

Labour Market Alignment and Graduate Employability among TVET Alumni: Evidence from a Tracer Study at the Technical University of Mombasa, Kenya

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Abstract

Technical and Vocational Education and Training (TVET) is widely recognised as a key route for building the skilled labour force needed for industrial expansion, national competitiveness, and longer-term development goals. Even so, questions remain about whether TVET programmes consistently produce graduates whose competencies fit what employers and workplaces actually require. Using a cross-sectional graduate tracer survey, this study assessed labour market alignment and employability outcomes among alumni of the Technical University of Mombasa (TUM) TVET Institute in Kenya. The analysis drew on Human Capital Theory, Employability Theory, Skills Mismatch Theory, and Labour Market Signalling Theory. Data were obtained from 161 graduates through a structured online questionnaire, then analysed using descriptive statistics, Cronbach's alpha, Kruskal-Wallis H tests, Chi-square tests, and thematic analysis of open-ended responses.

The results point to major difficulties in labour market entry. Unemployment affected 70.8% of respondents, and only 16.8% reported employment that matched their field of training. While industrial attachment and employer recognition were rated more positively than other areas, less favourable views emerged around curriculum relevance, readiness for work, alignment between training and jobs, support for internships, and institutional help with job placement. Inferential tests showed statistically meaningful differences in perceptions across employment categories. Graduates working within their field repeatedly reported stronger curriculum relevance, greater workplace readiness, higher usefulness of acquired skills, and a better view of institutional reputation than those who were unemployed. Qualitative accounts converged on similar priorities, calling for more practice-oriented learning, curriculum updates, closer and more consistent employer collaboration, stronger digital skills preparation, improved career support, and upgraded learning facilities.

Overall, the study indicates that although TUM-TVET offers a credible base of technical training through competency-based approaches and industrial attachment, employability outcomes are limited by weak labour market alignment and insufficient institutional support during the transition into work. For improvement, the evidence points to deeper employer engagement, expansion of work-integrated learning, routine tracer studies as an institutional practice, stronger digital and entrepreneurial skills integration, and more effective career placement services. These findings add empirical support for curriculum reform, quality assurance planning, and policy measures aimed at making TVET provision in Kenya more responsive to shifting labour market needs.

Key Words: Technical and Vocational Education and Training (TVET); Graduate Employability; Labour Market Alignment; Graduate Tracer Study; Curriculum Relevance; Skills Mismatch; Industrial Attachment; Work-Integrated Learning; Kenya; Technical University of Mombasa

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1. Introduction

Technical and Vocational Education and Training (TVET) now sits prominently within national development planning, largely because it offers a practical route to producing a workforce able to sustain industrialisation, technological progress, and wider economic competitiveness. With rapid technological change reshaping production and services, labour markets ask for more than

occupational technique. Digital capability, problem solving, flexibility, and related transferable skills have become routine expectations for contemporary work settings (International Labour Organization [ILOa], 2024; Organisation for Economic Co-operation and Development [OECD], 2023). Policy attention has therefore moved beyond the earlier emphasis on expanding access, toward the harder question of whether training systems actually prepare learners for existing and emerging jobs. UNESCO (2024) points to the need for education systems to respond more directly to labour market conditions, and it links this responsiveness to tighter connections between training providers and employers. Under these conditions, TVET is increasingly treated as a key instrument for reducing youth unemployment, widening inclusive growth, and supporting sustainable development trajectories (UNESCO, 2024).

Across African countries, this repositioning of TVET is tied to the demographic weight of a youthful population and to the expectation that skills development can support socioeconomic change. Even where education and training opportunities have expanded, youth unemployment remains high, and one recurring explanation is the uneven match between graduates' capabilities and what employers require (World Bank, 2024). In response, the African Union's Continental TVET Strategy (2025–2034) calls for closer cooperation among states, industry actors, and training institutions, with the aim of producing demand-driven programmes that speak to growth areas including digital technologies, green industries, manufacturing, maritime services, and the informal economy (African Union, 2025). Yet policy direction has not removed persistent constraints. Financing gaps, governance weaknesses, limited room for curriculum adjustment, underdeveloped instructor capacity, and low levels of employer participation in design and delivery continue to limit outcomes (UNESCO-UNEVOC, 2022).

