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Influence of Technical Skills on Employability of Engineering Graduates from Technical and Vocational Education and Training Institutions in Uasin Gishu County

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Kemei Cheruiyot John[1]; Titus Murgor (Phd)[2]; Julius Keter[3]

Abstract:

Purpose: *The study sought to determine the influence of technical skills on the employability of engineering graduates from Technical and Vocational Education and Training (TVET) institutions in Uasin Gishu County. The investigation was anchored on Human Capital Theory and applied an explanatory research design to assess how technical competencies shape graduate employability.*

Material/methods: *The target population included 622 diploma engineering graduates from four public TVET institutions who completed their studies in 2018 and 2019. A sample of 242 respondents was selected using Slovin's formula through stratified and simple random sampling. Data were collected using a structured five-point Likert-scale questionnaire. Reliability was examined using Cronbach's Alpha, while face validity was established by expert reviewers. Descriptive statistics and Pearson product-moment correlation were employed to analyze the relationship between soft skills, technical skills, and employability.*

Findings: *The study findings revealed that technical skills particularly technical competencies such as the use of modern engineering tools and design analysis were found to increase the marketability and job readiness of graduates.*

Conclusion*: The study concludes that specific technical skills play a central role in improving the employability of engineering graduates. Strengthening these competencies within TVET programs can contribute to better workforce outcomes.*

Value: *The findings offer practical insights for TVET institutions, curriculum developers, policymakers, and employers by identifying the technical skill areas that most strongly enhance employability. The study emphasizes the need for hands-on training, industry collaboration, and structured internship programs to support the development of job-ready engineering graduates.*

Keywords*: Employability, Engineering Graduates, Technical Skills, TVET*

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[1] MED Student, Technology Education Department, Moi University
email: johnkemei95@gmail.com
[2] Lecturer, Technology Education Department, Moi University
[3] Lecturer, Technology Education Department, Moi University

1. Introduction

Technician Engineering Training (TET), a specialized category within Technical and Vocational Education and Training (TVET), plays an essential role in national development, particularly in an era where technology is embedded in organizational operations (Royal Academy of Engineering, 2020). TVET is designed to equip graduates with relevant skills, knowledge, values, and attitudes for w\ork, and TET is strongly linked to modernization, internationalization, and labor market demands (Suleiman, 2022). Employability is understood as a combination of transferable, general, cognitive, and industry-specific abilities that enable graduates to obtain and sustain employment (Romgens, 2019). Scholars further argue that employability extends beyond job acquisition to include contributions to the knowledge economy, improved social mobility, and long-term career progression (Majid et al., 2020; Balangen et al., 2021).

The purpose of employability skills development is to prepare graduates to secure employment, retain jobs, and perform optimally in the workplace (Sermsuk, Triwichitkhun & Wongwanich, 2014). With rapid globalization and technological change, employers increasingly seek graduates with a blend of technical abilities and non-technical skills, including adaptability, communication, collaboration, and problem solving (Pitan, 2016; Simatele, 2015; Cavanagh et al., 2015). Industry expectations now emphasize workplace competencies such as resource management, technology use, interpersonal relations, and systems handling (Digest et al., 2000). Training and practical industrial exposure have been recognized as critical avenues for developing these competencies (Kazilan, Hamzah & Bakar, 2009).

Within engineering fields, studies indicate that employers expect graduates to demonstrate both technical mastery and soft skills from the onset of employment. Engineering graduates are required to apply engineering principles, conduct experiments, manage projects, and adapt to business environments (Azami et al., 2009a; Motsoeneng et al., 2013; Cai, 2013). Beyond technical capabilities, employers value communication, teamwork, leadership, problem-solving, and continuous learning (Spinks et al., 2007; Smith & Kruger, 2008; Asefe & Abidin, 2021). While some countries, such as the Philippines and Iran, report improved employability outcomes linked to effective technician engineering training (Chavez et al., 2016; Laguador et al., 2020; Farhadi et al., 2020), others note a widening skills mismatch where graduates remain academically qualified but not workplace ready (Kenayathulla et al., 2019; Nirmala, 2021; Nair, 2020).

