

# **Industrial Attachment And Its Effect On Employability Of Diploma Graduates From Public Technical Institutes In Machakos County, Kenya**

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## **Abstract:**

Graduates of technical institutes in Kenya, particularly those from Machakos County, have a persistent gap between the skills they acquire and the demands of the job market. This has resulted in higher unemployment rates among the graduates despite the integration of industrial attachment into TVET diploma programs, which is expected to equip them with competencies to enhance their employability. Furthermore, there has been a scarcity of information on industrial attachment and its effect on the employability of these graduates. This study therefore investigated the effect of industrial attachment on the employability of diploma graduates from public technical institutes in Machakos County, Kenya. The study was guided by human capital theory and applied a mixed-method convergent parallel design. The target population comprised 347 graduates and 200 trainers and 3 principals, from which 175 graduates, 60 trainers and 3 principals were sampled. The technical training institutes were purposively sampled and then stratified into various departments. One graduate identified from each department was sought to help reach the rest through snowball sampling. The main research instrument was a questionnaire for graduates, while interview guides for trainers and principals were used to enhance triangulation. Quantitative data were analyzed descriptively using percentages, frequencies, means, and standard deviations, and inferentially using regression and correlation analysis with the aid of the Statistical Package for Social Sciences (SPSS). Qualitative data from interviews were transcribed, categorized into themes, and reported in narrative summaries. The findings revealed that industrial attachment significantly enhanced employability across all four dimensions. Hands-on technical skills had the strongest influence ( $\beta = .298$ ), as industrial attachment bridged the gap between theory and practice, improved technical proficiency, and increased job readiness. Professional development ( $\beta = .178$ ) enhanced employability through networking and career exposure, though limited by inadequate follow-up and awareness of professional associations. Industry-specific experience ( $\beta = .276$ ) provided authentic workplace exposure, fostering understanding of industry standards and quality practices. Communication competencies ( $\beta = .234$ ) improved active listening, empathy, and assertiveness, enhancing teamwork, workplace relationships, and confidence. Collectively, the four dimensions explained 69.9% of the variance in employability ( $R^2 = .699$ ), demonstrating a strong positive cumulative effect of industrial attachment. The study concluded that industrial attachment is a critical mechanism for developing employability skills and facilitating smooth transition from training to employment. It enhanced graduates' technical competence, professional maturity, and workplace adaptability, consistent with Human Capital theory. The study recommended that TVET institutions strengthen industry partnerships, improve supervision and placement processes, and integrate soft skills and professional development training. Industry partners should offer structured mentorship, provide diverse practical experiences, and collaborate in curriculum design. Government should standardize policies, support financing, and incentivize industry participation, while students should take proactive roles in maximizing learning and networking opportunities.

**Keywords:** Industrial Attachment, Employability, Diploma Graduates, Public Technical Institutes, Machakos County

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## **I. Introduction**

### **Background of the Study**

"Individuals' employability in a variety of industries is greatly influenced by Technical and Vocational Education and Training (TVET)" <sup>42</sup>. TVET being pragmatic in nature, it equips students with practical skills and real-world experience that enhance their marketability to employers <sup>46</sup>. TVET's primary focus is on the

study of technologies and allied sciences. It also strengthens the development of practical skills relevant to jobs in a variety of economic and social spheres<sup>47</sup>. According to empirical data, enrolling in TVET programs is positively correlated with increased employability rates<sup>42</sup>. The demand for qualified individuals is rising globally as the global economy continues to change.

TVET programs need industrial attachment, which is a crucial element aimed at giving students practical experience in their disciplines. It entails assigning students to relevant businesses or organizations for a predetermined amount of time. With the help of this experiential learning strategy, students can apply academic knowledge to real-world issues with practical abilities and become familiar with industrial procedures<sup>18</sup>. Graduate employability is positively impacted by industrial attachment. Research has demonstrated that students who participate in industrial attachment possess a greater likelihood of landing a job after graduation than their counterparts who lack this experience<sup>7</sup>.

Students can develop and hone technical skills, problem-solving techniques, and soft skills like communication, teamwork, and time management through industrial attachment<sup>36</sup>. Students are able to adjust to the demands of the workplace by working in real-world settings, which provide them with insights into industry trends, technology, and work culture<sup>31</sup>. Interaction with industry specialists is facilitated by industrial attachment, forming beneficial networks that may result in employment prospects<sup>34</sup>.

Students who participate in industrial attachments gain practical experience that enhances their confidence and self-worth, so better equipping them for the workforce<sup>32</sup>. Industrial attachment has many advantages, but it can also be ineffective due to issues like poor supervision, little opportunity, and programs that don't align with industry standards. To maximize the effect of industry attachment on graduate employability, TVET institutions and companies must work together to address these issues<sup>12</sup>.

Globally, industries rather than academic institutions determine TVET curricula in industrialized nations like Australia<sup>11</sup>. As a result, TVET programs have remained relevant and students are focused on industry demands. In Bangladesh, the gap between the skills that businesses need and the knowledge that TVE training programs impart is widening<sup>18</sup>. According to<sup>18</sup>, working together with industry is the only method to close the skills gap and increase the employability of TVET graduates in the nation.

Nigeria is a prime example of an African country where industrial attachment gives students real-world work experience. The interaction between the industry-based supervisor and the institution-based supervisor fostered by industrial attachment produced TVET graduates who were prepared for the workforce<sup>1</sup>. It was discovered in the state of Oromia that successful partnerships between the TVET sector and industry significantly enhance the employability skills that graduates of polytechnics acquire.<sup>1</sup> suggested that in addition to developing policy and strategy-supported incentive mechanisms for industries, the government should work to promote TVET-industry partnerships and educate other key stakeholders about the mutual benefits of such partnerships. Additionally, "the curriculum should be reviewed and updated to reflect the ever-evolving demands of the labor market"<sup>27</sup>. One strategy for helping graduates of "Technical and Vocational Education and Training programs in Uganda adjust to the workforce is to offer internships" or industrial attachment programs<sup>23</sup>.

According to<sup>17</sup> in addition to TVET's importance in closing the skills gap and increasing employability, by providing people with the necessary information and skills especially in developing nations like Kenya, it also opens doors to respectable employment and advances sustainable development<sup>17</sup>. There is a mismatch between graduate capabilities and employer requirements, raising concerns about the quality and applicability of TVET programs<sup>50</sup>. Kenya is aware of how crucial TVET is to promoting economic growth and employability. Session Paper No. 10 of 2016 on Revitalizing Technical and Vocational Education and Training (TVET) for Socio-economic Transformation highlights the need of using Competency Based Training (CBT) to give graduates information, skills, and attitudes that are relevant to the business<sup>16</sup>. It also describes the frameworks for diploma programs and how the learning objectives match the demands of the job market. Therefore, encouraging cooperation between educational institutions and business to advance work-based learning, internships, and apprenticeships will increase employability.