Kenya has pursued significant reforms intended to strengthen TVET, framed through Vision 2030, the Bottom-Up Economic Transformation Agenda (BETA), and the Competency-Based Education and Training (CBET) framework. At their core, these reforms aim to strengthen practical competence, entrepreneurship, and labour market fit, partly by aligning programmes with occupational standards and industry requirements (Technical and Vocational Education and Training Authority [TVETA], 2023). Public investment has expanded infrastructure and supported new programmes, and enrolment in public institutions has grown alongside these changes. Even so, graduate unemployment continues to be raised as a major concern. Employers often refer to gaps in hands-on exposure, readiness for workplace routines, digital competence, communication, and problem solving (World Bank, 2023). Evidence from Kenya indicates that employability improves when employer involvement is stronger and when work-integrated learning is available and well structured (World Bank, 2023).

Within this landscape, graduate employability has come to function as a visible marker of institutional performance, both in higher education and in TVET. Employability is commonly treated as more than the act of securing a first job, instead it is discussed as a multidimensional profile that includes technical ability, adaptability, teamwork, communication, innovation, entrepreneurship, and the capacity for lifelong learning (OECD, 2023). Employers, in turn, increasingly prioritise graduates who can work effectively in shifting organisational environments shaped by technological disruption and ongoing change (ILO, 2025). Such expectations push training institutions to pair classroom-based learning with sustained workplace exposure, including internships, industrial attachments, apprenticeships, and longer-term collaboration with industry. Tracer studies have therefore gained importance as an evaluation approach, offering a way to judge whether training experiences translate

into labour market outcomes and to pinpoint aspects of curricula that require revision (UNESCO-UNEVOC, 2022).

Even with global expansion in TVET provision, skills mismatch remains a significant barrier to employment. The term refers to the gap between what trainees learn and what jobs demand. Outdated curricula, weak practical components, limited employer input into programme design, and too few opportunities for workplace learning are often cited as sources of this mismatch (UNESCO, 2024). UNESCO (2024) notes that many young Africans remain without work despite higher educational attainment, which reflects training systems that do not adjust quickly enough to shifting labour market needs. Also, as digital tools, automation, artificial intelligence, and environmentally sustainable production approaches spread across sectors, curricula require regular review and adjustment if graduates are to remain competitive (ILO, 2025; World Economic Forum, 2025).

For these reasons, labour market alignment has become a central goal in current TVET policy and practice. Alignment is typically understood as an ongoing process, covering routine curriculum review, employer involvement in programme design, competency-based assessment, certification linked to industry expectations, structured work-integrated learning, and consistent tracking of graduate outcomes (African Union, 2025). Many countries now treat graduate tracking systems and labour market observatories as essential for producing evidence that can support planning and policy choices (World Bank, 2024). Where alignment improves, employer satisfaction tends to rise, graduate employability strengthens, and productivity gains are more likely because human capital is better matched to tasks and roles (World Bank, 2024).

In Kenya, however, research that investigates labour market alignment through the perspectives of TVET graduates is still limited, especially in coastal settings such as Mombasa County. Much of the existing literature concentrates on policy roll-out, institutional performance measures, or employer views, while graduates' accounts of labour market entry, preparedness for work, curriculum relevance, and post-graduation institutional support receive less sustained attention. Empirical material on alumni perceptions of industrial attachments, career guidance, employer linkages, and labour market integration in public TVET institutions remains insufficient. This gap restricts curriculum reform and institutional planning at a moment when universities and TVET providers face growing pressure to demonstrate relevance and measurable outcomes. Tracer study results from the Technical University of Mombasa (TUM), pointing to high unemployment, weaker perceived workplace readiness, and limited job-placement support, reinforce the case for evidence-led improvement.

