices. The presence of women in leadership and instructional roles within TVET institutions was found to positively

correlate with increased female enrolment, yet such representation remains limited.

Overall, the reviewed studies demonstrate that achieving gender parity in TVET engineering programs requires a holistic and multi-level approach—addressing both systemic barriers and institutional practices while promoting mentorship and supportive learning environments. The insights drawn from the literature also revealed existing knowledge gaps, particularly regarding the localized determinants of female enrollment in TVET institutions within Nandi County, Kenya. These gaps provide a strong justification for the current study, which seeks to examine the interplay of socioeconomic, institutional, and policy factors, as well as the availability of role models, in influencing female participation in TVET engineering programs in Nandi County.

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CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter covers the study's location, target population, sample techniques, research methodology, and research variables. The chapter also discusses validity, reliability, study piloting, sample size, and research tools. The chapter also discusses data gathering methods, ethics and study logistics.

3.1 Research Design

A descriptive survey was utilized as the research design in this study. This design is widely used to explain the current aspects of variables in a situation. According to Orodho (2003) and Njeru (2008), the design is reliable in both quantitative and qualitative research when gathering opinions, attitudes, and perceptions about people's identities. Its primary goal is to describe, document, analyze, and report on the current condition (Kothari, 2003). A descriptive survey is a strategy for gathering information that involves interviewing a sample of individuals or administering a questionnaire to them (Orodho, 2008). This approach enabled the researcher to analyze contemporary factors, such as socioeconomic, policy, institutional and role model availability determinants which were relevant to this research. The researcher used questionnaires to collect information from respondents on their thoughts and perspectives on determinants of female enrolment in TVET engineering programs in Nandi County. Descriptive statistics were used to collect and analyze quantitative data. The design allowed the researcher to draw inferences and generalizations based on the findings of the inquiry.

3.2 Location of the Study

The study was conducted in Nandi County which is one of the 47 counties in Kenya. The county is in Kenya's North Rift area and comprises 2,884.4 square kilometers. Kakamega County borders it on the west, Vihiga County on the southwest, and Kisumu County on the south. It is also bordered to the north and east by Uasin Gishu County. The county has many TVET institutions, both public and private career centers. According to the recent 2019 census, the county had 885,711 people. Compared to other counties like Mandera, Turkana, Kwale and Migori County, Nandi County has a low number of female enrollments in TVET institutions (County Statistical Abstract, 2015). A report from the 2018 TVET conference at Sigalagala Polytechnic found an 80.9% gender disparity in the engineering field (MoeST, 2018).

3.3 Target Population

Table 1: Target Population Distribution

Category	Ollessos Technical Training Institute	Emsos Technical Training Institute	Total
Students	154	56	210
Trainers	46	14	60
Registrars	1	1	2
County TVET Director		1	1

The study's target group consisted of 210 engineering diploma and certificate students, 60 trainers in engineering departments that lecture and interact with students, two registrars from each institute, as well as one TVET Director.

3.4 Sampling Procedures and Sample Size Determination

3.4.1 Sampling Procedure

This study employed both probability and non-probability sampling techniques to ensure the results were generalized. Nandi County was selected based on prior research indicating significant gender disparities in TVET engineering enrolment (County

Abstract, 2015). While sampling error is an inherent aspect of selecting a sample from a population, researchers aim to minimize these errors (Fellows & Liu, 2021). Typically, a sample representing 30% of the accessible population is deemed sufficient for generalization. For this study, 2 out of the 7 public TVET institutions in Nandi County were chosen through simple random sampling to ensure a representative sample. Given the limited number of registrars, just two in total, a census approach was used for interviewing them, making it both practical and cost-effective. The target group, consisting of trainers and students from the engineering departments at these two institutions, were further divided into two strata for analysis using stratified random sampling.

3.4.2 Sample size

In quantitative research, the sample size should be carefully planned during the design phase, so researchers must choose a sample that most effectively represents the target population (Pandey & Pandey, 2021). The study's target group consisted of 210 engineering department diploma and certificate students, 60 trainers in engineering departments, two registrars each from each institute, as well as one Nandi County TVET Director. To determine the sample size to be used, 136 students, 52 trainers, 2 registrars and one county TVET Officer were sampled at a confidence level of 95% (Krejcie & Morgan 1970).

3.5 Research Instruments

Data collection is the process of gathering and measuring information on targeted variables in an established system, which then enables one to answer relevant questions and evaluate outcomes (Murgan, 2013). This study collected data using questionnaires and interview schedules.

3.5.1 Questionnaires for Students and Trainers

Compared to observation, questionnaires are more objective and standardized. 52 trainers and 136 engineering students from Nandi County's Ol'lessos Technical Training Institute and Emsos Technical Training Institute received the surveys. There were two distinct questionnaires: one for trainers and one for students. This approach allowed the study to obtain a range of perspectives from the sample population.

The questionnaire comprised two sections: part A and part B. Part B asked about socioeconomic, institutional, parental, role model, and policy issues affecting female students' enrollment in engineering programs at the institutions while Part A gathered biographical data. Scale, open-ended, and closed-ended questions were included in the surveys. Closed-ended questions were designed to allow respondents to express their opinions, and open-ended questions to investigate attitudes more comprehensively. Additionally, scale questions enabled respondents to indicate their level of agreement or disagreement with the factors used to evaluate opinions.

3.5.2 Interview Schedules for Registrars and TVET Director.

The researcher may gather the precise and comprehensive data required to meet certain study objectives through an interview schedule. Information from the two registrars and the County Director of TVET Nandi County were obtained using oral interviews. Face-to-face interaction was the preferred communication mode, as it allowed for clarification of any confusing responses.

3.6 Piloting of the Instruments

Mugenda and Mugenda (2013) recommended selecting a sample size between 1% and 10% of the total sample frame for piloting to ensure the final research maintains consistency and validity. This approach helps ensure that the observations are accurate

and that the necessary information is gathered to address the research questions effectively. The piloting process is crucial for assessing the usefulness of the research instrument, allowing researchers to identify and resolve any unclear or ambiguous questions in the questionnaire.

In this study, sample survey research was conducted at the Ollessos Technical Training Institute-Town Campus to pre-test the questionnaire and evaluate whether the questions were clear and appropriately framed to achieve the desired outcomes. A total of 14 female students and 5 trainers were selected for the piloting phase. Of the 19 questionnaires distributed to both students and trainers, 18 were returned, resulting in a 94% response rate. This high return rate was considered a positive outcome, providing valuable feedback that contributed to the refinement of the research instrument and ultimately ensured that the study could effectively meet its objectives.

3.6.1 Validity of the study Instruments

Validity refers to the degree to which a test captures what we truly want to capture (Mugenda and Mugenda, 2013). In order to ensure construct validity, Yin (2004) suggests using a variety of information sources, creating a chain of evidence, and having key informants evaluate the report. Pilot testing was done at Ollessos Technical Training institute- town campus before the study to ensure the validity of the instruments used in this investigation. The instruments were revised based on feedback to ensure the study's objectives were met. The instrument generated consistent data that could be applied to the entire population, its validity was deemed acceptable. The researcher examined the tools to ensure they fulfilled the study's goals in addition to validating the questionnaires.

Three stages were taken in order to establish the chain of evidence: Piloting bridged the gap between the conceptual framework that evolved and the subsequent field study and the questionnaire used as a data collection tool, while the literature review offered an emerging framework. Statistical research also confirmed these conclusions. By comparing the responses of the different respondents, content validity was determined in order to carry out this procedure. The instrument is considered reliable if its results are consistent or nearly consistent; otherwise, it should be updated and retested (Creswell, 2014).

3.6.2 Reliability of the Study instruments

Accurately describing and measuring postulated variables is a major difficulty in many fields of study. In applied research, where variables are frequently hard to measure or directly investigate, this difficulty is especially noticeable. Reliability and item analysis are frequently employed in research to build trustworthy measuring scales, enhance current scales, and evaluate the reliability of scales that are currently in use in order to address this problem. In particular, the design and assessment of summated scales, scales composed of several distinct measurements or items, require reliability (Mugenda and Mugenda, 2013).

A measuring scale's reliability is usually assessed by looking at the correlations between the measures or items that comprise the scale in relation to their variances. The scale's proper representation of the variable it is meant to measure is guaranteed by this procedure. A pre-visit to the study region was carried out in order to determine the dependability of the research instrument. This made it possible to conduct a preliminary evaluation of the research instrument's field reliability (Creswell, 2014).

The Cronbach's alpha test-retest approach was used to further evaluate the research instrument's internal consistency. By assessing how closely similar the items on a scale are to one another, this method checks for internal consistency. An acceptable internal reliability value of 0.78 for trainees and 0.71 for trainers was attained after modifications based on the preliminary testing. These values show a high degree of internal consistency, indicating that the research tool is trustworthy and able to yield consistent findings for the various study groups.

3.7 Data Collection Procedure

The researcher applied for a research authorization from the National Commission for Science, Technology, and Innovation (NACOSTI) through Moi University's School of Education in order to obtain approval for the study and gain access to the databases of the pertinent organizations. To obtain authorization to carry out the research in their facilities, introductory letters were submitted to the relevant institutions.

In order to make sure that participants were aware of the precise day and time they would be asked to submit their replies, the researcher then visited with officials from the institutions where the study would be conducted. The researcher personally visited the participants at these sessions to discuss the study's goals, hand out questionnaires, and answer any queries or worries they might have had.

The participants received guarantees that the information they provided would be kept private and used only for the study. They were also told that there was no pressure or coercion to participate and that it was completely voluntary. After the respondents completed the questionnaires, they were collected.

The researcher made sure that respondents had enough time to accurately answer the questions and gave clarifications where necessary during the interview. This strategy

made it possible to guarantee the accuracy of the data gathered as well as the participants' comfort and confidence when answering questions.

3.8 Data Analysis

Both qualitative and quantitative methodologies were used in the data collection for this study, which offered a thorough approach to meeting the objectives of the study. The theme analysis of the qualitative data was guided by the study objectives.

Editing and categorizing the responses was the first step in the procedure for the quantitative data, which were collected via surveys. The Statistical Package for Social Sciences (SPSS), version 27, was used to enter coded data, making it easier to prepare, summarize, and analyze. Descriptive data generated using SPSS helped shed light on the factors influencing female enrollment in public technical and vocational education and training (TVET) institutions in Kenya's Nandi County. Tables displaying percentages and frequencies along with graphs to visually depict the data were used to illustrate the quantitative analysis's findings.