In order to increase the mobility and competitiveness of graduates, the Kenya National Qualifications Framework (KNQF) creates a nationwide standard for comparing and recognizing abilities obtained through TVET<sup>16</sup>. Based on expectations for knowledge, abilities, and application (competency), the framework establishes standards for graduation levels. As such, it facilitates the transferability of qualifications between industries and nations, hence augmenting the employability of graduates<sup>22</sup>. The Kenyan legal framework governing TVET provision is established by the<sup>44</sup>. It requires quality control procedures to guarantee that graduates have knowledge and abilities that are applicable to the industry. In turn, this encourages collaborations between educational institutions, business, and local communities to improve the employability and marketability of graduates.

According to<sup>2</sup>, "businesses should help TVET institutions by offering industrial attachment programs for TVET teachers." These programs are a form of professional development that influence students' acquisition

of employable skills<sup>2</sup>. TVET is regarded by the Kenyan government as a vital route to economic development, as stated in the Skills Development Act (2006) and Vision 2030. Studies like those by <sup>21, 40</sup>, however, raise issues with the mismatch between TVET programs and industry demands, which has an effect on the employability of graduates. Industrial collaborations are thought to be a viable remedy, according to research by <sup>35</sup>. It's common knowledge that practical training is important. Research by <sup>3</sup> highlight the benefits of developing practical skills for TVET graduates' employability, but also raise questions about how sufficient the possibilities for practical training are in various TVET programs.

Technical and Vocational Education and Training (TVET) provides hands-on and practical training that bridges the gap between education and employment, equipping individuals for direct job placement or additional study <sup>50</sup>. This is especially important in Kenya, where a sizable portion of the youth population looks for work <sup>29</sup>. Numerous studies cast doubt on TVET graduates' employment in Kenya, despite their promise. <sup>48</sup> highlighted “a mismatch between the skills offered by TVET colleges and the expectations of the industry”. Furthermore, impeding graduate employment include restricted industrial linkages and insufficient infrastructure <sup>30</sup>.

One of the main obstacles to youth employment in Kenya is the mismatch in skills, the hunt for white-collar professions, and the lack of training for the present and future labor markets, especially in technical domains like roads, water, energy, agriculture, and ICT. In contrast to higher education, TVET is perceived by Kenyan youth as being less competitive. There is a sizable disparity between the training provided in engineering courses at TVET institutions and the skills needed by industry, despite efforts to revitalize TVET education in Kenya and developing nations generally.

This discrepancy has partially contributed to the rise in youth unemployment in Kenya <sup>45</sup>. According to research by <sup>20</sup>, “technician engineering graduates from Thika Technical Training Institute and Meru Technical Training Institute, respectively, who studied mechanical and construction engineering, said the training procedure was awful.” Additionally, there is very little industry participation in Technician Engineering Training (T.E.T.) <sup>20</sup>.

In Machakos County there are six Public Technical Institutes offering Diploma in Technical Vocational Education and Training. These are: Katine Technical Training Institute, Masinga Technical and Vocational College, Machakos Technical Institute for the Blind, Mwala Technical and Vocational College, Yatta Technical and Vocational College and Machakos Town Technical and Vocational College. Out of the six three are new; Machakos town TVC had their first cohort being admitted in January 2024, Yatta TVC had their first cohort being admitted in May 2024 while Mwala TVC had their first cohort being admitted in September 2021 and expecting their first graduands in September 2024.

There is inadequacy of data regarding employment status of diploma graduates from technical institutions in Machakos county in Kenya. This therefore calls for a study on effect of industrial attachment on employability of diploma graduates from public technical institutes in Machakos county, Kenya. The key variables in this study are; industrial attachment which is the independent variable which refers to practical training period that TVET diploma graduates undertake in industries or organizations related to their field of study and employability which is the dependent variable which refers to the ability of TVET diploma graduate to secure and maintain gainful employment. It also includes the Time taken before employment. The potential intervening variables are employer perception of industrial attachment and economic conditions. The perception of employers on value of industrial attachments and the quality of graduates from public technical institutes can affect hiring decisions. The overall economic climate and job market conditions in Kenya can influence the demand for graduates and their employment prospects. By examining industrial attachment and its effect on employability, this study aims to understand how practical work experience can contribute to success of diploma graduates in Machakos county, Kenya.

### **Statement of the Problem**

Industrial attachment serves as crucial bridge between theoretical knowledge gained in TVET institutions and application of practical experience in real-world work environments. Technical expertise is the cornerstone for achieving industrial transformation in line with Kenya's Vision 2030. TVET's main objective is to create sufficient number of competent craftsmen, technologists, artisans and technicians at all levels of the economy through acquisition of practical experience in their disciplines. Employability is therefore enhanced by promoting cooperation between training institutions and industry to enhance work-based education, internships and apprenticeships. Industrial attachment is very crucial in improving the employability of diploma graduates by developing useful abilities such as hands-on experience, industry-specific knowledge and problem-solving abilities.

However, graduates of Technical Institutes in Kenya particularly those from Machakos county seem to have a persistent gap between the skills they acquired and demands of the job market. This has resulted to higher unemployment rates among the graduates. This is despite the integration of industrial attachment into

Technical, Vocational, Education and Training diploma programs. Despite the emphasis on practical skills development, there is dearth of empirical evidence on the effect of industrial attachment on employability of diploma graduates from public technical institutes in Machakos county, Kenya. Thus, the reason why the study on industrial attachment and its effect on employability of diploma graduates from public technical institutes in Machakos county, Kenya is significant.

### **Objective of the Study**

The objective of this study was to investigate the effect of industrial attachment on employability of diploma graduates from public Technical Institutes in Machakos county, Kenya in an attempt to proposing how industrial attachment can be leveraged to enhance employability of graduates from technical institutes.

### **Significance of the Study**

This study was beneficial to stakeholders in the education sector in terms of preparing graduates for work.

- i. The findings majorly constitute an evaluation of industrial attachment programs at public technical institutes. By identifying the specific ways in which attachments contributed to employability, the research helped improve the design, implementation, and assessment of these programs.
- ii. The study contributes to broader impact assessments of technical education in Kenya. By demonstrating the link between industrial attachments and graduate employment outcomes, it provided evidence of the effectiveness of investing in this type of work-integrated learning.
- iii. By identifying the strengths and weaknesses of TVET diploma programmes in relation to the role of industrial attachment on employability, the study offers recommendations to technical institutes that helped improve the effectiveness of these programmes in preparing graduates for the workforce. This, in turn, enhanced the employability of individuals completing TVET diploma courses.
- iv. It also contributes valuable insights for policymakers, educators, and other stakeholders to enhance TVET programmes, align them with industry needs, and improve graduates' chances in the job market.