Against this background, the present study investigates labour market alignment and graduate employability among alumni of the Technical University of Mombasa TVET Institute. Attention is given to employment outcomes, graduates' assessments of curriculum relevance and workplace preparedness, the nature and adequacy of institutional support, and the factors that shape labour market integration. The study aims to generate evidence that can inform curriculum redesign, strengthen industry partnerships, guide employability interventions, and support market-oriented TVET programming in Mombasa County and in Kenya more broadly.

2. Literature Review

2.1 Human Capital Theory

Human Capital Theory, associated with Schultz (1961) and Becker (1964), remains a core framework for analysing how education and training relate to labour market outcomes. The theory

frames education as an investment that raises knowledge, skills, and productivity, and in turn increases earnings potential and contributes to national growth. In TVET, this perspective is especially relevant because the sector is designed to build occupation-linked capabilities and practical skills expected to translate into employability and industry contribution.

Labour market shifts linked to the Fourth Industrial Revolution have reinforced the relevance of this approach. Digitalisation, automation, artificial intelligence, and advanced manufacturing are altering workplace requirements and raising demand for adaptable, high-skill workers. TVET institutions are therefore expected to graduate individuals with technical competence alongside digital literacy, innovation capacity, entrepreneurial skills, and lifelong learning habits. International agencies consistently frame skills development as a key route to inclusive growth, lower unemployment, and improved competitiveness (UNESCO, 2025; ILO, 2024).

In Kenya, Human Capital Theory is reflected in reforms centred on CBET and BETA, which prioritise competency acquisition and industry relevance more than conventional academic achievement. The underlying assumption is that graduates with market-relevant competence will transition into work more easily, while also addressing skills shortages. Yet persistent unemployment among graduates suggests that expanding education alone does not guarantee favourable labour market outcomes unless training quality, relevance, and employer demand align.

Tracer studies increasingly show that returns to vocational education depend not only on how much education is completed but on whether training is current, practical, and connected to workplaces. Graduates exposed to industrial attachments, apprenticeships, and work-integrated learning tend to perform better in the labour market than those whose training remains mostly classroom-based, consistent with the view that skills accumulation improves productivity and employability. Still, recent evidence suggests that institutional quality, employer engagement, technological change, and labour market conditions shape whether human capital investments translate into jobs.

Findings from the present tracer study broadly fit the assumptions of Human Capital Theory but also expose institutional constraints. Alumni reported moderate satisfaction with attachment relevance and employer recognition, yet rated job-market preparedness, employment alignment, and institutional support for internships and job placement lower. With more than 70% of respondents unemployed, the data indicate that qualifications by themselves did not ensure labour market entry. In this setting, improving the returns to educational investment requires tighter connections between curriculum delivery, workplace learning, and employer expectations.

Human Capital Theory is therefore useful for examining employability in TVET. At the same time, many scholars argue that it should be read alongside frameworks that bring in labour market dynamics, employer behaviour, signalling processes, and institutional partnerships. In practice, employability depends not only on the skills graduates hold, but on how well those skills match current demand and how effectively graduates can demonstrate them to prospective employers.

2.2 Employability Theory

Employability Theory redirects the discussion away from employment as a one-off endpoint and toward a wider capacity, namely whether graduates can obtain work, remain employable over time, and move forward in labour markets that do not stay still. Where Human Capital Theory tends to centre on productivity improvements tied to schooling and training, Employability Theory treats graduate achievement as multi-layered. Technical proficiency matters, but so do portable skills, individual dispositions, career self-management, adaptability, and the surrounding labour market

context (OECD, 2023). In this reading, employability is not equivalent to knowledge accumulation; it rests on how personal capabilities intersect with institutional backing and the availability of economic openings.