Conversely, a thematic analysis was conducted on the qualitative data. This approach allowed for a deeper understanding of the experiences, viewpoints, and difficulties experienced by female students in TVET programs by the identification of important themes and patterns in the responses. A more thorough grasp of the variables affecting female enrollment in TVET institutions was made possible by the use of thematic analysis to group the data into relevant categories that complemented the objectives of the study.

3.9 Ethical and Logistical Considerations

Khaguya (2014) asserts that ethical concerns in research are intimately related to the fundamental moral principles of a study making it essential to address these issues at

every stage of the investigation. Several important ethical considerations, such as informed consent, privacy, anonymity, secrecy, and accountability to the research community, were addressed during the study's fieldwork.

The researcher initially obtained approval from Moi University to conduct the study, ensuring that all ethical requirements were followed. All respondents received explicit notice of their consent to participate in the study and their freedom to withdraw participation at any time. This guaranteed that participation was voluntary and that participants were fully aware of their rights.

As mandated by the ethical criteria, the researcher also submitted the questionnaires and interview schedules to the National Commission for Science, Technology, and Innovation (NACOSTI) for approval. A study permit and an introduction letter requesting authorization for data gathering were issued to the institutions upon approval.

Following the institutions' and participants' approval, the researcher provided the respondents an explanation on the study's objectives. The researcher made it clear that any information submitted would be kept private and utilized exclusively for scholarly study. Maintaining ethical standards in research requires that participants feel at ease and confident in the process, which was made possible by this step.

3.10 Summary of the Chapter

This chapter has outlined the methodological framework adopted to investigate the determinants of female enrollment in TVET engineering programs in Nandi County. The study employed a descriptive survey design, which enabled the collection of both quantitative and qualitative data to gain an in-depth understanding of the research problem. The chapter detailed the study's location, target population, sampling

procedures, and sample size determination, as well as the research instruments, questionnaires and interview schedules, used to gather data.

The processes of piloting, validity, and reliability testing were also described to ensure that the instruments produced consistent and accurate data. Furthermore, the data collection procedures, analysis methods, and ethical considerations were outlined, demonstrating the researcher's commitment to maintaining scientific rigor and ethical integrity throughout the study.

Overall, the methodology presented in this chapter was carefully designed to align with the study objectives and provide credible findings on the socioeconomic, institutional, policy, and role model factors influencing female participation in TVET engineering programs.

CHAPTER FOUR
DATA PRESENTATION, ANALYSIS, INTERPRETATION AND
DISCUSSION

4.0 Introduction

This chapter covers data presentation, analysis and interpretation of the research findings. Descriptive statistics are used in the first section to give background information about the study participants. The analysis of the data in relation to the particular study objectives as supplied by the interview schedule and questionnaire respondents is presented in the second section.

4.1 Response Rates

The response rate is shown in the Table 2.

Table 2: Summary of Response rates

Respondent	Target population	Sample	Response rate
Students	210	136	132 (97%)
Trainers	60	52	52 (100%)
Registrars	2	2	2 (100%)
County TVET Director	1	1	1 (100%)

Table 2 shows a total of 136 questionnaires were distributed to students, with 132 returned, resulting in a 97% return rate. Additionally, 52 questionnaires were issued to trainers, and all of them were returned, yielding a 100% return rate. Interviews were conducted with two registrars and the county director, achieving a response rate of 100%. This was a positive return rate which helped the study to fully achieve its objectives

4.1.1 Demographic Information of Respondents

Participants in the study comprised female engineering students, registrars (those in charge of student admissions), and trainers from engineering departments. Gender, age

group, marital status, educational attainment, and Home County were among the information gathered. The two registrars, one from the Engineering department and the other from the Health Sciences department, were both male. They were in a good position to offer information on enrollment trends among female students in engineering programs at their technical training institutes, and their experience as registrars was clear from the answers supplied in the questionnaire. Additionally, the researcher asked engineering faculty members for their demographic data. Table 3 presents the findings.

Table 3: Distribution of Engineering Departments Teaching Staff Demographics

Profile	Variable	Frequency	Percent
Gender	Male	39	75.0
	Female	13	25.0
	Total	52	100.0
Education level	Diploma	21	40.4
	Undergraduate degree	31	59.6
	Total	52	100.0
Marital status	Single	21	40.4
	Married	31	59.6
	Total	52	100.0
Home county	Nandi	9	17.3
	Uasin Gishu	31	59.6
	Elgeyo Marakwet	4	7.69
	Kisumu	4	7.69
	Kericho	4	7.69
	Total	52	100.0
Period of stay in the current institution	Less than 1yr	17	32.67
	2-5yrs	22	42.3
	Above 6 years	13	25
	Total	52	100.0

Table 3 shows that the bulk of departmental teaching personnel (75%) were male, with only a minority (25%) being female. As a result, male trainers were more drawn to

technical professions in teaching compared to female teaching personnel. In terms of education level, 40.4% held a diploma, while 59.6% held an undergraduate degree.

32.67% of respondents said they had been at their current station for less than a year when asked how long they had been there. 25% had been employed at their current place for more than six years, while 42.3% had been there for two to five years. Consequently, it can be demonstrated that more than half of the instructors at technical training facilities had been employed for more than five years, offering information on the trends in female enrollment. Female students participating in engineering programs at Nandi County's public technical training schools provided the researcher with demographic data. Table 4 presents their responses.

Table 4: Distribution of Students Demographic Information

Variable	Profile	Frequency	Percent
Age category	19 years and below	7	5.3
	19-34 years	96	77.72
	More than 35 years	29	21.96
	Total	132	100
Education level	KCPE	0	0
	KCSE	94	71.21
	Certificate	38	28.79
	Total	132	100
Marital status	Single	112	84.85
	Married	20	15.15
	Total	132	100
Home county	Nandi	32	24.24
	Kericho	23	17.42
	Bomet	19	14.39
	Kisii	8	6.06
	Uasin gishu	28	21.21
	Trans-Nzoia	22	16.67
	Total	132	100

Results in table 4 indicate that for age category, 5.3% were aged 19 years and below, 77.72% were aged between 19– 34 years whereas only 21.96% were aged more than 35 years.

Engineering programs found to attract more young people (18-35 years old) than those above the age of 36, most likely due to government funding and marketing to enroll in the TVET sector. In terms of academic level, none had KCPE, 71.21% had completed secondary school and enrolled in certificate programs, and 28.79% were pursuing diploma programs. This shows that students participated in a variety of programs offered by the engineering department at all levels.

According to marital status, 15.15% of respondents were married, while the majority (84.85%) were single. The results suggest that married individuals and those without children are drawn to engineering courses. This may be due to the many study options offered by tertiary institutions that accept married students as well as government incentives like financial help and sponsorships for deserving students.

4.2 Socioeconomic Determinants influencing Enrolment of Female Students in Engineering Programs

How socioeconomic factors affect female students' enrollment in engineering courses in Nandi County was the study's main objective. The researcher asked registrars, engineering trainers, and engineering students for their opinions. Students were asked if they thought that social factors affected females' choices to enroll in engineering programs at Nandi County's state technical training schools. Table 5 discusses the findings.

Table 5: Students' Perception on Socioeconomic Determinants Influencing Enrolment of Female Students in Engineering

Item	SD	D	NS	A	SA	MEAN	SDV
There is a negative attitude towards Engineering by female students	2 (1.5%)	3 (2.3%)	6 (4.4%)	11 (8.3%)	110 (83.3%)	4.70	0.791
There is negative societal attitude towards female engineers	0 (0%)	3 (2.3%)	16 (12.1%)	25 (18.9%)	88 (66.7%)	4.50	0.796
There is discrimination against female TVET graduates in the labour market	0 (0%)	2 (1.5%)	0 (0%)	19 (14.4%)	111 (84.1%)	4.81	0.496
TVET graduates are viewed as inferior to university graduates	4 (1.5%)	2 (1.5%)	16 (12.1%)	18 (13.6%)	92 (69.7%)	4.45	0.976
Members of the society consider it wasteful to educate girls in engineering	2 (1.5%)	0 (0%)	2 (1.5%)	27 (20.5%)	101 (76.5%)	4.70	0.651
Engineering is a well-paying job and prestigious career	0 (0%)	0 (0%)	3 (2.3%)	22 (16.7%)	107 (81.1%)	4.79	0.463
There is desire for women to venture in male dominated career	3 (2.3%)	3 (2.3%)	0 (0%)	28 (21.2%)	97 (73.5%)	4.61	0.816

KEY: SA-Strongly agree, A- Agree, NS- Not sure, D- Disagree, SD- Strongly disagree

Table 5 makes it evident that 83.3% of respondents strongly agreed, 8.3% agreed, and

2.3% disputed that girls had a negative attitude towards engineering. Additionally, the findings revealed that 4.5% of respondents were unsure and 1.5% strongly disagreed that girls have a negative attitude toward engineering. The results show that females' unfavorable attitudes regarding engineering had a detrimental effect on female students' enrollment in technical programs. Regarding the poor social perception of female engineers, the results indicated that the majority of respondents (66.7%) were significantly impacted by this perception while deciding to enroll in technical programs at technical institutions. The results also showed that 2.3% of respondents disagreed that the negative perception of female engineers in society influenced their choice of career.

84.1% of respondents strongly agreed and 14.4% agreed that discrimination against female TVET graduates in the labor market significantly influenced their enrollment in technical courses. Additionally, 1.5% of respondents said that they chose technical courses based more on their personal feelings than on their prospects for employment. 69.7% of respondents strongly agreed that TVET graduates are viewed as inferior to university graduates, 13.6% agreed that this perception of TVET graduates as inferior to university graduates significantly influenced their enrollment, and 3.0% strongly disagreed, according to the study investigating this question. It was also clear that 12.1% were unsure whether TVET graduates' perception as being less valuable than university graduates affected female enrollment, whereas 1.5% disagreed. According to the survey, 76.5% of the respondents strongly agreed and 20.5% agreed that society views it as useless to educate girls in engineering. It is also evident that 1.5% of respondents strongly believe that girls' enrollment is impacted by societal perceptions that engineering education is useless. It is clear from table 5 that 16.7% of respondents agreed and 81.1% strongly agreed that engineering is a prestigious and well-paying

occupation. However, 2.3% of respondents were unsure if engineering is a prestigious and well-paying career that influences career choice, whereas none of the respondents disagreed or strongly disagreed. In regard to desire for women to pursue careers that are dominated by men, 21.2% of respondents agreed and 73.5% strongly agreed.