### **Theoretical Framework of the Study**

The theoretical framework was derived from existing theories relevant to the study. This research was anchored on Human Capital Theory, which provided a conceptual basis for linking education and training to employability outcomes. The Human Capital Theory, developed by Gary Becker and Theodore Schultz in 1964, emphasized how individuals' professional capabilities were positively impacted by education and training, enhancing productivity and efficiency<sup>5</sup>. The theory argued that investment in human capital—through education, workplace training, communication, and problem-solving skills—resulted in higher output, financial gains, and organizational growth<sup>6,13</sup>. The foundation of the theory was the idea that a population's productivity could be improved through formal education. It proposed that societies with higher levels of education were more productive. Investing in employees' education and training was believed to increase their productivity and value to the firm and economy. Such investments could take the form of formal education, on-the-job training, apprenticeships, and professional development.

According to<sup>49</sup>, investment in human capital was as valuable as material wealth, and integrating the concept into educational systems was essential for promoting social and economic growth.<sup>4</sup> further argued that education contributed to economic development by increasing labour force productivity. In relation to this study, Human Capital Theory provided a useful lens for examining how industrial attachment functioned as an investment in human capital. The theory supported the idea that practical work experience gained through industrial attachment enhanced graduates' skills, knowledge, and employability.

### **Literature Review and Research Gaps**

The most prevalent linkage between Kenyan industry and TVET institutes, according to research on the subject, is industrial attachment. The primary obstacles to establishing industry-TVET links are the industries' lack of response and the TVET institutions' lack of effort. Relevant practical skills for industrialization were made available when industries and TVET institutions collaborate effectively<sup>26</sup>. This study does not however, describe the hands-on practical skills that influence the employability of TVET diploma graduates.

It is appropriate for trainees to communicate with one another. They however, get to interact with people who have a variety of abilities and competences the instant they go out for industrial attachment. This aids in the practice and imitation of skills adapted from them by trainees. When it comes to sharing knowledge, a student's relationship with another student is not the same as that of a student with skilled personnel. In the former case, trainees engaged and shared knowledge with each other while in the latter trainees engaged and shared knowledge with skilled personnel who offered a variety of competencies that the students could choose from to improve their career practice<sup>31</sup>. This study doesn't specifically provide information on the most

successful professional development during industrial attachment and how it affects TVET Diploma graduates' employability.

A skill becomes perfect with repeated practice, and successful people have distinctive practical skills in a particular area that set them apart from their peers. <sup>14, 15</sup> note that the government has been supporting and facilitating the acquiring these abilities through TVET programs to improve productivity and accelerate the economy. Enhancing manufacturing abilities, gaining access to financing, expediting processes, and generally raising living standards are some advantages gained from practical experience in the manufacturing sector <sup>9</sup>.

For Kenya's TVET institutions to grow, partnerships are essential. Numerous benefits result from these institutions' partnerships with the corporate sector. The TVET institutions, staff, students, partner communities, industries, and the general public all benefit from this form of association. A "win-win" scenario is produced when the public and private sectors work together since the latter can use the former and their trainers to teach and retrain their employees. Conversely, TVET colleges have the ability to offer practicum opportunities to their trainees, which allows them to get practical experience and occupational skills that will make them stand out when applying for jobs. Stakeholders' main concern has been the declining quality of several TVET institutions, which were formerly at the forefront of producing skilled labor. Some of the difficulties these institutions have faced can be linked to outdated equipment and a dearth of opportunities for trainees to hone the skills they have learned in their particular schools. Therefore, by working together, these institutions and the commercial sector can give trainees the chance to apply what they have learned, as well as give them access to cutting-edge technology that helps them stay up to date on current events. Additionally, some of these institutions' initiatives to upgrade their infrastructure for the benefit of their trainers, trainees, and the areas in which they are located may be funded by the private sector. Results show that Graduates ought to have communication skills collaborate effectively in groups, as well as be flexible enough to adjust to various work settings and individuals. Employers look for graduates who can solve problems independently, have self-assurance, and make sound judgments. Additionally, they respected originality and inventiveness <sup>3</sup>.

The above study does not capture communication competencies such as reading, writing, speaking, listening and mathematics during industrial attachment and how they influence employability of TVET diploma graduates. Furthermore, indicators such as active listening, empathy and assertiveness are not well highlighted.

In summary the reviewed literature consistently emphasizes the positive association between the hands-on practical skills development during industrial attachment, professional development during industrial attachment, industry-specific experience during industrial attachment and communication competencies during industrial attachment highlighting instrumental role of TVET in preparing graduates for successful entry into the workforce.

There is however no clarity on effect of industrial attachment on employability of diploma graduates from public technical institutes in Machakos county, Kenya in the recent years especially in Katine Technical Training Institute, Machakos Technical Institute for the Blind and Masinga Technical and Vocational College. The current study intended to fill this gap.

**Table 1.1: Research Gaps**

Author	Study	Findings	Research gap
<sup>31</sup>	Interrogated how industrial attachment experience helps trainees in TVET colleges in Nairobi County build their employability abilities	Industrial attachment enhances psychomotor abilities, which are critical for trainees in TVET	Apart from psychomotor skills, this study did not identify any additional practical abilities needed to improve the employability of TVET diploma holders. Theory of acquisition was utilized unlike in the current study where human capital will be used. (theoretical gap)
<sup>43</sup>	Established Rwandan TVET Graduates' Competences and Employability with their Potential Employers' Satisfaction	social capital/ social networks have a vital part in the graduates' chances of employment in the new job search mechanisms	This study does not indicate the most successful professional development during industrial attachment and how it affects TVET Diploma graduates' employability (empirical gap).
<sup>8</sup>	Evaluated second-year students' competency in technical courses	Industrial attachments were fostered in TVET institutions as a strategy to enhance students' acquisition of relevant practical skills.	This study does not capture the industrial relevant experiences which are attractive to employers of TVET diploma graduates in industries particularly those in Kenya (empirical gap)
<sup>3</sup>	Assessed benefits that result from TVET institutions' partnerships with the corporate sector	Graduates acquire communication skills and collaborate effectively in groups, are flexible enough to adjust to various work settings and individuals.	This study does not capture Communication Competencies During Industrial Attachment and how they influence employability of TVET diploma graduates (conceptual gap)

## II. Research Methodology

### Research Design

<sup>28</sup> defined research design as the methodology of carrying out a study. <sup>25</sup> stated that the purpose of research design was to arrange the parameters for data collection and analysis in a way that struck a balance between procedural efficiency and relevance to the study goal. This study employed a mixed research methodology. The researcher used the mixed-method convergent parallel design. Quantitative and qualitative data were collected at the same time. Results were compared and combined during interpretation. Quantitative data were collected to assess the overall impact of industrial attachment on employability, while qualitative data were collected to explain or elaborate on the quantitative findings. For this study, quantitative data established the general trend—whether industrial attachment had a positive effect on employability metrics—while qualitative data provided context and depth, explaining why industrial attachment had this effect, what specific skills and experiences gained during attachment were most valuable to employers, and what graduates’ perspectives were on the connection between attachment and their career outcomes.