In higher education and TVET, employability has moved into the foreground as a measure of how well institutions perform. Assessment by governments, employers, and development partners often goes beyond enrolments and completions, taking in graduate employment results, employer perceptions, and the match between training provision and labour market needs (UNESCO, 2024). Relatedly, the International Labour Organization maintains that current labour markets demand blended profiles: solid technical know-how combined with communication, problem-solving, teamwork, and an orientation to learning across the life course (ILO, 2024). As a result, providers are asked to equip students not only for first entry into work but also for career continuity and growth under shifting economic conditions.

TVET discussions commonly connect employability with competency-based approaches, learning in workplaces, and sustained engagement with industry. Work-integrated learning arrangements, for example internships, industrial attachments, apprenticeships, simulations, and project-based formats, are frequently linked with stronger readiness for practice and less friction in the move from school to work (UNESCO-UNEVOC, 2022). Employers, in turn, often prioritise graduates who pair occupation-specific capability with transferable strengths, including communication, critical thinking, adaptability, digital literacy, and professional conduct (World Bank, 2023). On that basis, employability is increasingly framed as distributed responsibility, carried jointly by training providers, employers, the state, professional bodies, and graduates.

Ongoing changes in labour markets have also widened what counts as employability. Artificial intelligence, automation, data analytics, and green technologies have altered skill profiles across most sectors, changing what is required and how quickly it must be renewed. The Future of Jobs Report 2025 notes a growing preference for workers who can keep updating their skills, respond to technological shifts, and work effectively with digital tools across varied settings (World Economic Forum, 2025). OECD (2023) makes a comparable point, treating resilience and adaptability as core employability features under uncertainty. Many TVET institutions have responded by adjusting curricula, deepening employer collaboration, and adding entrepreneurship and digital-skills components aimed at reducing structural unemployment linked to outdated competencies (ILO, 2025).

Findings from the Technical University of Mombasa (TUM) tracer survey are consistent with central expectations in Employability Theory. While graduates generally reported positive experiences of industrial attachments, they expressed weaker satisfaction regarding preparedness for the job market, alignment with labour market realities, the support attached to internships, and placement-related services. The open-ended responses repeatedly returned to a small set of priorities: more practical training, curriculum refinement, stronger digital competence, closer employer partnerships, and clearer career support. Taken together, these results indicate that employability is unlikely to be produced through classroom teaching alone; it relies on ongoing coordination between training institutions and labour market stakeholders (World Bank, 2024).

Employability Theory therefore sits alongside Human Capital Theory by widening the analytical frame beyond educational investment and the accumulation of skills. Human Capital Theory is primarily concerned with economic returns to education, whereas Employability Theory brings institutional support, work-integrated learning, transferable competencies, and adaptability to the centre of analysis. Read together, the two perspectives offer a useful basis for interpreting graduate

outcomes in contemporary TVET systems and for examining the conditions that shape labour market integration.

2.3 Skills Mismatch Theory

Skills Mismatch Theory accounts for the gap that often opens up between the capabilities students gain through education and training and the competencies employers actually seek in the labour market. Under this view, unemployment and underemployment can remain stubbornly high even among credentialed graduates when education and training systems do not adjust to shifting industry needs. Human Capital Theory, by contrast, generally treats education investment as a straightforward route to better employability. The mismatch approach is more conditional, it holds that the labour-market value of education rests, to a large degree, on how closely learned skills fit current demand. For that reason, educational attainment by itself does not assure employment when graduates do not hold competencies that align with contemporary work settings (OECD, 2023; UNESCO, 2024).

According to the Organisation for Economic Co-operation and Development (OECD, 2023), mismatch appears in three principal forms. Vertical mismatch arises when a worker is either overqualified or underqualified for the role performed. Horizontal mismatch refers to graduates taking jobs outside the disciplinary area in which they trained. Competency mismatch, in turn, occurs when formal credentials are present but the practical skills required for effective performance are missing. Within Technical and Vocational Education and Training (TVET), competency mismatch is especially consequential, since TVET is intended to prepare learners for direct entry into specialised occupations. Where curricula lag behind industry practice, training equipment and facilities age without replacement, and workplace learning remains limited, qualifications may not convert into productive employment or meaningful progression.