In East Africa, research highlights persistent employability challenges among TVET engineering graduates due to limited practical training, outdated curricula, weak industry linkages, and inadequate training facilities (Sheikheldin & Nyichomba, 2019; Kraemer-Mbula, Sheikheldin & Karimanzira, 2021; SADC, 2019). UNESCO-UNEVOC (2022) and INSEAD (2020) further note that current technician engineering training still struggles to meet dynamic manufacturing sector needs, resulting in graduates who lack the competencies required by employers. Despite global recognition of the importance of technical for sustainable employability (Nugraha et al., 2020), many graduates in sub-Saharan Africa experience difficulty securing employment or starting engineering enterprises. Engineering technician training is critical to Kenya's Vision 2030 industrialization goals; however, concerns continue to rise regarding the

effectiveness of Technical Education and Training (TET) in equipping graduates with employability skills amid a demand for over 68,000 engineers and 1.5 million technicians (Motuka & Orodho, 2021).

Despite the national shortage, many engineering graduates remain unemployed or underemployed, with employers often opting for expatriates due to perceived deficiencies in technical competence, practical exposure, and industry-standard skills among local graduates (Sheikheldin et al., 2022). Challenges such as inadequate funding, limited recognition, poor public perception, insufficient resources, and a shortage of qualified trainers further hinder the delivery of employability-oriented skills within TVET institutions (Murgor, 2017; Motuka & Orodho, 2021). Although prior studies have examined engineering education within TVET institutions (Lumumba et al., 2022; Ojera et al., 2021; Lumumba et al., 2020), limited research has specifically assessed how technician training influences employability through soft and technical skills, highlighting the need to investigate how training content and delivery align with labor market expectations in Uasin Gishu County, Therefore, this study seeks to assess the influence of technical skills on the employability of engineering graduates from TVET institutions in Uasin Gishu County in order to establish whether current TET programs effectively align with industry skill requirements.

2. Theoretical Framework

The Human Capital Theory, developed by Becker (1964), emphasizes that an individual's education, skills, and expertise are essential contributors to organizational success and national economic growth. It links employability and soft skills to broader human development philosophies, asserting that education enhances a country's ability to remain competitive in a dynamic global economy (Jonck, 2014; Oyinlola, Adedeji & Onitekun, 2021). From an organizational viewpoint, graduates' capabilities are assessed as human capital — the collective knowledge and skills that drive productivity and performance — making employability skills a core determinant of workplace success (Mohr & Seymore, 2018; Bridgstock, 2009).

Human Capital Theory further highlights the role of training in creating, maintaining, and retaining relevant Knowledge, Skills, and Abilities (KSAs), particularly through continuous improvement of training curricula to match industry needs (Kinyondo & Shija, 2021). In the engineering sector, the theory suggests that individuals with advanced education and industry-related competencies are more likely to excel professionally, which underscores the importance of technician training programs in shaping graduate employability. Therefore, the theory provides a relevant lens for examining how technician training influences the employability of engineering graduates from Technical and Vocational Education and Training (TVET) institutions in Uasin Gishu County.

3. Literature Review

Technical skills are widely recognized as the foundational abilities required to perform specific job-related tasks, particularly in fields such as engineering and technology. They are described as task-oriented competencies gained through education, training, or practical exposure and serve as a basis for designing curricula, defining job profiles, and meeting industry demands (Kennedy, 2016; James & James, 2004; Chell & Athayde, 2011). Distinguished from soft skills—which relate to attitudes, communication, and interpersonal behaviors—technical skills reflect specialized knowledge and tangible

abilities needed to operate tools, equipment, and systems effectively (Cimatti, 2016; Stulberg et al., 2021; Wokcik et al., 2019). These skills are factual in nature and often measurable, including capacities such as computer programming, use of foreign languages, diagnostic repair, and procedural tasks that determine workplace competency (Fan, Wei & Zhang, 2017; Kenayathulla, Ahmad & Idris, 2019).

Acquisition of technical skills may occur formally through structured learning in academic institutions, certification programs, and professional courses or informally through practical experience, self-guided learning, and continuous engagement with evolving technologies (Medina, 2010). International frameworks, such as the Washington Accord signed by the Board of Engineers Malaysia in 2009, further define these required competencies and ensure engineering education aligns with global industry standards. Such agreements outline technical capabilities that engineering graduates must possess to perform competently and independently within their profession, reinforcing the central role of technical skills in employability and professional success. Table 1lists the technical capabilities that an engineering graduate must have in order to work as an engineer.