### Study variables

Variables were defined as features of cases measured or recorded <sup>24</sup>. A variable was a property that could vary from one element to another or evolve over time <sup>19</sup>. Three types of variables were considered in the study: independent, dependent, and intervening variables. The independent variable was industrial attachment, while the dependent variable was employability of TVET diploma graduates. The industrial attachment variables included hands-on practical skills development, professional development, industry-specific experience, and communication competencies. Some of the intervening variables were employer perception of industrial attachment and prevailing economic conditions.

### Location of Study

The research was conducted among diploma graduates of Katine TTI, Masinga TVC, and Machakos Technical Institute for the Blind in Machakos County, Kenya. Machakos County shares borders with Embu to the north, Kitui to the east, Makueni to the south, Kajiado to the west, Murang’a and Kirinyaga to the northwest, and Nairobi and Kiambu counties to the west <sup>33</sup>. The county’s diverse industries offered a variety of attachment opportunities, ensuring that graduates were exposed to different work environments. There had been limited research specifically examining industrial attachment and its effect on employability of diploma graduates from public technical institutes in Machakos County, making this study a valuable contribution to local knowledge and program evaluation.

### Target Population of the Study

Target population is the entire collection of items from which inferences are made <sup>10</sup>. The target population referred to the entire set of people or things to which the researcher intended to apply the findings <sup>37</sup>. The target population for this investigation comprised 347 graduates from Katine TTI, Masinga TVC, and Machakos Technical Institute for the Blind who had graduated in the years 2022 and 2023, and 200 trainers and 3 principals from the same institutions. This selection was based on <sup>38</sup> recommendation that homogeneity and increased validity and reliability be ensured by selecting recent graduates who had completed their studies within a two-year window. Lists provided by the institutions served as the foundation for identifying the graduates. However, since “Where are they now” lists might have changed over time, a short time limit was adopted to enhance accuracy. Diploma holders were targeted since they possessed relevant knowledge and skills required in the labor market.

**Table 2.1: Target Population**

Category	Target population
Graduates from Masinga TVC	116
Graduates from Katine TTI	117
Graduates from Machakos technical institute for the blind	114
Trainers from the three institutes	200
Principals from the three institutes	3
<b>Total</b>	<b>550</b>

Source: Masinga TVC, Katine TTI and Machakos technical institute for the blind registrars’ office

### Sampling Techniques and Sample Size

A sample size, according to <sup>39</sup>, consists of individuals, objects, or events selected as representatives of the entire population. <sup>38</sup> stated that a sample size of 30% was sufficient for representativeness in follow-up surveys. The sample size for diploma graduates was 50% of the target population in each stratum, resulting in 175 diploma holders. A sample of 60 trainers was used, representing 30% of the trainers while the 3 principals

were included in the study. The study utilized purposive, stratified, and snowball sampling procedures. Katine TTI, Masinga TVC, and Machakos Technical Institute for the Blind and their Principals were purposively selected. Stratified sampling was used to represent the eight areas of specialization: Electrical, Mechanical, Civil Engineering, Fashion Design, Business Studies, ICT, Agriculture, and Liberal Studies.

“In cases where the population is heterogeneous, stratified random sampling is a helpful technique for gathering data. This method divides the whole diverse population into several homogeneous groupings, called strata, each of which is homogeneous within itself. Units are then randomly picked from each stratum”<sup>41</sup>. “The relative relevance of each stratum in the population determines the sample size for each stratum”<sup>41</sup>. One graduate from each specialty area was chosen from the lists of contacts left at the institution for snowball sampling, and this individual was contacted then served as a conduit for additional respondents to supply the data.

**Table 2.2: Sampling Technique and Sample Size**

Category	Target population	Sample Size
Electrical engineering Graduates	33	17
Mechanical Engineering Graduates	31	16
Civil Engineering Graduates	32	16
Fashion design graduates	53	27
Business studies graduates	50	25
ICT graduates	48	24
Agriculture graduates	50	25
Liberal studies graduates	50	25
<b>Sub-total (Graduates)</b>	<b>347</b>	<b>175</b>
Trainers	200	60
Principals	3	3
<b>Total</b>	<b>550</b>	<b>238</b>

Source (Self, 2025)

### Data Analysis

After the data had been gathered, the questionnaires were coded and entered into the Statistical Packages for Social Scientists (SPSS version 27). Data was cleaned and analyzed using descriptive and inferential statistics. Descriptive statistics include the mean, standard deviation, percentages and frequency. Correlation analysis and Multiple Regression were used as inferential statistics to assess the strength of the association between the technical training industrial attachment and the employability of graduates from technical and vocational training institutions in Machakos County.

The regression model be utilized was:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon$$

Where:

Y=Employability of TVET Diploma graduates

X<sub>1</sub>= Practical skills development

X<sub>2</sub>= Professional development

X<sub>3</sub>= Industrial relevant experience

X<sub>4</sub>= Communication competencies

β<sub>0</sub> is Constant term

β<sub>1</sub>, β<sub>2</sub>, β<sub>3</sub> and β<sub>4</sub> are regression coefficients that explain the quantity via which dependent variable gets altered in each unit alteration of independent variable.

ε = is the error term to capture unsolved variations in the model and which is presumed to be typically dispersed through mean zero besides constant variance.

Qualitative data from interviews were transcribed, categorized into themes and reported in narrative summaries.

### III. Data Analysis, Interpretation And Discussion Of Findings

#### Response Rate

The study sampled 238 respondents comprising 175 TVET diploma graduates, 60 TVET trainers, and 3 principals from three public technical institutes in Machakos County. Out of the 175 questionnaires distributed to TVET diploma graduates, 163 were properly filled and returned, representing a response rate of 93.1%. For the TVET trainers, 49 out of 60 participated in the interviews, representing a response rate of 81.7%. All three principals (100%) participated in the interviews. The overall response rate was 90.3% (215 out of 238 respondents). According to<sup>28</sup>, a response rate of 70% and above is excellent for analysis and reporting. Therefore, the response rate achieved in this study was considered adequate for drawing valid conclusions.

**Table 3.3: Response Rate**

Category	Sample Population	Actual Response	Response Rate (%)
TVET Diploma Graduates	175	163	93.1
TVET Trainers	60	49	81.7
Principals	3	3	100.0
<b>Total</b>	<b>238</b>	<b>215</b>	<b>90.3</b>

Source: Field Data (2025)

The high response rate from diploma graduates (93.1%) was attributed to the researcher's personal follow-up and the relevance of the study to the respondents' experiences. The high response rate from trainers (81.7%) ensured rich and detailed information was provided. The 100% response rate from principals demonstrated their commitment to research and institutional improvement.

Overall, the background information indicates that both TVET trainers and principals in Machakos County are well-qualified and experienced, with substantial involvement in student industrial attachment programs. Among trainers, the majority possess at least a diploma-level qualification and have several years of experience supervising students, underscoring their capability to provide meaningful guidance during industrial attachments. Principals bring strategic oversight, ensuring that institutional policies and program structures support student employability outcomes. Collectively, these characteristics provide a solid foundation for understanding the implementation and impact of industrial attachment programs in the region.