However, 2.3% disagreed, 2.3% strongly disagreed, and 0% were unsure if women's desire to pursue careers in fields dominated by males affected their choice of career.

The researcher also asked the trainers to rate their agreement or disagreement with the socioeconomic factors affecting the enrollment of female students in engineering courses in Nandi County's public technical training institutions. Table 6 presents the findings.

Table 6: Trainers Socioeconomic Factors Influencing Female Students' Enrolment in Engineering Courses

Item	SA	A	NS	D	SD	MEAN	SDV
Engineering courses are generally considered to be the masculine subjects	45 (86.5%)	5 (9.6%)	2 (3.8%)	0 (0%)	0 (0%)	1.00	0.474
Members of the society consider it wasteful to educate girls in engineering since they will be married off	44 (84.6%)	6 (11.5%)	2 (3.8%)	0 (0%)	0 (0%)	1.00	0.487
Engineering is a well-paying job and a prestigious career	1 (1.9%)	0 (0%)	0 (0%)	45 (86.5%)	6 (11.5%)	4.00	0.539
University graduate trainers are superior to TVET graduate trainers	1 (1.9%)	0 (0%)	0 (0%)	46 (88.5%)	5 (9.6%)	4.00	0.522

KEY: SA-Strongly agree, A- Agree, NS- Not sure, D- Disagree, SD- Strongly disagree

According to the results in Table 6, the majority (86.5%) of trainers strongly agreed that engineering courses are primarily perceived as masculine by members of society.

Most prospective female students do not enroll in engineering courses at public technical training institutions since these disciplines are typically linked with the masculine gender. An additional interviewee reported that most people in society think engineering is a field that is dominated by men. These results are in line with other studies carried out in Ghana and Nigeria, which showed that engineering is viewed by society as a subject dominated by men (Powell, 2006; Bird, 2011; Okoye & Ekon, 2016).

Additionally, the findings in table 6 showed that the majority of trainers believed that it was wasteful for communities to send females to engineering schools since they would be married off and the money spent on their education would be hard to recoup. This is because, in some African civilizations, a girl is expected to fully integrate into her new family after marriage and is no longer expected to participate in the financial affairs of her family of origin or birth family.

Additionally, just a small percentage of trainers seemed to agree with the idea that engineering is a prominent profession, with the majority (86.5%) disagreeing. This implied that over 50% of the employees did not view engineering as a respectable career, which would discourage female students from attending public technical training institutions in Kenya's Nandi County. The high unemployment rates found in developing nations may be the cause of this.

Furthermore, given the quantity of work required for technical activities, the compensation for individuals employed is inadequate. Lastly, Table 6 shows that most trainers (88.5%) did not feel that university graduate trainers are better than TVET graduate trainers. According to one of the trainers, *"it really depends on the context and the specific needs of the industry, but in our experience, both university graduates and*

TVET graduates bring valuable skills to the table." This is probably because trainers, who are more knowledgeable than students about the benefits of TVET engineering courses, think that this does not prevent girls from enrolling in engineering programs.

Table 7: Parental Factors Influencing Low Enrolment of Female Students in Engineering Programs

Item	SD	D	NS	A	SA	MEAN	SDV
Many parents are unwilling to bear the cost of education	0 (0%)	73 (55.3%)	0 (0%)	5 (3.8%)	54 (40.9%)	3.30	1.467
Parents religious beliefs and social cultural traditions do not allow girls to pursue engineering career paths	0 (0%)	39 (29.5%)	0 (0%)	56 (42.4%)	37 (28.0%)	3.69	1.173
Parent education level influences enrollment of female in TVET institutions	4 (3.0%)	2 (1.5%)	8 (6.1%)	37 (28.0%)	81 (61.4%)	4.43	0.910
There is a traditional belief that engineering is meant for male	3 (2.3%)	4 (3.0%)	2 (1.5%)	37 (28.0%)	86 (65.2%)	4.51	0.860
Parents view technical engineering programs as inferior to university engineering courses	9 (6.8%)	5 (3.8%)	22 (16.5%)	21 (15.9%)	75 (56.8%)	4.12	1.223
High poverty levels influence female enrollment in TVET institutions	8 (6.1%)	10 (7.6%)	0 (0%)	40 (30.3%)	74 (56.1%)	4.23	1.170
Parent's lack of awareness of the socioeconomic value of TVET affect female enrollment	1 (0.8%)	9 (6.8%)	0 (0%)	47 (35.6%)	75 (56.8%)	4.41	0.865
Many parents prefer paying fee for male to female	2 (1.5%)	30 (22.7%)	3 (2.3%)	24 (18.2%)	73 (55.3%)	4.03	1.278

KEY: SA-Strongly agree, A- Agree, NS- Not sure, D- Disagree, SD- Strongly disagree

Students' perceptions of parents' capacity to pay for a female child's education in an engineering course varied, as Table 7 demonstrates. While 40.9% of the students strongly agreed that some parents were unwilling to educate their daughters when they chose engineering programs, nearly half of the students (55.3%) disagreed. The results showed that low enrollment in public technical training institutes was caused in part by some parents' reluctance to pay for their daughters to train in engineering programs. These results are in line with Khaguya's (2014) study conducted in Bungoma County, where 38% of participants said that some parents would not cover their daughters' tuition for science-based classes. One interviewee claimed that although some respondents select their own courses, parents have an impact on their daughters' selections. Some parents forbid their daughters from enrolling in STEM courses. This means that some parents choose programs for their children to attend training facilities, and as a result, they choose other programs than what they want.

The statistics showed that the vast majority of students agreed that girls are discouraged from pursuing engineering courses or occupations because of their parents' cultural, societal, and religious beliefs. As seen in Table 7, some parents still have cultural, sociological, and religious beliefs that discourage their daughters from venturing in engineering. Consequently, the low enrollment rates in public technical training schools are influenced by parental factors.

The study found that 61.4% of students thought that their parents' educational background affects whether or not their daughters enroll in public technical training institutions' engineering programs. The majority of girls sought professional guidance from their parents, and the parents' educational attainment had a crucial role in determining the course of study to be pursued, according to Otto's research on parental

factors impacting job choice (Genco, Hölttä-Otto, & Seepersad, 2010). Okoye (2016) survey conducted in Nigeria, which revealed that 54% of participants felt that parents in the engineering industry will encourage their daughters to pursue engineering degrees in Nigeria, lends credence to this fact.

According to the majority of students (42.4%), their parents discourage their daughters from pursuing engineering because they still believe it is a profession best left to males. Another respondent said that most parents do not think females can succeed in engineering, which leads to a negative attitude towards female enrolment. This indicated that some parents dissuaded their daughters from enrolling in public technical training institutions' engineering programs. The findings showed that most respondents (56.8%) concurred that parents might not encourage their daughters to study technical engineering because they believe the field is inferior.

Another respondent also agreed that some parents consider TVET programs to be for students who failed their KCSE examinations, which in turn lowers the interest of female students in engineering. Labeling courses as male/female is also a contributing factor. The findings are in line with a study by Okoye (2016) that indicated parents deterred students from enrolling in TVET programs, a view supported by 80% of students and 77% of trainers.

Most students thought that the low enrollment of female students in engineering programs was caused by high levels of poverty. This meant that many parents were unable to send their daughters to Nandi County's technical training institutions to study engineering courses because of the high poverty rate. The findings also revealed that, although 22.7% of the students disagreed, half of the students agreed that parents would rather pay for their male children's education than their female ones. This demonstrates

that parents' decision to enroll their daughters in engineering programs at technical training institutions, which they view as costly, is influenced by their capacity to pay the necessary fees. *"Social responsibilities, a lack of knowledge on TVET courses, a lack of role models, a lack of experience in STEM courses, and insufficient understanding on policy concerns such as progression mechanisms, TVET funding, and entry requirements"* were among the other societal factors mentioned by interviewees as deterring girls from enrolling in TVET engineering programs. A normal distribution of the collected data was assumed by the researcher. The results of the model analysis are shown in Table 8.

Table 8: Model Summary on Influence of Social Determinants on Low Enrolment

Model	R	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
					F Change	df1	df2	
1	.355 ^a	.126	1.02554	.126	18.695	1	130	.000

a. Predictors: (Constant), socioeconomic determinants

Table 8 shows that the regression coefficient is $R=0.355$, which is moderately positive, and the R square is 0.126, meaning that socioeconomic determinants in Nandi County account for just 12.6% of the change in female student enrolment. Table 8 displays the regression coefficient, indicating a linear relationship that is statistically significant ($p < 0.05$) between the independent and dependent variables based on change statistics.

Table 9: Regression Coefficients for Social Determinants on Low Enrolment

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.088	.467		2.331	.021
	SOCIOECONOMIC DETERMINANTS	.491	.114	.355	4.324	.000

a. Dependent Variable: ENROLMENT

The linear regression equation is:

$$y = 1.088 + 0.491\beta X$$

According to the equation above, social determinants and female students' enrolment in engineering programs are positively correlated (as indicated by the positive coefficient of 0.491) and this relationship is statistically significant ($p = 0.000$). In Nandi County, socioeconomic factors significantly influence female enrollment in TVET engineering courses, as indicated by the regression coefficient, which is likewise significant ($p = 0.000$). According to the research, girls' enrollment rises by 0.491 for every unit change in social variables. This explains why most students and registrars believed that low female enrolment in TVET engineering programs was caused by unfavorable societal perceptions.

4.3 Policy Determinants Influencing Enrolment of Female Students in Engineering

The study's second goal was to assess the ways in which different policy factors affected the number of female students enrolled in TVET engineering programs at public technical training institutions in Kenya's Nandi County. The study collected information from engineering students, instructors, and registrars at two public technical training colleges regarding the infrastructure availability and progression structure in order to address the research issue. Students and trainers of engineering were questioned if they had any additional financial sources outside their parents. Table 10 displays all of the responses.