Table 1: Technical Skills Essential for an Engineering Graduate

Technical Skills	**Characteristic**	**Details**
Environment and Sustainability	Type of solutions	The engineer should understand the social and ecological ramifications of professional engineering solutions, in addition to the significance of environmental sustainability.
Design/ development of solutions	The extent and novelty of engineering challenges, which refers to how new the problems are as well as how extensively the solutions have previously been recorded or acknowledged.	Develop strategies for complex engineering difficulties and build structures, parts, or methods that meet stated requirements while taking social, cultural, environmental and public safety and well-being aspects into account.
knowledge Engineering	The range and extent of education and the nature of knowledge, including abstract and applied knowledge.	To answer complex engineering problems, apply mathematics, science, engineering fundamentals and specific engineering expertise.
Modern Tool Usage	Degree of comprehension of the tool's suitability	Develop, select, and apply suitable approaches, resources, and current

	engineering and IT technologies, such as forecasting and simulation, to technically challenging processes while being aware of their limits.

Nasir, & Ali (2019).

Empirical evidence highlights that technical skills remain a core determinant of employability, especially in technology-driven sectors. Nugraha et al. (2019) found that engineering and technological competencies, alongside problem-solving and critical thinking, are among the most demanded technical abilities by industry. Their findings indicate that employers expect graduates to demonstrate mastery of technical content relevant to their field, such as engineering processes and the application of modern technologies, underscoring the necessity of specialized technical training to meet labor market expectations.

Further studies show that possessing technical skills alone influences graduates' capacity to secure meaningful employment. Olojuolawe and Fadila (2019), in a study involving Electrical Technology students in Nigeria, revealed that employers require graduates to have well-developed hard skills such as electrical systems knowledge, machinery handling, and technical troubleshooting. Their research emphasized that these competencies directly impact performance in the workplace and are therefore indispensable for career progression and sustaining employment in engineering-related fields.

Research by Mengistu and Negasie (2022) also reinforces the importance of technical abilities in the long-term employability of TVET graduates. Through a qualitative case study, they found that engineering graduates must possess strong technical knowledge to function effectively and remain competitive in the job market. Their findings concluded that the development of technical abilities is essential not only for immediate job placement but also for sustaining a long-term career path in engineering-related occupations, signaling that technical skills remain the foundation upon which employability in the engineering sector is built.

4. Methodology

The explanatory research was utilized to demonstrate the causal–effect link, rather than just to describe the events under investigation (Gratton & Jones, 2010). Explanatory research, according to Cooper and Schindler (2008), focuses on 'why' inquiries. The study generated explanations to answer the "why" questions. Explanatory design is used in studies designed to establish causal relationships. The explanations argued whether phenomenon Y (employability of engineering graduate) is affected by variable X (soft skills) as to show the extent of the effect.

The study targeted 622 diploma engineering graduates from 2018 and 2019 across four public TVET institutions in Uasin Gishu County. A stratified sampling technique was used, with the institutions forming four strata. Random sampling was then applied within each stratum to ensure accurate representation. The sample size of 242 was determined using Slovin's formula (2018), originally developed by Yamane (1967).

Firms were selected proportionately using simple random sampling, while 10 employers from manufacturing firms were purposively chosen for the study.

The study utilized a five-point Likert scale questionnaire, structured based on research questions and objectives. Questionnaires were chosen for their ease of administration, time efficiency, and ability to minimize researcher bias (Kothari, 2015; Saunders et al., 2015). A pilot study was conducted at Ziwa Technical and Training Institute, involving 20 engineering graduates (10% of the sample) as recommended by Connelly (2008). Reliability was assessed using Cronbach's Alpha, with a threshold of 0.7 for acceptability (Cronbach, 1951). Face validity was ensured through expert review, while content validity confirmed that the questionnaire effectively measured the intended concepts.

Data collected for purposes of this study was edited and coded using excel datasheet before being input to SPSS statistical software. Descriptive statistics were used as a guide in identifying the correct functional form of the model to be analyzed. Pearson product moment correlation coefficient lies between -1 and +1.