### Overall Employability Skills Acquired During Industrial Attachment

Beyond the four specific research objectives, the study also examined respondents' perceptions of overall employability skills acquired during industrial attachment. This section presented findings on how industrial attachment enhanced various employability skills and overall employability. The results are presented in Table 3.2.

**Table 3.4: Overall Employability Skills Acquired During Industrial Attachment**

Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	SD
Industrial attachment enhanced my communication skills (speaking, listening, reading, writing, and reporting)	48.5	36.8	9.2	3.7	1.8	4.27	0.90
Industrial attachment enhanced my thinking skills (creative thinking, problem-solving, decision-making, and learning how to learn)	50.3	35.6	8.6	3.7	1.8	4.30	0.89
Industrial attachment enhanced my interpersonal skills (teamwork, leadership, service, negotiation, and working with diversity)	49.1	36.2	9.2	3.7	1.8	4.29	0.89
Industrial attachment enhanced my technology skills (computer skills, internet use, operation of tools/equipment, and minor maintenance)	51.5	34.4	8.6	3.7	1.8	4.32	0.89
Industrial attachment enhanced my planning and resource management skills (time, finance, materials/facilities, and human resources)	47.2	37.4	9.8	3.7	1.8	4.26	0.90
Industrial attachment enhanced my personal qualities (self-esteem, responsibility, sociability, and self-management)	50.9	35.0	8.6	3.7	1.8	4.31	0.89
Overall, industrial attachment significantly improved my employability	54.0	33.7	7.4	3.1	1.8	4.35	0.88
I would recommend industrial attachment to other TVET students as essential for employability	56.4	32.5	6.7	2.5	1.8	4.39	0.86
<b>Overall Mean</b>						<b>4.31</b>	<b>0.77</b>

Source: Field Data (2025)

The findings in Table 3.2 reveal that respondents strongly agreed that industrial attachment enhanced various employability skills, with an overall mean score of 4.31 (SD=0.77). The highest-rated statement was "I would recommend industrial attachment to other TVET students as essential for employability" (M=4.39, SD=0.86), with 88.9% of respondents agreeing or strongly agreeing. This overwhelming endorsement demonstrates that respondents valued their industrial attachment experiences and recognized their importance for employability.

The statement "Overall, industrial attachment significantly improved my employability" also received strong agreement (M=4.35, SD=0.88), with 87.7% of respondents agreeing or strongly agreeing. This finding provided direct evidence that industrial attachment enhanced employability from the perspective of TVET diploma graduates themselves.

Among specific employability skills, technology skills received the highest mean score (M=4.32, SD=0.89), with 85.9% agreement. This was followed by personal qualities (M=4.31, SD=0.89), thinking skills

(M=4.30, SD=0.89), interpersonal skills (M=4.29, SD=0.89), communication skills (M=4.27, SD=0.90), and planning and resource management skills (M=4.26, SD=0.90). All six categories of employability skills received mean scores above 4.25, indicating that industrial attachment had comprehensive positive effects across multiple dimensions of employability.

The high rating of technology skills was particularly noteworthy, as it reflected the increasing importance of digital literacy and technological competence in modern workplaces. Industrial attachment exposed students to industry-standard technology, software, and equipment that enhanced their technological capabilities.

The qualitative data provided additional insights into overall employability enhancement. One Principal (Principal 1) explained: “Industrial attachment is transformative for our students. They enter attachment as students with theoretical knowledge, and they emerge as professionals with practical competence, workplace awareness, and employability skills. The transformation is comprehensive-it affects not just their technical skills but also their communication, interpersonal abilities, work ethics, and professional confidence.”

A Trainer (Trainer 1) added: “When we assess students before and after industrial attachment, we see improvements across all dimensions of employability. They become better communicators, more confident problem-solvers, more effective team members, and more technologically proficient. Most importantly, they develop a professional identity and understand what it means to be a working professional in their field.”

Respondents’ open-ended comments provided rich insights into the overall enhancement of employability through industrial attachment. When asked to identify the three most valuable skills or experiences gained, graduates highlighted a broad spectrum of benefits. Many emphasized technical skills and practical experience, noting the value of hands-on engagement with industry-standard equipment, the practical application of theoretical knowledge, and exposure to real-world projects and challenges. Others focused on professional development, including the opportunity to build networks, understand workplace culture, and cultivate professional ethics aligned with industry standards and best practices.

Equally important were communication and interpersonal skills, with respondents reporting improved teamwork, the ability to interact effectively with diverse groups, and increased confidence in professional communication. Problem-solving and critical thinking also emerged as key themes, as participants described learning to address real-world technical issues, make informed decisions, troubleshoot effectively, and perform under pressure. Finally, respondents reflected on significant personal growth, citing increased self-confidence, greater professional maturity, clearer career goals, and enhanced adaptability and resilience.

Overall, these responses illustrate that industrial attachment fosters multifaceted employability outcomes—strengthening not only technical and communication abilities but also broader professional competencies, personal attributes, and readiness for the demands of the workplace.

**Correlation Analysis**

To examine the relationships between the independent variables (hands-on technical skills, professional development, industry-specific experience, and communication competencies) and the dependent variable (employability), Pearson correlation analysis was conducted. The results are presented in Table 3.3.

**Table 3.5: Correlation Matrix**

Variable	1	2	3	4	5
1. Employability	1				
2. Hands-on Technical Skills	.742**	1			
3. Professional Development	.658**	.621**	1		
4. Industry-Specific Experience	.731**	.698**	.643**	1	
5. Communication Competencies	.695**	.634**	.672**	.681**	1

Note: \*\*indicates statistical significance at 1% level of significance (p < .01)

Source: Field Data (2025)

The correlation analysis revealed that all four independent variables had strong, positive, and statistically significant correlations with employability (p < .01). Hands-on technical skills had the strongest correlation with employability (r = .742, p < .01), followed by industry-specific experience (r = .731, p < .01), communication competencies (r = .695, p < .01), and professional development (r = .658, p < .01).

These correlation coefficients indicated that:

1. Hands-on technical skills had a strong positive relationship with employability, suggesting that graduates who developed higher levels of technical skills during attachment were more likely to be employable.
2. Industry-specific experience also had a strong positive relationship with employability, indicating that graduates who gained more meaningful industry experience during attachment had better employment outcomes.

3. Communication competencies had a strong positive relationship with employability, demonstrating that graduates who developed better communication skills during attachment were more employable.
4. Professional development had a moderately strong positive relationship with employability, suggesting that graduates who engaged in more professional development activities during attachment had better employment prospects.

The correlation matrix also revealed significant positive correlations among the independent variables themselves, ranging from  $r = .621$  to  $r = .698$ . This suggested that these dimensions of industrial attachment experience were interrelated—students who gained strong technical skills also tended to develop communication competencies, gain industry experience, and engage in professional development. This interconnectedness reflected the holistic nature of industrial attachment as a learning experience.