Concerns over mismatch have grown sharper as the global economy changes. Occupational profiles are being reworked by developments in artificial intelligence, automation, renewable energy, advanced manufacturing, logistics, and digital technologies. As a result, firms are placing increasing weight not only on technical competence but also on digital literacy, analytic reasoning, creativity, adaptability, and the capacity for ongoing learning (World Economic Forum, 2025; International Labour Organization [ILO], 2025). UNESCO (2024) notes that many education systems still channel learners toward jobs that are contracting or being rapidly transformed, a dynamic that helps explain persistently high graduate unemployment even as participation in education expands. In a related argument, the ILO (2024) points to labour markets that increasingly favour workers able to respond to technological shocks and to update their skills continuously.

Across Sub-Saharan Africa, mismatch continues to constrain youth employment and dampen productivity. Even with notable growth in TVET access, many providers still contend with outdated equipment, limited instructor capacity, minimal employer involvement, weak industrial attachment arrangements, and slow curriculum revision cycles (World Bank, 2024). Employers, in turn, commonly report that graduates require considerable retraining before they reach expected productivity levels. Reflecting these constraints, the African Continental Technical and Vocational Education and Training Strategy (2025–2034) prioritises curriculum responsiveness, labour market intelligence, employer engagement, and work-integrated learning as key routes to improved employability and narrower skills gaps (African Union, 2025).

Comparable patterns appear in Kenya despite reforms tied to the Competency-Based Education and Training (CBET) framework. Policy discourse stresses demand-led provision, partnerships with

industry, entrepreneurship, and competency acquisition. Yet employers still point to weaknesses in practical competence, workplace readiness, communication, teamwork, digital ability, and problem-solving among graduates (World Bank, 2023). Evidence from skills-development research in Kenya repeatedly indicates that closer, sustained cooperation between institutions and employers improves labour-market outcomes, primarily by keeping curricula anchored to workplace requirements (UNESCO-UNEVOC, 2022; World Bank, 2023).

Results from the present tracer study align with the central claims of Skills Mismatch Theory. Unemployment exceeded 70% among respondents, and only a small share reported employment that matched their training field. Respondents also reported low satisfaction with preparation for the job market ($M = 2.61$), alignment between employment and training ($M = 2.59$), institutional support for internships ($M = 1.92$), and assistance with job placement ($M = 1.79$). At the same time, industrial attachment relevance and employer recognition attracted comparatively higher ratings, implying that workplace exposure is valued, while institutional support during the move from training to employment is seen as insufficient.

Interview and open-ended responses support the same reading. Alumni repeatedly called for stronger practical training, curriculum changes, expanded digital-skills development, deeper employer partnerships, improved learning facilities, and more financial support. Practical exposure stood out as the dominant priority, identified by over 90% of respondents. Taken together, these accounts suggest that graduates experience a clear disconnect between what is taught in training and what is expected in current workplaces.

In this way, Skills Mismatch Theory offers a coherent explanation for weaker labour-market outcomes among TVET graduates. Improving employability, within this framework, depends on ongoing curriculum review, sustained employer involvement in programme design, wider access to work-integrated learning, investment in up-to-date training infrastructure, and routine use of labour market intelligence (African Union, 2025; UNESCO, 2024). Tracer studies, from this standpoint, function not only as evaluative instruments but also as practical mechanisms for locating competency gaps, guiding curriculum revision, and tightening the fit between TVET provision and labour-market needs.

2.4 Labour Market Signalling Theory

Labour Market Signalling Theory, developed by Spence (1973), explains how education functions as a signal in hiring contexts where employers cannot directly observe applicants' ability, motivation, or competence. Recruiters therefore rely on observable proxies such as qualifications, certifications, work experience, internships, institutional reputation, and references when making decisions.