5. Findings and Discussion

The study analyzed quantitative data to assess how technician training programs influence the employability of engineering graduates from TVET institutions in Uasin Gishu County, using both descriptive and inferential statistics. Data were collected from diploma engineering graduates of four public institutions—Rift Valley Technical Training Institute, Kipkabus Vocational Training Center, Eldoret Vocational Training Center, and Koshin Technical Training Institute—who completed their studies in 2018 and 2019. Of the 242 questionnaires distributed, 224 were returned, yielding a 92.6% response rate, which exceeds the 60% threshold considered acceptable for survey-based research, thereby ensuring the reliability and representativeness of the study findings.

Sample Characteristics

The demographic analysis revealed that the majority of engineering graduates were male (71.4%), indicating a significant gender disparity within technician training programs. Most respondents (85.7%) were aged between 21 and 30 years, suggesting that the graduates were predominantly in the early stages of their careers. The year-of-graduation data showed that 70.8% of graduates completed their studies between 2018 and 2022, with 2018 recording the highest graduation rate (24.1%), reflecting potential growth in enrollment and completion during that period, followed by a decline in 2022–2023 which may be linked to shifting socio-economic or educational factors.

Employability of Engineering Graduates

The study sought to establish the employment status as presented in Table 2 of the engineering graduates from TVET institutions in Uasin Gishu County. Based on the findings in Table 2, there is a nearly balanced distribution between employed (49.6%) and unemployed (50.4%) engineering graduates. The almost balanced distribution suggests that other factors, possibly including broader economic conditions, internship opportunities and industry linkages might have an influence on the employability outcomes.

Table 2: Employment Status

	Frequency	Percent
Yes	111	49.6
No	113	50.4
Total	**224**	**100**

In addition, the findings in Table 3 revealed that engineering graduates generally expressed confidence in securing employment (mean = 4.42), believed their diploma is recognized by employers (mean = 4.27), and felt adequately prepared for the job market (mean = 4.23). Graduates also demonstrated proactive efforts to enhance employability by seeking internships and co-op opportunities (mean = 4.09), indicating awareness of the importance of practical exposure. However, challenges persist, as relatively few graduates reported receiving job invitations (mean = 2.70), aligning offers with career goals (mean = 3.15), or satisfactory compensation (mean = 2.56). Overall satisfaction with job prospects and perceived competitive advantage remained moderate. The composite mean score of 3.57 suggests that while graduates possess employability skills, improvements are needed in industry engagement, practical experience, and job placement support to better align training outcomes with labor market expectations.

Table 3: Employability Skills

	Mean	Std. Dev
I feel confident in my ability to secure employment in the engineering field.	4.42	0.82
I believe that my engineering degree has prepared me well for the job market.	4.23	1.08
I have actively sought internship or co-op opportunities to enhance my employability.	4.09	0.86
I have received job offers or interview invitations from reputable engineering firms or organizations.	2.70	1.41
I am satisfied with the job prospects available to me as an engineering graduate.	3.27	1.43
I believe that my engineering diploma is valued and recognized by potential employers.	4.27	1.02
I have received job offers that align with my career goals and expectations.	3.15	1.45
I am satisfied with the salary and benefits offered to me as an engineering graduate.	2.56	1.49
I believe that my engineering education has given me a competitive edge in the job market.	3.44	1.43
Employability Skills	**3.57**	**0.68**

Technical Skills

The findings from Table 4 indicate that engineering graduates perceive themselves as highly proficient in a wide range of technical skills acquired through the technician training program, with an overall mean of 4.17 and a standard deviation of 0.61. Graduates reported strong competence in applying engineering techniques, analyzing designs, understanding engineering systems for business and management, and demonstrating discipline-specific proficiency. They also indicated the ability to apply technical knowledge in multidisciplinary settings, design and conduct experiments,

analyze data, and utilize modern engineering tools and software. In addition, respondents expressed confidence in assembling equipment, selecting appropriate tools, and using computer and information technologies effectively. These results suggest that the technician program effectively contributed to the acquisition of technical skills necessary for engineering practice and improved employability.