However, the correlation coefficients among independent variables were not excessively high (all below .70), indicating that multicollinearity was not a serious concern for regression analysis. Each independent variable captured distinct aspects of industrial attachment experience that contributed uniquely to employability.

### Regression Analysis

To determine the combined effect of the four independent variables on employability multiple regression analysis was conducted. The regression model applied was:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

Where:

- Y = Employability of TVET Diploma graduates
- X<sub>1</sub> = Hands-on technical skills
- X<sub>2</sub> = Professional development
- X<sub>3</sub> = Industry-specific experience
- X<sub>4</sub> = Communication competencies
- β<sub>0</sub> = Constant term
- β<sub>1</sub>, β<sub>2</sub>, β<sub>3</sub>, β<sub>4</sub> = Regression coefficients
- ε = Error term

### Model Summary

The model summary presented the overall fit of the regression model. The results are presented in Table 3.4.

**Table 3.6: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.836	.699	.691	.38542

Source: Field Data (2025)

The model summary showed that the four independent variables (hands-on technical skills, professional development, industry-specific experience, and communication competencies) collectively explained 69.9% of the variance in employability ( $R^2 = .699$ ). The adjusted  $R^2$  value of .691 indicated that the model remained robust even after adjusting for the number of predictors and sample size.

The multiple correlation coefficient ( $R = .836$ ) indicated a strong positive relationship between the combined independent variables and employability. This suggested that industrial attachment experiences, as measured by the four dimensions, had a substantial effect on graduate employability.

The standard error of the estimate (.38542) was relatively small, indicating that the model's predictions were reasonably accurate. Overall, the model summary demonstrated that the regression model was a good fit for the data and that the independent variables were strong predictors of employability.

### Analysis of Variance (ANOVA)

The ANOVA table tested whether the regression model was statistically significant. The results were presented in Table 3.5.

**Table 3.7: ANOVA**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	54.782	4	13.696	92.186	.000 <sup>b</sup>
Residual	23.476	158	.149		
Total	78.258	162			

a. Dependent Variable: Employability

b. Predictors: (Constant), Communication Competencies, Professional Development, Hands-on Technical Skills, Industry-Specific Experience

Source: Field Data (2025)

The ANOVA results showed that the regression model was statistically significant ( $F(4, 158) = 92.186, p < .001$ ). This indicated that the independent variables collectively had a significant effect on employability. The very low p-value ( $p < .001$ ) provided strong evidence that the relationship between industrial attachment experiences and employability was not due to chance.

The F-statistic of 92.186 was substantially larger than the critical F-value at the .05 significance level, further confirming the model's statistical significance. This meant that at least one of the independent variables had a significant effect on employability.

**Regression Coefficients**

The regression coefficients table presented the individual contribution of each independent variable to employability. The results were presented in Table 3.6.

**Table 3.8: Regression Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.487	0.215		2.265	.025
Hands-on Technical Skills	0.312	0.068	.298	4.588	.000
Professional Development	0.186	0.059	.178	3.153	.002
Industry-Specific Experience	0.289	0.071	.276	4.070	.000
Communication Competencies	0.245	0.064	.234	3.828	.000

c. Dependent Variable: Employability

Source: Field Data (2025)

The regression coefficients revealed that all four independent variables had statistically significant positive effects on employability ( $p < .05$ ). The regression equation was:

$$Y = 0.487 + 0.312X_1 + 0.186X_2 + 0.289X_3 + 0.245X_4$$

Where:

- Y = Employability
- X<sub>1</sub> = Hands-on Technical Skills
- X<sub>2</sub> = Professional Development
- X<sub>3</sub> = Industry-Specific Experience
- X<sub>4</sub> = Communication Competencies

**Interpretation of Regression Coefficients:**

Hands-on Technical Skills ( $\beta = 0.312, t = 4.588, p < .001$ ): This variable had the strongest effect on employability among the four predictors. The positive coefficient indicated that for every one-unit increase in hands-on technical skills developed during industrial attachment, employability increased by 0.312 units, holding other variables constant. The standardized coefficient (Beta = .298) indicated that hands-on technical skills contributed 29.8% of the explained variance in employability when controlling for other variables. The t-value of 4.588 and p-value less than .001 confirmed that this effect was highly statistically significant.

Industry-Specific Experience ( $\beta = 0.289, t = 4.070, p < .001$ ): This variable had the second strongest effect on employability. The positive coefficient indicated that for every one-unit increase in industry-specific experience gained during industrial attachment, employability increased by 0.289 units, holding other variables constant. The standardized coefficient (Beta = .276) indicated that industry-specific experience contributed 27.6% of the explained variance in employability. The t-value of 4.070 and p-value less than .001 confirmed that this effect was highly statistically significant.

Communication Competencies ( $\beta = 0.245, t = 3.828, p < .001$ ): This variable had the third strongest effect on employability. The positive coefficient indicated that for every one-unit increase in communication competencies acquired during industrial attachment, employability increased by 0.245 units, holding other variables constant. The standardized coefficient (Beta = .234) indicated that communication competencies contributed 23.4% of the explained variance in employability. The t-value of 3.828 and p-value less than .001 confirmed that this effect was highly statistically significant.

Professional Development ( $\beta = 0.186, t = 3.153, p = .002$ ): This variable had the smallest but still significant effect on employability among the four predictors. The positive coefficient indicated that for every one-unit increase in professional development gained during industrial attachment, employability increased by 0.186 units, holding other variables constant. The standardized coefficient (Beta = .178) indicated that professional development contributed 17.8% of the explained variance in employability. The t-value of 3.153 and p-value of .002 confirmed that this effect was statistically significant.

Constant ( $\beta_0 = 0.487$ ,  $t = 2.265$ ,  $p = .025$ ): The constant term was statistically significant, indicating that there was a baseline level of employability (0.487) when all independent variables were zero. However, this interpretation had limited practical meaning since it was unlikely that graduates would have zero levels of all four variables after completing industrial attachment.

### **Discussion of Findings**

This section discussed the study's findings in relation to existing literature, theoretical frameworks, and the Kenyan TVET context. The discussion was organized according to the four research objectives.

The regression analysis revealed that the four dimensions of industrial attachment experience collectively explained 69.9% of the variance in employability ( $R^2 = .699$ ,  $F(4, 158) = 92.186$ ,  $p < .001$ ). This finding provided strong statistical evidence that industrial attachment significantly enhanced the employability of TVET diploma graduates from Machakos County, Kenya.

The finding that hands-on technical skills had the strongest effect ( $\beta = .298$ ), followed by industry-specific experience ( $\beta = .276$ ), communication competencies ( $\beta = .234$ ), and professional development ( $\beta = .178$ ), suggested that while technical competence was most critical for employability, soft skills and professional development also made important contributions. This finding aligned with the holistic nature of employability, which encompassed not just technical skills but also communication abilities, professional networks, workplace socialization, and personal qualities.