In TVET, signals extend beyond possession of a certificate or diploma, they include credible evidence of practical competence and readiness for work. Employers often place higher value on graduates who have completed industrial attachments, apprenticeships, competency-based assessments, and recognised certifications. These elements indicate that graduates can contribute with limited additional training. Institutions with strong employer ties can strengthen the signalling value of their qualifications by ensuring that students accumulate meaningful workplace experience before graduation.

Changes in recruitment practices have broadened the range of signals that matter. Alongside formal credentials, employers increasingly consider digital competence, communication, teamwork, leadership potential, adaptability, innovation, and a commitment to continuous learning. Portfolios,

digital credentials, badges, project work, entrepreneurial activity, and participation in industry competitions can all function as supplementary indicators of capability.

Institutional reputation also carries signalling power. Institutions with a track record of producing competent graduates typically benefit from employer confidence. Where curricula are perceived as outdated or practical training weak, graduates may face a reduced signalling value even if their formal qualifications appear comparable. This makes quality assurance, accreditation, tracer studies, and sustained employer engagement central to institutional credibility.

The TUM tracer survey reflects several of these processes. Alumni rated institutional reputation ($M = 2.94$), employer recognition ($M = 3.16$), willingness to recommend the institution ($M = 3.03$), and willingness to support TUM initiatives ($M = 2.99$) as moderate. Yet internship support and job placement were rated weakly, suggesting limited institutional mechanisms for strengthening employer confidence and graduate visibility.

Group comparisons provide a further link to signalling. Graduates employed within their field reported stronger perceptions of curriculum relevance, skills usefulness, employment alignment, and willingness to recommend TUM-TVET than unemployed peers. This implies that successful employment can reinforce confidence in the value of credentials and increase perceived strength of the institutional signal.

Labour Market Signalling Theory therefore complements Human Capital and Skills Mismatch perspectives. It suggests that employability depends not only on competence acquisition but also on how credibly competence is communicated to employers through qualifications, workplace learning, reputation, and recognised credentials.

2.5 Graduate Tracer Studies

Graduate tracer studies are now widely treated as a practical way to judge how far Technical and Vocational Education and Training (TVET) programmes meet labour market needs, and whether they translate into employment for graduates. Put simply, a tracer study tracks graduates after completion and documents outcomes through indicators that include employment status, movement across occupations, changes in earnings, progression to further study, the match between workplace tasks and competencies gained during training, and employer views of graduate performance. Because standard institutional metrics tend to concentrate on enrolment, retention, and completion, tracer studies fill a different gap by focusing on the education-to-work transition and by checking whether training results correspond to labour market requirements (UNESCO-UNEVOC, 2022).

Across countries, international bodies such as UNESCO, the International Labour Organization (ILO), and the World Bank increasingly treat tracer studies as evidence-oriented instruments for tracking employability, judging programme performance, and mapping emerging skill demands in economies that change quickly (ILO, 2024; UNESCO, 2024; World Bank, 2024). Data produced through tracer surveys can then feed directly into curriculum review, planning and priority setting, decisions on funding and inputs, and institutional accountability to the state, employers, and surrounding communities. For this reason, a growing number of higher education and TVET providers have folded tracer work into quality assurance processes and into ongoing improvement routines (UNESCO-UNEVOC, 2022).

A further contribution of tracer studies lies in labour market intelligence. By collecting graduates' accounts and interpretations in a systematic manner, they bring into view which occupations are expanding, what competencies are becoming necessary, what obstacles graduates meet when seeking work, and where curricula appear to require revision. With technological change,

automation, digitalisation, and global integration increasingly influencing labour markets, such evidence becomes central to keeping programmes aligned with shifting demand (World Economic Forum, 2025; ILO, 2025). Also, because tracer evidence can show patterns over cohorts, institutions are better placed to anticipate workforce needs and to adjust training to changing economic priorities (OECD, 2023).