Table 4: Extent of Acquisition of Technical Skills through the Technician Program

	Mean	Std. Deviation
Able to use the necessary techniques for engineering practice	4.32	0.76
Analyze engineering design effectively	4.12	0.88
Demonstrate knowledge and understanding of engineering systems for management and business practices	4.25	0.74
Competent in a specific engineering discipline	4.37	0.64
Actively continue to acquire in-depth technical competence in a specific engineering discipline (electrical, highway, structure, etc	4.09	0.71
Apply technical skills in a specific engineering discipline effectively	4.29	0.70
Able to design and conduct experiments	4.14	0.82
Analyze and interpret data	4.33	0.87
Apply my knowledge in multidisciplinary engineering effectively	4.23	0.71
Effectively utilize the necessary skills for engineering practice	4.22	0.84
Proficiently use modern engineering tools and software	4.10	0.83
Able to assemble equipment following written directions	4.46	0.79
Able to select and use proper tools and equipment for a particular job/task	4.47	0.71
Ability to access, analyze, and apply skills and knowledge of science and engineering	4.15	0.78
Effectively use information technologies (computers, networks, and electronics)	3.94	1.05
Skilled in using computing technologies	4.06	0.82
Employ an engineering system approach	4.04	0.88
Technical skills	**4.17**	**0.61**

Correlation Analysis

The correlation findings in Table 5 indicated that there is a positive relationship between the acquisition of technical skills on the employability of engineering graduates, with r = 0.235 at a 0.000 level of significance. This indicates that graduates that demonstrated a high degree of hard or technical skills are likely to have better employability prospects. The findings suggest that graduates who have acquired hard or technical skills are more likely to secure employment, as these skills are directly applicable to the tasks and challenges, they will encounter in the engineering workplace. In line with the findings, Mesuwini & Bomani's (2021) emphasized the need for both technical (hard) and soft skills for sustainable employment opportunities while proposing a teaching approach that aligns with industry requirements. The study findings also resonate with Ubamadu

et al. (2022) who observed that in the globally competitive environment, technical skills are critical for employability. The study findings also corroborate with that of Mengistu and Negasie's (2022) which suggested that there is positive relationship between technical skills and employability, arguing that both technical and soft skills are essential for long-term work opportunities for engineering graduates. Similarly, Nugraha et al. (2019) provided a comprehensive list of both hard and soft skills, such as engineering skills, technological and information technology skills, along with soft skills like communication and problem-solving that are critical for employability. Olojuolawe and Fadila (2019) was also of the opinion that Electrical Technology college graduates must possess both hard and soft skills for them to succeed in the sector. Collectively, the extant literature highlights the critical role of both hard and soft skills in employability and also inherently support the study finding of a positive correlation between the acquisition of technical skills and the employability of engineering graduates from TVET institutions in Uasin Gishu County.

Table 5: Correlation Analysis for Technical skills and Employability of Engineering Graduate from TVET Institutions

		Employability skills	Technical skills
employability skills	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	224	
technical skills	Pearson Correlation	.235**	1
	Sig. (2-tailed)	0.000	
	N	224	224

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

6. Conclusion

Technical skills were found to enhance the employability prospects of engineering graduates from the TVET institutions. The acquisition of technical skills, such as the proficient use of modern engineering tools and engineering design analysis, emerged as a key factor in enhancing the marketability of these engineering graduates. Thus, the technical skills acquired were key to building a strong technical foundation, preparing the graduates to effectively navigate the demanding engineering field. This accentuates that continuous emphasis on technical skills development is integral to fostering competent and employable graduates from TVET institutions.

7. Recommendations

Given that the acquisition of technical skills positively contributes to the employability of engineering graduates, TVET institutions need to prioritize enhancement and acquisition of technical skills among engineering graduates. Specifically, the focus of these institutions should be on integrating theoretical knowledge with practical application through hands-on workshops, industry collaborations, and internships. Also, the curriculum must be continuously updated to align with the evolving demands and technologies in the engineering field. This will ensure that the graduates are well-versed in the current practices. Further, it is necessary to establish partnerships with local engineering firms in the region for practical training and mentorship programs so as to bridge the gap between academic training and real-world engineering challenges.

8. Further Research

The study's primary objective was to examine the influence of technical on the employability of engineering graduates from technical and vocational education and training institutions in Uasin Gishu County. Further research could focus on different counties or regions in Kenya to provide a broader perspective on the effectiveness and relevance of technician training programs. There is also a need for comparative studies on employers' views on the competence of engineering graduates from universities and TVET institutions to establish gaps in the technical training curriculum in the engineering field and ensure long-term employability trajectories of engineering graduates. It would also be beneficial to investigate the employers' satisfaction and the performance of these graduates over time.

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