Table 10: Other Sources of Financing apart from Parents

Awareness of other sources of financing	Trainers		Students	
	Frequency	Percent	Frequency	Percent
Aware	46	88.5	121	91.7
Not aware	6	11.5	11	8.3
Total	52	100.0	132	100.0

According to Table 10, 91.7% of students and 88.5% of trainers knew of other ways to pay for their tuition during the school year. 8.3% of students and 11.5% of trainers were not aware of other funding options. These results were in line with those of a research

by Kiplangat and Muthima (2020) in Elgeyo Marakwet County, Kenya, which found that 37.2% of regular students and 55.8% of trainers were aware of government assistance in vocational training institutions. Their response to the request to reveal particular funding sources is displayed in Table 11.

Table 11: Trainers and Students Responses on Various Sources of Financing

Other sources of financing	Trainers		Students	
	Frequency	Percent	Frequency	Percent
Government capitation	7	13.46	40	30.30
HELB Loan	28	53.8	91	68.94
CDF	11	21.1	1	0.758
Not aware	6	11.5	10	7.58
Total	52	100.0	132	100.0

Table 11 shows that, aside from parents and guardians fee payment, the most common form of funding was HELB loan, which was reported by 53.8% of trainers and 68.94% of students. Other sources of finance mentioned by trainers included CDF (21.1%) and government capitation (13.46%). Kiplangat and Muthima (2020) found that 0.758% of school graduates were aware of the NG-CDF bursary. When asked if they knew that students who wanted to enroll in VTCs were also targeted by the NG-CDF bursary, 7.58% of respondents stated they didn't know and that they only knew that the bursary helped students in secondary schools, middle-level colleges, and universities. Enrolment of female students in public technical training schools may also be influenced by government policies regarding the availability of infrastructure. Figure 2 below displays the responses of trainers and students who were asked if facilities like libraries, workshops, and classrooms aided female students in enrolling in Nandi County's public technical training institutions.

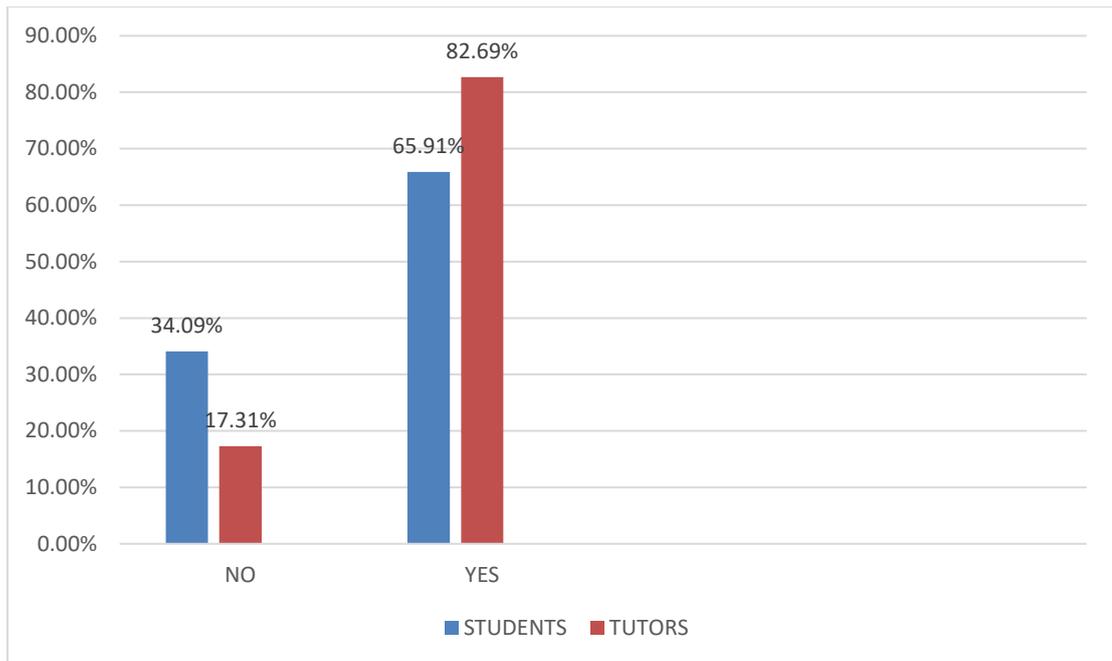


Figure 2: Provision of Infrastructural Facilities Affects Enrolment

Results in figure 2 demonstrate that 65.91% of engineering students and 82.69% of trainers acknowledged that availability of infrastructural resources for engineering department influence female students' enrolment in public technical training institutes in Nandi County, Kenya. Less than half (34.09%) of students, however, said that female students' decisions to enroll in engineering programs at the county's TVET colleges are unaffected by the availability of physical facilities. This was in line with the findings of Ebenehi and Baki (2015), who claimed that physical infrastructure had an impact on Nigerian girls' enrollment. When asked to explain their opinions, 26.92% of the trainers said that most female students prefer to learn in a setting with resources that are appropriate but not overburdened. The question of whether engineering course materials should be inclusive and offer competitive possibilities for all students, regardless of gender, to engage and learn was posed to trainers and engineering students. Some female students might not want to share tools with other students, for instance, according to one trainer, which could deter other female students from enrolling in these classes.

Table 12: Engineering Curriculum and their Gender Biasness

Response	Trainers		Students	
	Frequency	Percent	Frequency	Percent
NO	0	0.0	115	87.1
YES	52	100.0	17	12.9
Total	52	100.0	132	100.0

Table 12 shows that 87% of students and all trainers disputed that engineering curriculum materials were gender biased. The low enrolment of female students in engineering courses in Nandi County may not have been caused by the gender-neutral engineering curriculum materials provided by TVETA in public TVET institutions. According to earlier studies by Fielden (2000) and Muthima and Ngugi (2017), curriculum resources and equipment were biased toward women, especially the machines that did not assess women's physical prowess. Table 12 displays the students' answers when asked if they were aware of the progression structure. In order to help students decide whether they could move forward after completing their current stage, trainers were asked if the students were aware of the nation's progression structure policy. The results for both students and trainers are shown in Table 13.

Table 13: Students Awareness of Progression Structure Policy

	Trainers Response on Student Level of Awareness		Students Level of Awareness	
	Frequency	Percent	Frequency	Percent
Yes	44	84.6	18	13.6
No	8	15.4	114	86.4
Total	52	100.0	132	100.0

Table 13 shows that 86.4% of students said they were unaware of the department's progression structure policies, but 84.6% of trainers in the department were aware of them. The poor enrolment of potential female students in Nandi County may be due to part of the students' ignorance about the progression method. This finding was in line with Cherotich's (2016) assertion that in order to help students advance from one level

to the next, there was a need to raise knowledge of the progression structure. The researcher asked trainers to rate whether the policies they had put in place had prompted more females to enroll in engineering courses in order to summarize the policy areas. Figure 3 illustrates their reaction.

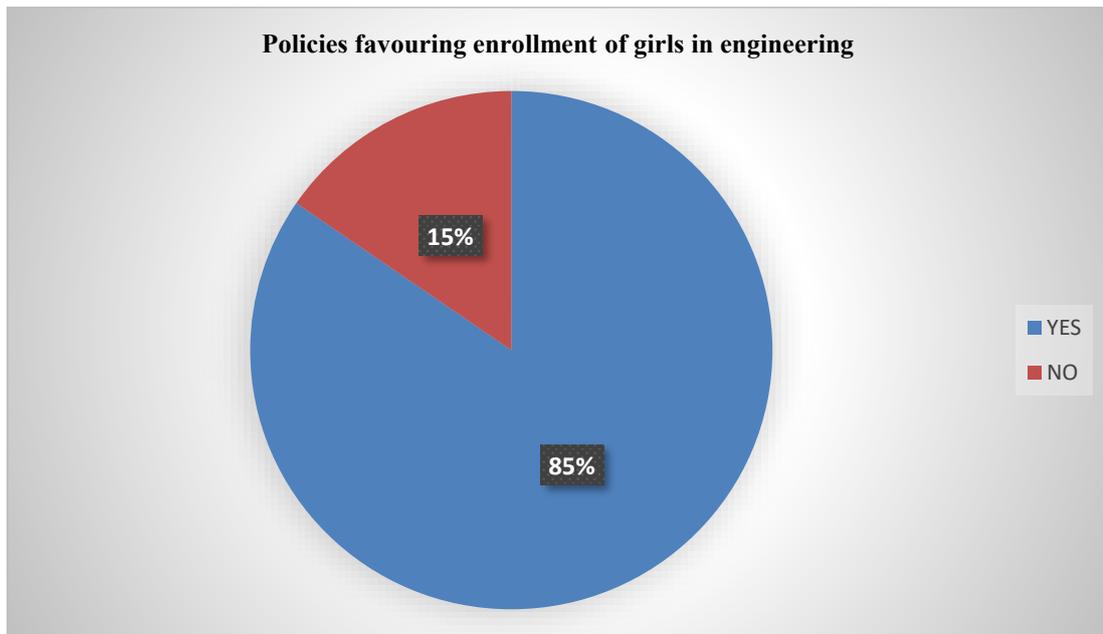


Figure 3: Trainers Responses on Whether Policies in Place Affect Enrolment

Results in figure 3 indicate that most trainers (85%) agreed that the government policies in place like entry requirements, progression structure, funding and bursaries have increased girls' enrollment in engineering courses at public technical training institutions in Nandi County. Only 15% stated that the policies have not encouraged female students to enroll in engineering programs. This demonstrates a significant improvement in policy aspects compared to earlier years, when several research studies identified poor policies as contributing to low female engineering enrollment (Ebenchi & Baki, 2015). Furthermore, respondents were asked what changes to government policy were needed to boost the number of female engineering students. They stated that female students ought to be granted scholarship to study engineering courses. According to the two registrars interviewed for the study, the government has enhanced

policy considerations such as funding and awareness creation. However, there was a need to raise knowledge about the progression structure, capitation, scholarships, sensitization, and gender rule in the recruitment of ttainers. The researcher assumed that the obtained data followed a normal distribution. Table 14 shows the outcome of the model analysis.