Within Kenya, tracer studies have taken on greater policy weight as training institutions face stronger expectations to demonstrate that programmes are relevant and that graduates obtain employment. The Competency-Based Education and Training (CBET) framework stresses outcomes and calls for institutions to evaluate graduate performance, then revise curricula using labour market feedback (World Bank, 2023). Even so, tracer studies in many public institutions remain irregular, which reduces the supply of timely evidence that could guide planning and curriculum improvement (UNESCO, 2024).

Evidence from the Technical University of Mombasa (TUM) tracer survey illustrates how this approach operates in practice. Drawing on 161 alumni, the survey assessed employment outcomes, labour market fit, workplace readiness, and the institution's forms of support. Alongside descriptive reporting, the study applied reliability testing, inferential methods, and thematic analysis to identify factors linked to employability. Results pointed to high unemployment, weaker confidence in workplace preparedness, limited support for internships and job placement, and a need to deepen employer involvement and strengthen practice-oriented training. In this sense, the survey demonstrates how tracer studies can function as strategic instruments for detecting competency gaps, guiding curriculum change, and tightening alignment between TVET provision and labour market expectations.

2.6 TVET Employability and Industry Partnerships

Graduate employability in TVET is increasingly tied to the strength and substance of relationships between training providers and industry. Labour markets now expect graduates to combine occupation-specific expertise with transferable abilities, including communication, teamwork, problem-solving, adaptability, and digital literacy (OECD, 2023). As a result, TVET systems that perform well are typically those where cooperation among institutions, employers, professional bodies, and policymakers is sustained across curriculum development, delivery arrangements, workplace learning, assessment practices, and recruitment pathways (African Union, 2025).

Industry partnerships affect employability through several channels. When employers contribute to curriculum design and periodic review, programmes are more likely to reflect current job requirements and technological shifts. Working with firms also increases access to industrial attachments, internships, apprenticeships, and other forms of work-integrated learning, giving learners practical exposure before graduation (UNESCO-UNEVOC, 2022). Also, feedback from employers on graduate performance offers concrete signals about competency shortfalls, supporting continuous curriculum improvement and strengthening programme relevance (World Bank, 2024).

Ongoing labour market changes associated with artificial intelligence, automation, digital technologies, and the expansion of green industries have further amplified the need for institution–industry collaboration. The Future of Jobs Report 2025 notes rising demand for digital capability, analytical thinking, creativity, resilience, and the capacity for continuous learning (World Economic Forum, 2025). In parallel, the International Labour Organization [ILO] (2025) links structured

workplace learning to improved adaptation in changing work settings, with longer-term gains for employability.

Empirical work repeatedly shows that graduates with structured workplace learning tend to achieve stronger employment outcomes than peers whose training is mainly classroom-centred. Workplace exposure supports the application of theory in real settings while also strengthening communication, professionalism, teamwork, adaptability, and critical thinking (World Bank, 2023; UNESCO-UNEVOC, 2022). Reflecting this, the African Continental TVET Strategy (2025–2034) frames employer engagement, workplace learning, and labour market intelligence as core pillars for improving employability outcomes across the continent (African Union, 2025).

Findings from the TUM tracer survey align with these broader arguments. Alumni placed strong emphasis on expanding hands-on training, tightening employer linkages, revising curricula, strengthening digital skills, upgrading learning facilities, and improving career-support services. Statistical results also indicated that graduates working within their areas of study reported higher ratings of curriculum relevance, workplace preparedness, perceived usefulness of skills, and willingness to recommend the institution, compared with unemployed graduates. Taken together, these patterns suggest that closer cooperation with employers can strengthen programme relevance while also improving graduates' transition into work.

Overall, partnerships with industry remain a key mechanism for improving labour market fit in TVET. By widening workplace learning opportunities, supporting curriculum innovation, and increasing employer confidence in graduate competencies, collaboration between institutions and employers contributes materially to employability and to wider economic development..

2.7 Conceptual Framework

This study combines Human Capital Theory, Employability Theory, Skills Mismatch Theory, and Labour Market Signalling Theory to explain employability outcomes among TVET alumni. Employment outcomes are treated as shaped by institutional inputs and labour market conditions.