The high overall mean score for employability skills acquired during industrial attachment ( $M = 4.31$ ) and the finding that 87.7% of respondents agreed that industrial attachment significantly improved their employability provided direct evidence of industrial attachment's effectiveness from the perspective of graduates themselves. The overwhelming endorsement of industrial attachment (88.9% would recommend it to other TVET students) further validated its importance for employability.

The finding that 74.2% of respondents were either employed or self-employed, with 60.1% working in fields related to their TVET programmes, suggested relatively positive employment outcomes for TVET diploma graduates from Machakos County who had completed industrial attachment. The finding that 84.4% of employed respondents secured jobs within six months of graduation, with 53.3% finding employment within three months, indicated that industrial attachment facilitated rapid transition from education to employment.

These employment outcomes were better than the national youth unemployment rate of approximately 26% (Kenya National Bureau of Statistics, 2023), suggesting that TVET diploma graduates with industrial attachment experience had better employment prospects compared to the general youth population. This finding provided empirical support for government policies promoting TVET education and industrial attachment as strategies for addressing youth unemployment in Kenya.

The study's findings aligned with the Human Capital Theory's proposition that investments in education and training enhanced individuals' productive capacities and labor market outcomes. Industrial attachment represented such an investment, providing students with technical skills, industry experience, professional networks, and communication competencies that increased their human capital and, consequently, their employability and earning potential.

The study's findings had important implications for TVET policy and practice in Kenya. First, they provided empirical evidence supporting the continuation and expansion of industrial attachment as a core component of TVET programmes. Second, they highlighted specific dimensions of industrial attachment (hands-on technical skills, professional development, industry-specific experience, and communication competencies) that should be emphasized in programme design and implementation.

## **IV. Summary Of Findings, Conclusions, And Recommendations**

### **Overall Effect of Industrial Attachment on Employability**

Beyond the four specific research objectives, the study examined the overall effect of industrial attachment on employability by analyzing how the four dimensions collectively influenced employment outcomes. The findings revealed that industrial attachment had a comprehensive and significant positive effect on employability.

**Collective Effect of Industrial Attachment Dimensions:** Multiple regression analysis revealed that the four dimensions of industrial attachment experience (hands-on technical skills, professional development, industry-specific experience, and communication competencies) collectively explained 69.9% of the variance in employability ( $R^2 = .699$ ,  $F(4, 158) = 92.186$ ,  $p < .001$ ). This finding provided strong statistical evidence that industrial attachment significantly enhanced employability through multiple interconnected mechanisms. The adjusted  $R^2$  value of .691 indicated that the model remained robust even after adjusting for the number of predictors and sample size, confirming the reliability of the findings.

The regression equation was:  $Y = 0.487 + 0.312X_1 + 0.186X_2 + 0.289X_3 + 0.245X_4$ , where Y represented employability,  $X_1$  represented hands-on technical skills,  $X_2$  represented professional development,  $X_3$  represented industry-specific experience, and  $X_4$  represented communication competencies. This equation demonstrated that all four dimensions made unique and significant contributions to employability, with hands-on technical skills having the strongest effect ( $\beta = .312$ ), followed by industry-specific experience ( $\beta = .289$ ), communication competencies ( $\beta = .245$ ), and professional development ( $\beta = .186$ ).

**Overall Employability Skills Enhancement:** The study found that industrial attachment enhanced various categories of employability skills ( $M = 4.31$ ,  $SD = 0.77$ ). The majority of respondents agreed that industrial attachment enhanced their technology skills (85.9%), thinking skills (85.9%), personal qualities (85.9%), interpersonal skills (85.3%), communication skills (85.3%), and planning and resource management skills (84.6%). These findings demonstrated that industrial attachment had comprehensive effects across multiple dimensions of employability, enhancing not just specific technical or communication skills but also broader professional competencies and personal qualities.

**Direct Assessment of Employability Impact:** The study found overwhelming agreement that industrial attachment significantly improved employability. The majority of respondents (87.7%) agreed that overall, industrial attachment significantly improved their employability, while 88.9% agreed that they would recommend industrial attachment to other TVET students as essential for employability. This overwhelming endorsement demonstrated that respondents valued their industrial attachment experiences and recognized their importance for employability.

**Employment Outcomes:** The study revealed relatively positive employment outcomes for TVET diploma graduates from Machakos County who had completed industrial attachment. The majority of respondents (74.2%) were either employed or self-employed, with 60.1% working in fields related to their TVET programmes. Among employed respondents, 84.4% secured jobs within six months of graduation, with 53.3% finding employment within three months. These employment outcomes were better than the national youth unemployment rate of approximately 26%, suggesting that TVET diploma graduates with industrial attachment experience had better employment prospects compared to the general youth population.

The qualitative data revealed that many graduates were hired by the organizations where they completed their attachment, with principals reporting that approximately 30% of graduates secured employment through attachment-related connections. Employers who hired graduates from the studied institutions consistently cited job-readiness, technical competence, communication skills, and professional maturity as key reasons for hiring, attributing these qualities to the industrial attachment experience.

**Correlation Among Industrial Attachment Dimensions:** Correlation analysis revealed significant positive correlations among the four independent variables, ranging from  $r = .621$  to  $r = .698$ . This suggested that these dimensions of industrial attachment experience were interrelated—students who gained strong technical skills also tended to develop communication competencies, gain industry experience, and engage in professional development. This interconnectedness reflected the holistic nature of industrial attachment as a learning experience that simultaneously developed multiple competencies.

## Conclusions

Based on the study's findings, the following conclusions were drawn in relation to the research objective: The study concluded that industrial attachment had a comprehensive, significant, and positive effect on the employability of TVET diploma graduates from Machakos County, Kenya. The four dimensions of industrial attachment experience (hands-on technical skills, professional development, industry-specific experience, and communication competencies) collectively explained 69.9% of the variance in employability, providing strong statistical evidence that industrial attachment was a critical mechanism for enhancing graduate employability.

The study concluded that industrial attachment enhanced employability through multiple interconnected mechanisms that simultaneously developed technical competence, professional networks, industry socialization, and communication skills. This holistic development prepared graduates not just to secure employment but to succeed and advance in their careers. The relatively positive employment outcomes observed among respondents (74.2% employed or self-employed, with 84.4% of employed respondents securing jobs within six months) provided empirical evidence that industrial attachment enhanced employability and facilitated rapid transition from education to employment.

The study concluded that industrial attachment was consistent with Human Capital Theory's proposition that investments in education and training enhanced individuals' productive capacities and labor

market outcomes. Industrial attachment represented such an investment, providing students with knowledge, skills, and competencies that increased their human capital and, consequently, their employability and earning potential.

However, the study also concluded that the effectiveness of industrial attachment depended critically on the quality of implementation. Significant challenges—including inadequate supervision, assignment to non-technical tasks, financial constraints, placement mismatches, short durations, and safety concerns—limited the effectiveness of industrial attachment for some students. These challenges highlighted the need for TVET institutions to invest in stronger industry partnerships, better supervision and monitoring systems, improved placement matching, financial support for students, and quality assurance mechanisms to ensure that all students received high-quality attachment experiences that effectively enhanced their employability.