Table 14: Model Summary on Influence of Policy Determinants on Low Enrolment

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.162 ^a	.026	.019	1.08235	.026	3.494	1	130	.064

a. Predictors: (constant), policy determinants

The results in Table 14 indicate that policy factors in Nandi County can account for 2.6% of the change in female students' enrollment in TVET engineering courses, with the correlation coefficient of the regression being $R = 0.162$ which is weakly positive, and the R square being 0.026. The independent and dependent variables do not exhibit linearity ($p < 0.05$), as indicated by the F-change statistic $p = 0.064$. The regression coefficient result for the independent variable versus the dependent variable is shown in Table 15.

Table 15: Regression Coefficients for Policy Determinants on Low Enrolment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.301	.421		5.464	.000
	POLICY determinants	.687	.368	.162	1.869	.064

a. Dependent Variable: ENROLLMENT

The linear regression equation is:

$$y = 2.301 + 0.687\beta X$$

According to the equation above, female students enrolled in TVET engineering courses have a positive coefficient ($\beta = 0.162$) with policy determinants. At $p = 0.064$,

the regression coefficient is not significant. Policy factors have no discernible impact on TVET engineering enrollment, according to the analysis. The majority of students, instructors, and registrars believed that female students' enrolment in TVET engineering programs were unaffected by gender-biased course materials and students' ignorance of funding sources, and progression structure.

4.4 Institutional Determinants Influencing Female Enrolments in TVET Engineering Courses in Nandi County

The study's third objective was to evaluate how institutional factors affected the number of women enrolled in TVET engineering programs in Nandi, Kenya. The study collected information on selection criteria (entry requirements) and the impact of technology and physical facilities on female student enrolment in order to address the third research question. Trainers and students completed questionnaires, and registrars were interviewed. Regarding the impact of institutional concerns on female student enrollment in their departments, students were asked to rate their level of agreement or disagreement. Table 16 presents the responses.

Table 16: Students Perception on Institutional Determinants Influencing Enrolment of Female Students in TVET Engineering Courses in Nandi County.

Item	SD	D	NS	A	SA	MEAN	SDV
There are gender biased engineering curriculum materials	3 (2.3%)	8 (6.1%)	1 (0.8%)	96 (72.7%)	24 (18.2%)	3.98	0.801
There are negative comments by male engineering lecturers towards female students	3 (2.3%)	7 (5.3%)	1 (0.8%)	104 (78.8%)	17 (12.9%)	3.95	0.745
Peer pressure force female to do other courses perceived for females	2 (1.5%)	8 (6.1%)	1 (0.8%)	112 (84.8%)	9 (6.8%)	3.89	0.668
There are inadequate physical facilities in engineering department	6 (4.5%)	11 (8.3%)	2 (1.5%)	98 (74.2%)	15 (11.4%)	3.80	0.914
There are outdated/ poor technology in engineering departments	8 (6.1%)	18 (13.6%)	2 (1.5%)	90 (68.2%)	14 (10.6%)	3.64	1.043

KEY: SA-Strongly agree, A- Agree, NS- Not sure, D- Disagree, SD- Strongly disagree

According to the findings shown in Table 16, the majority of students (72.7%) thought that female students' enrollment in TVET engineering programs was influenced by gender-biased engineering curricular materials. This shows that gender prejudice in the curriculum was still present, which prevented women from enrolling in Nandi County's public technical training institutions. Second, 78.8% of students said that girls were deterred from enrolling in Nandi County's public technical training institutions by the scathing remarks made by male engineering staff. This could lead to dropouts or deter prospective students from enrolling due to the perception created by others dropping out. 0.8% were unsure, and 7.6% shows to disagree with the statement. According to the research, female students are sometimes reprimanded by trainers, which affects their

likelihood of enrolling in the programs again. These results are consistent with those of Carlone (2004) and Kiwana, L., Kumar, A., & Randerson, N. (2011), who found that 77% and 58% of respondents, respectively, thought that male teachers regularly, whether consciously or unconsciously, dissuaded female students from pursuing engineering programs through remarks made in the classroom.

The majority of students (84.8%) agreed, with 6.8% strongly agreeing, that a low percentage of female students request engineering course seats because of peer pressure to enroll in other courses that are perceived as more appropriate for women in schools. This implies that one factor influencing female students' decisions to enroll in engineering schools is peer pressure. According to the report, the majority of students (74.2%) concurred that female students are deterred from applying to different programs by the engineering department's lack of physical facilities. This implies that more female students will enroll in universities with adequate and standard engineering facilities than in institutions with inadequate resources to facilitate efficient learning. More than half of the students (68.2%) agreed when asked about the use of technology, and 10.6% strongly agreed that the department's outdated technology was a factor in the low enrolment of female students. Public technical training institutions need to upgrade their technological resources in light of the world's changing landscape in order to draw in female students, who seem to favor institutions with cutting-edge and modern technological resources and facilities to support their education (UNESCO, 2016). This implies that one of the institutional causes of low female student enrolment in engineering programs is outdated facilities that do not fit the current engineering technological climate. The trainer's assessment of the institutional factors influencing female students' enrollment in TVET engineering programs in Nandi County is shown in Table 17.

Table 17: Trainer's Perception on Institutional Determinants Influencing Enrolment of Female Students in TVET Engineering Courses in Nandi County.

Item	SD	D	NS	A	SA	MEAN	SDV
Male students get more attention in classrooms than female students from trainers	43 (82.7%)	4 (7.7%)	0 (0%)	2 (3.8%)	3 (5.8%)	1.00	1.091
Gender biased engineering curriculum materials	42 (80.8%)	5 (9.6%)	0 (0%)	2 (3.8%)	3 (5.8%)	1.00	1.092
There are on-job training programs for trainers in your TVET institutions	3 (5.8%)	3 (5.8%)	0 (0%)	3 (5.8%)	43 (82.7%)	5.00	1.146
Engineering training facilities do not favor female trainees	4 (7.7%)	1 (1.9%)	0 (0%)	4 (7.7%)	43 (82.7%)	1.00	1.145
Male trainees dominate the workstations during practical sessions	2 (3.8%)	2 (3.8%)	0 (0%)	3 (5.8%)	45 (86.5%)	5.00	0.964

KEY: SA-Strongly agree, A- Agree, NS- Not sure, D- Disagree, SD- Strongly disagree

According to table 17, majority of trainers (82.7%) strongly disagreed that male students in Nandi County's public technical training institutes got greater attention than female pupils. This meant that all students in the engineering department, regardless of gender, received the same attention and were not subjected to discrimination; hence, enrollment was not impacted. Majority of trainers (80.8%) disagreed that engineering curriculum materials were gender biased, according to the results. Students' responses, which indicated that the course materials used in engineering programs were applicable to all profiles and were not gender specific, were in line with this.

According to the results, 82.7% of trainers thought that the physical facilities in the engineering department were insufficient and do not favor women. This implies that

both genders are subjected to discrimination by the engineering department's facilities. According to the results, just 3.8% of trainers disagreed with the majority (86.5%) who strongly agreed that male students predominate at work stations during practical work when compared to female students. This meant that female students' enrollment in public technical training schools in Nandi County, Kenya, was frequently hampered by the predominance of male engineering students during practical activities. The collected data was considered to have a normal distribution pattern by the researcher. Table 18 displays the results of the model analysis.

Table 18: Model Summary on Influence of Institutional Determinants on Low Enrolment

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			Sig. F Change	
					R Square Change	F Change	df1		
1	.401a	.161	.154	1.00470	.161	24.927	1	130	.000

a. Predictors: (Constant), Institutional determinants

The results in Table 18 show that the regression's correlation coefficient is $R = 0.401$, which is strongly positive, and the R square is 0.161, which indicates that institutional factors in Nandi County account for 16.1% of the change in female students' enrolment in TVET engineering courses. This implies that additional factors not taken into account by this model may be the cause of 83.9% of female students' enrollment in TVET engineering programs. The F-change data show that the enrollment of female students in TVET engineering programs and institutional variables have a linear relationship ($p < 0.05$). The results of the regression coefficient between the independent variable and the dependent variable are displayed in Table 19.

Table 19: Regression Coefficients for Institutional Determinants on Low Enrolment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.778	.467		1.665	.098
	INSTITUTIONAL DETERMINANTS	.595	.119	.401	4.993	.000

a. Dependent Variable: ENROLLMENT

Linear regression equation is:

$$y = 0.778 + 0.595\beta X$$

The equation shows that institutional determinants and female students' enrolment in TVET engineering courses are positively correlated ($\beta=0.401$). Regarding the impact of institutional variables on female enrolment in TVET engineering courses in Nandi County, the regression coefficient is likewise significant ($p=0.00$). According to the coefficient, female students' enrolment in TVET engineering programs rises by 0.595 for every unit change in institutional determinants. This indicates that the enrolment of female students in TVET engineering courses in Nandi County is largely influenced by institutional variables. According to one registrar who participated in the interviews, low enrollment was caused by obsolete technology, poor facilities, and a lack of knowledge about changes in entry requirements. The majority of students and trainers agreed with this.

4.5 Availability of Role Models Influencing Enrolment of Female Students in TVET Engineering Courses in Nandi County

Determining the impact of role model availability on female enrollment in TVET engineering courses in Nandi, Kenya, was the study's main goal. The study collected information on the number of female trainers and trainees, the performance of female students in comparison to male students on exams, the treatment of female students by

trainers, and the impact of these factors on female student enrolment in order to answer the fourth research question. Trainers and students completed questionnaires, and registrars were interviewed. Students were asked to score how much they agreed or disagreed with the statement that the presence of role models helped attract female students to their department.

The purpose of the study was to determine how role models affected the enrolment of female students in technical courses. It is generally understood that young women can be encouraged to enroll in more technical courses at Technical Training Institutions by using role models, a sociological area of influence.

Namuddu (1992) asserts that the lack of positive role models in society severely impaired women's empowerment and children's desire to learn. In this regard, Griffin and Ann-Marie (2007) stress that encouraging teachers and positive role models are essential to boosting female enrolment in school, particularly in traditionally male-dominated areas. They contend that these factors might create an atmosphere in which female students feel empowered and inspired to follow their passions and academic objectives.

Table 20: Students Perception on Availability of Role Models Influencing Enrolment of Female Students in TVET Engineering Courses in Nandi County.

Item	SD	D	NS	A	SA	MEAN	SDV
A female member in your family has pursued an engineering course	29 (22.0%)	96 (72.7%)	0 (0%)	6 (4.5%)	1 (0.8%)	4.11	0.680
There are few female trainers in engineering	2 (1.5%)	5 (3.8%)	0 (0%)	110 (83.3%)	15 (11.4%)	3.99	0.636
There are fewer female trainees in engineering department	1 (0.8%)	7 (5.3%)	0 (0%)	112 (84.8%)	12 (9.1%)	3.96	0.610
Most heads of departments are female	4 (3.0%)	86 (65.2%)	1 (0.8%)	30 (22.7%)	11 (8.3%)	2.68	1.114

KEY: SA-Strongly agree, A- Agree, NS- Not sure, D- Disagree, SD- Strongly disagree

The results in table 20 shows that 22.0% of students strongly disagreed that a female member in their family has pursued an engineering course, while 72.7% disagreed. Only a few (4.5%) agreed that a female member in their family had pursued an engineering course. This means that they lack family role models to guide them into the engineering field. 83.3% of students agreed and 11.4% strongly agreed that there are few female trainers in engineering. This shows that most students prefer other courses to technical ones because they do not have enough female trainers to demonstrate that females can also succeed career wise if they pursue technical courses. The results also showed that 84.8% of students agreed and 9.1% students strongly agreed that there are fewer female trainees in engineering department. This means that there are few female students in engineering to act as role models to other female trainees who would like to enroll in engineering courses. Study results also revealed that most students (65.2%) disagreed that most heads of departments were female.

Table 21: Trainers Perception on Availability of Role Models Influencing Enrolment of Female Students in TVET Engineering Courses in Nandi County.

Item	SD	D	NS	A	SA	MEAN	SDV
Majority of trainers in your department are female	42 (80.8%)	6 (11.5%)	0 (0%)	2 (3.8%)	2 (3.8%)	1.00	0.973
Female trainees perform better than male trainees in engineering courses exams	41 (78.8%)	6 (11.5%)	0 (0%)	3 (5.8%)	2 (3.8%)	1.00	1.037
Male and female trainers are given equal treatment in your department	6 (11.5%)	5 (9.6%)	0 (0%)	4 (7.7%)	37 (71.2%)	5.00	1.465
Most head of departments are female	42 (80.8%)	7 (13.5%)	0 (0%)	1 (1.9%)	2 (3.8%)	1.00	0.905

KEY: SA-Strongly agree, A- Agree, NS- Not sure, D- Disagree, SD- Strongly disagree

The results in table 21 show that 80.8% of trainers strongly disagreed that majority of trainers in their department were female, 11.5% disagreed, while only a few agreed that majority of trainers in their department are female. This means that students lacked enough female trainers to act as role models and to guide them into engineering field therefore causing low female enrollment in technical courses. However, 78.8% of trainers strongly disagreed while 5.8% trainers agreed that female trainees perform better than male trainees in engineering courses exams. This shows that there is a notion that engineering is a male dominated field and thus makes the female trainees look down on their ability to perform in engineering.

The results also showed that 71.2% trainers strongly agreed while 7.7% of the trainers agreed that male and female trainers are given equal treatment in their departments. This means that there is no domination of male trainers over female trainers which

contributes to a positive perception. Study results also revealed that 80.8% of trainers strongly disagreed that most heads of departments are female in public technical training institutes in Nandi County. This shows that most heads of departments are male because the institution may prefer heads of departments to be males or there are few female candidates for the position. During the interview, trainers responded that; *when girls see women in engineering roles, this not only validates their aspirations but also provides tangible examples of how they can navigate similar paths, fostering greater confidence and ambition in pursuing their goals.* This means that the presence of female role models is crucial for inspiring and encouraging young girls to pursue careers in fields like engineering. The researcher assumed that the obtained data followed a normal distribution. The model analysis outcome is provided in Table 22

Table 22: Model Summary on Influence of Availability of Role Models Determinants on Low Enrolment.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.381 ^a	.145	.139	1.01405	.145	22.083	1	130	.000

a. Predictors: (Constant), Availability of Role models

The results in Table 22 indicate that the presence of role models in Nandi County can account for 14.5% of the change in female students' enrollment in TVET engineering courses, with the correlation coefficient of the regression being $R=0.381$, which is strongly positive, and the R square being 0.145. This implies that additional factors not taken into account by this model may be the cause of 85.5% of female students' enrollment in TVET engineering programs. The availability of role models and female students' participation in TVET engineering programs have a linear relationship ($p < 0.05$), according to the F-change statistics. The results of the regression coefficient between the independent variable and the dependent variable are displayed in Table 23.

Table 23: Regression Coefficients for Availability of Role Models Determinants on Low Enrolment

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.557	.334		4.667	.000
	AVAILABILITY OF ROLE MODELS	.517	.110	.381	4.699	.000

a. Dependent Variable: ENROLMENT

The linear regression equation is:

$$y = 1.557 + 0.517\beta X$$

The results in Table 23 shows that, female students' enrollment in TVET engineering courses is positively influenced by the availability of role model determinants ($\beta=0.381$). The availability of role models has a substantial ($p=0.00$) impact on female enrolment in TVET engineering courses in Nandi County, according to Table 23. This indicates that female students' enrolment in TVET engineering courses in Nandi County is significantly impacted by the availability of role model determinants. One interviewee claimed that low enrolment in the engineering department was caused by the male predominance of department directors and trainers. This was a consensus among the trainers and most of the students.

4.6 Summary of the Chapter

Chapter Four presents the results of data collected from students, trainers, registrars, and the County TVET Director in Nandi County. The purpose of this chapter was to analyze and interpret the findings in line with the study's objectives, which sought to determine the socioeconomic, institutional, policy, and role model factors influencing female enrolment in TVET engineering programs. The chapter begins by outlining the response rate, which was high, indicating reliable participation across the sampled

respondents. Demographic data showed that the majority of respondents were female students and trainers within the active learning and teaching age groups, confirming the study's focus on the experiences of women in technical education.

In analyzing the socioeconomic factors, the findings revealed that financial constraints, parental education levels, and societal expectations significantly affect female enrolment and retention in engineering programs. Many female students reported that lack of financial support and gendered perceptions of technical fields discouraged their participation. Institutional factors were also found to influence enrolment patterns. The study established that gender-insensitive learning environments, lack of adequate facilities, limited mentorship programs, and few female trainers in engineering departments contributed to the low participation of women. Respondents emphasized the need for more supportive policies within institutions to encourage inclusivity and create a more welcoming environment for female learners. Regarding policy factors, the study found that although Kenya has established several frameworks—such as Vision 2030, the TVET Act (2013), and gender mainstreaming policies—their implementation at the institutional level remains weak. Many respondents expressed limited awareness of these policies, indicating a gap between policy formulation and practical execution.

The influence of role models emerged as a key determinant of female participation. The absence of visible female engineers and mentors within institutions and industry settings was found to discourage young women from pursuing engineering courses. The study highlighted the importance of promoting female representation in leadership and teaching positions within TVET institutions to inspire and motivate female students.

Overall, the findings revealed that socioeconomic barriers, weak institutional support, insufficient policy enforcement, and lack of role models collectively contribute to the persistent gender gap in TVET engineering programs. The chapter concluded that achieving gender equity in TVET requires coordinated efforts among stakeholders, government, institutions, and communities, to address these challenges through awareness, resource allocation, mentorship, and inclusive policy implementation.

CHAPTER FIVE

SUMMARY OF FINDINGS, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter covers the Summary of Findings, Conclusions, Recommendations and Suggestions for Further Research.

5.2 Summary of Findings

The socioeconomic, institutional, policy, and role model aspects that affect female enrolment in engineering programs in Nandi County's public technical training colleges were examined in this study. Ol'lessos Technical Training Institute and Emsos Technical Training Institute, two public technical training facilities in Nandi County, served as the study's sites. 52 trainers from the engineering department, 136 female engineering students, and two registrars participated in the survey. Questionnaires and an interview schedules were used to gather data for this study. While qualitative data was subjected to theme analysis, quantitative data was assessed using SPSS (version 27). Tables, bar graphs, and charts were used to display the data that was analyzed. A summary of the study's findings based on its objectives is given in the following section.

5.2.1 Socioeconomic Determinants Influencing Female Enrolment in TVET Engineering Courses

Regarding socioeconomic factors, most respondents firmly agreed that: Girls have a negative attitude towards engineering; Society has a negative attitude toward female engineers; Female TVET graduates face discrimination in the job market; TVET graduates are seen as less qualified than university graduates; and society views it as wasteful to educate girls in engineering, which affects the enrolment of female students

in engineering. However, trainers strongly disagreed that engineering courses are primarily perceived as masculine by members of society, and that communities do not consider it wasteful to educate girls in engineering programs, thereby having no influence on female students' enrolment in engineering programs. Finally, students disputed that parents' unwillingness to encourage their daughters to pursue engineering courses has no bearing on female students' enrolment in engineering programs.

5.2.2 Policy Determinants Influencing Enrolment in TVET Engineering Courses

Regarding policy variables, trainers and students were aware of alternative sources of funding for students fees during an academic year. According to trainers and students, the most popular form of funding, besides parents and guardians' fee payment, was HELB loans, which had no effect on female students' enrolment in engineering programs. Most engineering students and instructors concurred that female students' enrolment is influenced by the infrastructure available in engineering departments. More than half of the students, girls' decisions to enroll in engineering programs were unaffected by the availability of physical facilities. Most female students, according to trainers, would rather learn in an environment with suitable but not overburdened resources. All the trainers, however, denied that there was gender bias in the engineering curriculum. The department's trainers and most of their students were aware of the policies pertaining progression structure, but students claimed not to be. The majority of trainers said that more girls were enrolled in engineering programs as a result of government initiatives.