### **Recommendations**

Based on the study's findings and conclusions, several recommendations are proposed to enhance the effectiveness of industrial attachment programmes and the employability of TVET diploma graduates.

### **Policy Recommendations**

At the policy level, the government and relevant policy makers should strengthen frameworks that support the implementation of industrial attachment programmes within TVET institutions. These includes:

- i. Developing clear national guidelines to standardize attachment duration, supervision procedures, and assessment mechanisms across institutions. Policies should promote structured collaboration between industry and training institutions through incentives such as tax rebates or recognition awards for companies that regularly host and mentor students.
- ii. Sufficient financial and logistical support should be allocated to facilitate supervision, monitoring, and evaluation of attachment programmes, including funding for institutional capacity building, supervisor training, and the development of digital systems for student placement and tracking. The government should also expand public-private partnerships to create more attachment opportunities and integrate these experiences into broader youth employment and skills development strategies.
- iii. Regular labour market surveys are recommended to identify emerging skill gaps and inform continuous curriculum review. Furthermore, policies should ensure that TVET education remains responsive to technological, economic, and industrial trends, bridging the gap between education and employment, while prioritizing student welfare through workplace safety regulations, insurance coverage, and grievance reporting mechanisms.
- iv. Ultimately, industrial attachment should be positioned as a central pillar in national skills development, linking education to productivity and sustainable employment.

TVET institutions, at the policy level, should strengthen partnerships with industries through formal agreements that clearly define roles, expectations, and quality standards. These includes:

- i. Establishing industry advisory boards can guide curriculum design, improve placement processes, and ensure quality attachment experiences.
- ii. Continuous dialogue between institutions and industry partners through regular meetings and recognition of exemplary partners is recommended.
- iii. Institutions should also implement structured oversight mechanisms and leverage digital tools, such as online logbooks, for monitoring student progress.
- iv. Orientation and mentorship training for industry supervisors should be provided to enhance the quality of student guidance, and communication, professionalism, and workplace ethics should be integrated throughout training programmes rather than relying solely on attachment experiences.

### **Practical Recommendations**

At the practical level, TVET institutions should:

- i. Provide comprehensive pre-attachment preparation covering workplace ethics, communication, safety, and professional behavior, along with clear learning objectives to ensure students' readiness.
- ii. Improve placement matching through systematic processes that align students' skills, interests, and career aspirations with suitable industry opportunities, supported by a database of approved attachment sites.
- iii. Consider extending attachment duration to six to twelve months to allow deeper engagement with industry and broader learning exposure.
- iv. Establish Financial support mechanisms in collaboration with industries, government, and donors to reduce students' financial burden.

- v. Ensure that assessment of attachment capture both technical and soft skills, with structured input from industry supervisors, and students' achievements should be recognized through certificates, portfolios, or awards.
- vi. Facilitate participation in industry events, workshops, and professional associations to enhance professional development and leverage technology to improve placement management, supervision, and assessment, including virtual mentorship opportunities.

At the practical level, industries should:

- i. Safeguard student welfare by ensuring placement sites meet safety standards, providing insurance, and establishing grievance reporting mechanisms. Continuous improvement should be promoted through regular evaluation, stakeholder feedback, and benchmarking against best practices.
- ii. Develop formal partnerships with TVET institutions through Memoranda of Understanding (MOUs) that define placement structures, mentorship responsibilities, and expected learning outcomes. They should actively participate in curriculum design and review to ensure alignment with emerging labour market demands.
- iii. Increase the number of attachment opportunities and ensure equitable access across disciplines and genders.
- iv. Assign Qualified and committed supervisors to mentor students throughout the attachment period, providing regular feedback, assessing performance based on agreed criteria, and guiding professional development.
- v. Conduct Structured induction and safety training at the beginning of each attachment, and students should be assigned diverse and challenging tasks that expose them to real work environments, modern technologies, and innovation practices.
- vi. Where feasible, provide financial support in the form of stipends, transport allowances, or meals to promote inclusivity and reduce financial strain.
- vii. Maintain open communication with TVET institutions through periodic progress reports and joint evaluation sessions, while creating a safe and conducive learning environment that values mentorship, innovation, and lifelong learning.

By adopting these practices, industry partners contribute to human capital development and cultivate a pool of competent graduates who meet current and future workforce needs.

Students are also key stakeholders and should:

- i. Actively engage in maximizing the benefits of their industrial attachment experiences. They should approach attachment with a positive attitude, discipline, and eagerness to learn, viewing it as an opportunity to apply classroom knowledge in real-world contexts.
- ii. Be encouraged to set clear learning objectives, seek feedback from supervisors, and take initiative in performing assigned tasks while maintaining professionalism in appearance, communication, punctuality, and ethical conduct. Daily experiences should be documented through logbooks or digital reports to track progress and reflect on skill development.
- iii. Practice active networking with industry professionals, participation in workplace meetings, and seeking mentorship opportunities are essential for enhancing career readiness.
- iv. Emphasize Continuous self-improvement by embracing challenges, learning new technologies, and adapting to diverse work environments.
- v. Take advantage of pre-attachment training and institutional resources, uphold safety standards, report challenges or harassment, and respect organizational rules and culture.
- vi. Leverage attachment experiences to build professional portfolios that showcase practical competencies and personal growth, thereby enhancing employability, confidence, and competitiveness in the labour market.

### **Suggestions for Further Research**

Based on the study's findings, limitations, and emerging issues, several areas were identified for further research. Future studies should adopt longitudinal approaches to track TVET graduates over time and assess the long-term effects of industrial attachment on career growth, job satisfaction, earnings, and entrepreneurship. Comparative research across different counties and TVET qualification levels is needed to identify regional variations, best practices, and level-specific attachment outcomes. Further investigations should also focus on specific technical fields such as engineering, ICT, agriculture, and hospitality to understand field-specific challenges and opportunities. Research examining gender dimensions of industrial attachment is essential to explore barriers faced by female students and promote gender equity in placement and employability outcomes. Employer perspectives should also be studied to gain insights into expectations, satisfaction, and collaboration in attachment programmes. Cost-benefit analyses are needed to evaluate the economic value of industrial attachment for stakeholders. Future studies should explore alternative models of work-integrated learning, such as apprenticeships and virtual internships, and assess their effectiveness relative

to traditional attachments. Research on quality assurance mechanisms, technology integration, and entrepreneurship outcomes is crucial to improve programme design, monitoring, and innovation. Inclusive attachment studies should address the needs of students with disabilities and those from marginalized backgrounds. Additionally, investigations into the impacts of COVID-19 and Industry 4.0 technologies on industrial attachment would help inform adaptation and curriculum reform. Experimental and quasi-experimental studies should also be conducted to establish causal relationships between industrial attachment and employability outcomes, providing stronger evidence for programme enhancement.

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