5.2.3 Institutional Determinants Influencing Female Students Enrolment in TVET Engineering Courses

Regarding institutional factors, the majority of students agreed on gender biased

engineering curriculum materials. However, all trainers disagreed that the engineering curriculum was gender skewed. Although trainers and most students in the department acknowledged the existence of progression structure policies; however, the students reported that they were not adequately informed about the specific provisions of the progression structure policy. Most trainers believed that government policies have increased female enrolment in engineering courses. Female enrolment in TVET engineering programs is influenced by gender biased engineering curriculum materials. Students concurred that female' enrolment in public technical training institutes is influenced by unfavorable remarks made by male engineering staff. It is commonly known that a low percentage of females seek engineering jobs because of peer pressure to pursue other degrees in colleges that are thought to be more suitable for women. Majority of students believed that the engineering department's inadequate physical facilities discouraged ladies from applying for various courses. More than half of the students felt that the department's antiquated technology contributes to the low enrolment of female students. Most trainers argued that male students are given more attention than females in public technical training institutions. Majority of trainers also disagreed that engineering curriculum materials are gender skewed, hence influencing enrolment. Trainers agreed that the engineering department's physical facilities are insufficient to benefit females, and that male students dominate work stations during practical work compared to female students, impacting female students' enrolment in engineering programs.

5.2.4 Availability of role models Influencing Female Students Enrolment in TVET Engineering Courses

On the availability of role models determinant, majority of students agreed that there are fewer female trainees in engineering departments and trainers agreed that male and

female trainers are given equal treatment in their departments. Most students agreed that there are few female trainers in engineering thus influencing enrolment. Majority of students strongly disagreed that a female member in their family has pursued an engineering course, also disagreed that most heads of departments are female. Majority of trainers strongly disagreed that; majority of trainers in their department are female, and that female trainees perform better than male trainees in engineering course exams, most heads of departments are female in public technical training institutes in Nandi County and that influences enrolment in engineering programs.

5.3 Conclusions of the Study

This study had the following conclusions:

Examining the impact of socioeconomic factors on female enrolment in TVET engineering courses was the first objective. According to registrars, students, and trainers, the results showed a low percentage of female students enrolled in certificate and diploma engineering programs. Parental influences, unfavorable public opinions of engineering, and gender stereotypes were all contributing factors. The prevailing belief that engineering is exclusively for men has discouraged many potential female candidates.

However, enrolment in public technical training institutes in the region was not impacted by policy variables, such as unequal teaching staff distribution, government financing sources, and ignorance of progression mechanisms.

The third objective investigated the impact of institutional variables on female student enrolment in TVET institutions in Nandi County. The predominance of male students in engineering programs created a perception that these fields are male-dominated. Insufficient engineering facilities and outdated technological resources also contributed

to low female enrolment. Discussions with the registrar revealed that a lack of information regarding changes in entry requirements, such as the removal of the need to pass physics in secondary school, may deter many girls from pursuing engineering.

The final goal was to assess how the availability of role models influenced girls' enrolment in engineering programs. The absence of female engineers as role models negatively impacted female enrolment. Discussions with trainers highlighted that the preference for male trainers to serve as heads of departments significantly affected female students' career choices.

5.4 Recommendations from the Study

Based on the study's findings and conclusions, the following policy and theoretical recommendations are made with the goal of enhancing female enrolment in public technical training institutions engineering programs:

1. To address socioeconomic determinants, TVETA could organize a public education campaign in communities to promote opportunities for female engineering students. This can be accomplished through collaboration with religious institutions and county governments. There is a need to raise awareness, especially in rural areas, regarding the need to encourage female participation in TVET engineering courses.
2. To address institutional determinants, TVET institutions should update engineering facilities and resources to provide equal chances for all students, regardless of gender. Institutions may also consider partnering with secondary schools to promote and implement mentorship programs, especially in rural areas. To educate more girls about the prerequisites for enrolling in engineering degrees as potential jobs.

3. To address role model factors, TVET institutions should invite female role models to inspire young girls in secondary schools and technical training institutions to pursue engineering. Institutions should also consider females when appointing heads of departments so as to bring about gender equality and encourage more females to enroll in engineering courses

5.5 Recommendations for Further research

The following recommendations for further research are provided based on the study's findings as well as limitations:

1. Research investigating the career advancement, job satisfaction, and employment rates of female graduates holding diplomas and craft certificates from technical training institutions.
2. Research identifying the specific challenges and obstacles faced by female graduates in technical fields, including issues related to workplace environment, gender biases, and career advancement opportunities.

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APPENDICES

Appendix I: Table Determining Sample Size from a Given Population

N		S		N		S		N		S
10		10		220		140		1200		291
15		14		230		144		1300		297
20		19		240		148		1400		302
25		24		250		152		1500		306
30		28		260		155		1600		310
35		32		270		159		1700		313
40		36		280		162		1800		317
45		40		290		165		1900		320
50		44		300		169		2000		322
55		48		320		175		2200		327
60		52		340		181		2400		331
65		56		360		186		2600		335
70		59		380		191		2800		338
75		63		400		196		3000		341
80		66		420		201		3500		346
85		70		440		205		4000		351
90		73		460		210		4500		354
95		76		480		214		5000		357
100		80		500		217		6000		361
110		86		550		226		7000		364
120		92		600		234		8000		367
130		97		650		242		9000		368
140		103		700		248		10000		370
150		108		750		254		15000		375
160		113		800		260		20000		377
170		118		850		265		30000		379
180		123		900		269		40000		380
190		127		950		274		50000		381
200		132		1000		278		75000		382
210		136		1100		285		100000		384

KEY: N- POPULATION SIZE, S – SAMPLE SIZE

SOURCE: Krejcie & Morgan (1970)

Appendix II: Introductory Letter

MERCINELLY JERUTO,
P.O BOX 210-30302,
LESSOS.
21-02-2024.

THE PRINCIPAL,
EMSOS TECHNICAL TRAINING INSTITUTE,
P.O BOX 300-30100,
ELDORET.

Dear Sir,

REF: REQUEST TO CARRY OUT RESEARCH WITHIN THE INSTITUTION.

I am a Moi University student pursuing a Master's degree in education and currently need to collect data and write a thesis on the topic **DETERMINANTS OF FEMALE ENROLMENT IN ENGINEERING PROGRAMS OF PUBLIC TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN NANDI COUNTY, KENYA.**

Your institution is one of the research institutions I chose.

Your consideration is highly appreciated. Attached is the introductory letter from the university and the research permit from the National Commission for Science, Technology and Innovation.

Yours faithfully,

Mercinelly Jeruto
MTED/6029/22

MERCINELLY JERUTO,
P.O BOX 210-30302,
LESSOS.
21-02-2024.

THE PRINCIPAL,
OL'LESSOS TECHNICAL TRAINING INSTITUTE,
P.O BOX 210-30102,
LESSOS.

Dear Sir,

REF: REQUEST TO CARRY OUT RESEARCH WITHIN THE INSTITUTION.

I am a Moi University student pursuing a Master's degree in education and currently need to collect data and write a thesis on the topic **DETERMINANTS OF FEMALE ENROLMENT IN ENGINEERING PROGRAMS OF PUBLIC TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN NANDI COUNTY, KENYA.**

Your institution is one of the research institutions I chose.

Your consideration is highly appreciated. Attached is the introductory letter from the university and the research permit from the National Commission for Science, Technology and Innovation.

Yours faithfully,

Mercinelly Jeruto
MTED/6029/22

Appendix III- Informed Consent

Hello, I am Mercinelly Jeruto, a Moi University student pursuing a Master's degree and currently need to conduct a research study as part of the requirement for Master of Education in Technology Education (Electrical and Electronics Technology). The study is titled “**DETERMINANTS OF FEMALE ENROLMENT IN ENGINEERING PROGRAMS OF PUBLIC TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN NANDI COUNTY, KENYA**”. The information procured will be shared with stakeholders to ensure decent interventions are made so that female enrollment is increased in TVET institutions. During the research, you have the rights to

- i. Participate voluntarily, withdraw at any time.
- ii. Have your privacy respected as your information will be kept confidential and used for the purposes of this research.
- iii. Ask questions during research.
- iv. Understand the nature of the research, what it entails, and its likely impact

Kindly participate by filling the attached questionnaire and give your responses with utmost honesty. Thank you.

We have carefully read and agreed to the above provisions of the research.

Yours sincerely,

Mercinelly Jeruto

MTED/6029/22

Appendix IV-Questionnaire for Engineering Students

I am a Master's student at Moi University conducting research on the determinants of female enrolment in engineering programs of public technical vocational education and training institutions in Nandi County, Kenya. The information provided in this questionnaire will be kept strictly confidential and used solely for academic purposes. Please answer the questions as accurately and honestly as possible. Kindly tick (✓) where applicable.

Section A: Personal Information.

Gender? Male or Female

Age ranges: under 15 years, 16-34, and 35+ years.

What is your highest educational qualification?

KCPE , KCSE , and others.

Marital status: Single Married

Section B

1.0 Socioeconomic Determinants influencing Enrolment of Female Students in Engineering

Please check the appropriate box next to the statements in the table below to indicate how societal beliefs influence female students' enrollment in TVET engineering courses.

No	Item statement	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	There is a negative attitude towards engineering courses by girls					
2	There is negative societal					

	attitude toward female engineers					
3	There is discrimination against female TVET graduates in the labour market					
4	TVET graduates are viewed as inferior to university graduates					
5	Members of the society consider it wasteful to educate girls in engineering					
6	Engineering is a well-paying job and prestigious career					
7	There is desire for women to venture in male-dominated careers					

1.1 Parental factors influencing low enrolment of female students in engineering.

Indicate if you agree or disagree with the following statements

s/no	Item statement	Agree	Strongly Agree	Disagree	Strongly Disagree	Not sure
1.	Many parents are unwilling to bear the cost of education					
2.	Parents' religious beliefs and socio-cultural traditions do not allow girls to pursue engineering career path					

3.	Parent education level influences enrolment of female students in TVET institutions					
4.	There is a traditional belief that engineering is meant for males					
5.	Parents view technical engineering courses as inferior to university engineering courses					
6.	High poverty levels influence female enrolment in TVET institutions					
7.	Parents' lack of awareness of the socio-economic value of TVET affect female enrolment					
8.	Many parents prefer paying fee for males over females					

2. Policy Determinants influencing Enrolment of Female Students in Engineering

How much did you spend for your course per academic year? Tick properly.

- Under Kshs 15,000/= ()
- Between Kshs 15,001 and 20,000/=
- Between Kshs 20,001 and 50,000/=
- Above Kshs 50,000/=

Do you believe the selection criteria for TVET engineering courses are biased?

Answer: Yes or No.

Are there any other sources of money besides your parents/guardians?

Yes () No ()

If yes, please state them.

Do you believe that infrastructural amenities in your college, such as libraries and workshops, have an impact on female student enrolment?

Yes () No ()

If yes, how?

Do you believe the engineering curriculum materials are gender biased? Answer: Yes or No.

Are there female staff members in your department? Yes () No ()

Are you aware of the progression structure of a TVET student from an Artisan to a PhD holder? Yes () No ()

Tick appropriately

S/N	ITEM	1	2	3	4	5
1.	Societal Perceptions					
2.	Cultural/stereotypical factors					
3.	Parental level of income					
4.	Biased curriculum materials					
5.	Entry requirements					

Suggest possible ways of increasing the enrolment of female students in TVET engineering.

.....

.....

.....

3. Institutional determinants influencing enrolment of Female Students in TVET engineering courses in Nandi County.

Use a tick to rate the answers appropriately

S/NO	ITEM STATEMENT	Agree	Strongly agree	Disagree	Strongly disagree	Not aware
1.	There are gender biased engineering curriculum materials					
2.	There are negative comments by male engineering lecturers towards female students					
3.	Peer pressure forces female students to do other courses perceived as more suitable for females					
4.	There are inadequate physical facilities in engineering department					
5.	There is outdated/poor technology in engineering department					

4. Availability of Role Models influencing enrolment of Female Students in TVET engineering courses in Nandi County.

S/NO	ITEM STATEMENT	Agree	Strongly Agree	Disagree	Strongly Disagree	Not Aware
1.	A female member in your family has pursued an engineering course					
2	There are few female trainers in engineering					
3	There are few female trainees in engineering department					
4	Most heads of departments are female					

How would you rate the factors influencing female enrolment of students in TVET engineering from the most influential to the least using a scale of 1-5 where 1 is the most influential and 5 is the least influential?

Tick where appropriate

S/N	ITEM	1	2	3	4	5
1	Socio-economic factors					
2	Policy factors					
3	Institutional factors					
4	Availability of role models					

Appendix V: Questionnaire for Trainers in the Engineering Department

I am a Master's student at Moi University conducting research on the determinants of female enrolment in engineering programs of public technical vocational education and training institutions in Nandi County, Kenya. The information provided in this questionnaire will be kept strictly confidential and used solely for academic purposes. Please answer the questions as accurately and honestly as possible. Tick (✓) when applicable.

Section A - Personal Information

Gender: Male or Female

Age: Below 25 years between 25-50 years 50 years or older

Highest educational qualification?

Certificate , Diploma , Degree , Masters , and PhD .

Marital status: Single , married , and others .

Home County?

How long have you worked at this institution?

0–1 years , 2–5 years , 6–10 years , 11 years old or older

SECTION B

Socioeconomic Determinants influencing Enrolment of Female Students in TVET engineering courses.

Please indicate if you agree, strongly agree, disagree, or strongly disagree with the following statements;

s/no	Item statement	Agree	Strongly Agree	Disagree	Strongly Disagree	Not Sure
1	Engineering courses are generally considered to be the masculine subjects					
2	Members of the society considerit wasteful to educate girls in engineering since they will be married off.					
3	Engineering is a well paying job and a prestigious career					
4	University graduate trainers are superior to TVET graduate trainers					

2. Policy determinants influencing enrolment of female students in TVET engineering

Are there any other sources of funding in your college besides parents/guardians?

Answer: Yes or No.

Please state if there are any.

.....

Do you believe that infrastructural amenities in your college, such as libraries and workshops, have an impact on female student enrollment?

Yes (✓) No ()

If so, how? Please provide an explanation.

.....

Do you believe the engineering curriculum materials are gender biased? Is there enough female staff in your department?

Yes (✓) No ()

What should be done to boost the number of female engineering students?

.....

.....

.....

.....

Do you think the policies in place encourage more women to pursue engineering degrees?

Answer: Yes or No. If not, provide reasons.

.....

.....

.....

.....

Are trainees aware of the TVET progression structure, from Artisan to PhD? Yes ()

No ()

Tick where appropriate.

S/N	ITEM	Strongly Disagree	Disagree	Not sure	Agree	Strongly Agree
1	Societal Perceptions					
2	Cultural/stereotype factors					
3	Parental level of income					
4	Biased curriculum materials					
5	Entry requirements					

9. Suggest ways of increasing the enrolment of female student in TVET engineering.

.....

.....

3. Institutional Determinants influencing Enrolment of Female Students in TVET engineering courses.

Please tick appropriately

S/NO	ITEM Statement	Agree	Strongly Agree	Disagree	Strongly Disagree	Not Sure
1	Male students get more attention in classrooms than female students					
2	Gender biased engineering curriculum materials					
3	There is on-job training programs for trainers in your TVET institutions					
4	Engineering training facilities do not favor female trainees					
5	Male trainees dominate the workstations during practical sessions					

4. Availability of Role Models influencing enrolment of Female Students in TVET engineering courses in Nandi County.

S/NO	ITEM Statement	Agree	Strongly agree	Disagree	Strongly disagree	Not sure
1.	Majority of trainers in your department are female					
2.	Female trainees perform better than male trainees in engineering courses and examinations					

3.	Male and female trainers are given equal treatment in your department					
4.	Most head of departments are female					

How would you rate the factors influencing female enrolment of students in TVET engineering from the most influential to the least using a scale of 1-5 where 1 is the most influential and 5 is the least influential?

S/N	ITEM	1	2	3	4	5
1	Socio-economic factors					
2	Policy factors					
3	Institutional factors					
4	Availability of role models					

Thank you

Appendix VI: Registrar's Interview Schedule

Gender.....

The institution's name

How many years have you been a registrar at this institution?

Which department do you belong to?

Can you talk about your department?

In your perspective, how do the following factors influence female students enrolment in engineering at your institution?

- Parental considerations including: income, education, and attitude towards TVET courses.
- Institutional issues.
- Availability of female role models in engineering.
- Policy factors include bursaries, scholarships, progression framework, and entry requirements.

To what extent do you think the issues mentioned above have influenced the enrollment of female students of TVET engineering?

End of interview questions

Appendix VII- Interview Schedule for County TVET Director Nandi County

Gender:

How long have you worked in this capacity? -----

In your perspective, to what extent have the following factors influenced female enrolments?

Students taking TVET engineering courses?

- Social judgments and attitudes.
- Parental factors, such as money, education, and attitude towards TVET courses.
- Institutional factors.
- Policy factors include bursaries, scholarships, advancement, and entry requirements.

What hurdles do you confront in your efforts to improve enrolment in TVET engineering courses?

Have government policies such as bursaries, scholarships, and the implementation of a progressive framework in TVET helped female enrolment in engineering courses?

Please suggest ideas that will help to increase the number of female trainees enrolled in TVET engineering courses.

End of interview questions

Appendix VIII: Research Permit

Republic of Kenya
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 527421
Date of Issue: 18/July/2023
RESEARCH LICENSE



This is to Certify that Ms. Mercinely Jeruto of Moi University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nandi on the topic: DETERMINANTS OF FEMALE ENROLLMENT IN PUBLIC TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN NANDI COUNTY, KENYA. for the period ending : 18/July/2024.

License No: NACOSTI/P/23/27726
Applicant Identification Number: 527421
Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Verification QR Code



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THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
 Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
 - i. Endanger national security
 - ii. Adversely affect the lives of Kenyans
 - iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
 - iv. Result in exploitation of intellectual property rights of communities in Kenya
 - v. Adversely affect the environment
 - vi. Adversely affect the rights of communities
 - vii. Endanger public safety and national cohesion
 - viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. The license any rights thereunder are non-transferable
5. The Commission reserves the right to cancel the research at any time during the research period if in the opinion of the Commission the research is not implemented in conformity with the provisions of the Act or any other written law.
6. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research.
7. Excavation, filming, movement, and collection of specimens are subject to further necessary clearance from relevant Government Agencies.
8. The License does not give authority to transfer research materials.
9. The Commission may monitor and evaluate the licensed research project for the purpose of assessing and evaluating compliance with the conditions of the License.
10. The Licensee shall submit one hard copy, and upload a soft copy of their final report (thesis) onto a platform designated by the Commission within one year of completion of the research.
11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
12. Research, findings and information regarding research systems shall be stored or disseminated, utilized or applied in such a manner as may be prescribed by the Commission from time to time.
13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
 Innovation(NACOSTI),
 Off Waiyaki Way, Upper Kabete,
 P. O. Box 30623 - 00100 Nairobi, KENYA
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Appendix VIII: Research Authorisation



MOI UNIVERSITY
Office of the Dean School of Education

Email.deaneducation@gmail.com

P.O. Box 3900
Eldoret, Kenya

REF: MTED/6029/22

DATE: 6th June, 2023

THE EXECUTIVE SECRETARY
National Council for Science and Technology
Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: **RESEARCH PERMIT IN RESPECT OF MERCINELLY JERUTO –
MTED/6029/22**

The above named is a 2nd year Master of Education Student at Moi University, School of Education, Department of Technology Education.

It is required of her Master of Education studies to conduct a research project and produce a research report. Her research topic is entitled:

“Determinants of Female Enrollment in Public Technical Vocational Education and Training Institutions in Nandi County, Kenya.”

Any assistance given to enable her conduct research successfully will be highly appreciated.

Yours faithfully,

PROF. ANNE S. KISILU
DEAN, SCHOOL OF EDUCATION



Appendix IX: Plagiarism Awareness Certificate

SR838

*ISO 9001:2019 Certified Institution***THESIS WRITING COURSE***PLAGIARISM AWARENESS CERTIFICATE*

This certificate is awarded to

MERCINELLY JERUTO**MTED/6029/22**

In recognition for passing the University's plagiarism

Awareness test for Thesis entitled: **DETERMINANTS OF FEMALE ENROLLMENT IN ENGINEERING PROGRAMS; A CASE OF SELECTED PUBLIC TECHNICAL VOCATIONAL EDUCATION AND TRAINING INSTITUTIONS IN NANDI COUNTY, KENYA** with similarity index of 12% and striving to maintain academic integrity.

Word count:21587

Awarded by

Prof. Anne Syomwene Kisilu
CERM-ESA Project Leader Date: 02//05//2025