In the framework, curriculum relevance, quality of practical training, industrial attachment, digital competencies, student support, career services, and industry partnerships represent the core institutional inputs. These inputs shape the development of technical and transferable competencies.

Graduate employability is treated as a mediating construct that includes workplace preparedness, skills usefulness, career readiness, adaptability, and confidence in transition.

Labour market alignment is treated as the dependent outcome, assessed through employment status, employment within the field, perceived job relevance, employer recognition, satisfaction, and institutional reputation.

Industry partnerships play a dual role. They strengthen curriculum relevance and workplace learning directly, and they also moderate the link between competence and labour market outcomes by supporting internships, apprenticeships, recruitment opportunities, and employer feedback.

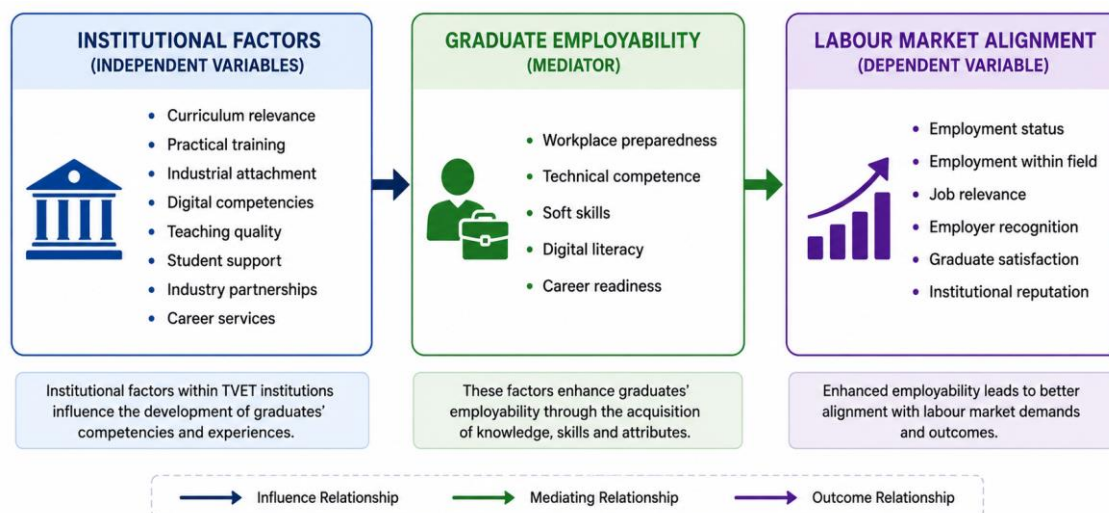


Figure 1: Conceptual Framework

The framework proposes that institutions with market-aligned curricula, strong practical training, and sustained industry collaboration are more likely to produce graduates whose competencies match labour market needs. Higher employability then increases the likelihood of relevant employment and strengthens institutional reputation. Conversely, limited employer engagement, restricted workplace learning, outdated curricula, and weak career support contribute to mismatch and weaker alignment.

3. Methodology

3.1 Research design

A cross-sectional, quantitative tracer survey was selected for this study, with the aim of examining employability and labour market alignment among alumni of the Technical University of Mombasa Technical and Vocational Education and Training (TUM-TVET) Institute. As documented in established guidance, tracer studies function as structured post-graduation follow-ups that track how graduates move into work, how well acquired competencies match job demands, and how effectively training programmes respond to labour market requirements (European Training Foundation [ETF], 2022; UNESCO-UNEVOC, 2022). While destination surveys typically stop at reporting employment status, tracer studies extend to issues such as skills use, job fit, career development trajectories, and graduates' assessments of programme quality, which can then be used as an evidence base for curriculum adjustment, quality assurance, and institutional decision-making (UNESCO, 2024).

Suitability of the cross-sectional approach rested on its capacity to capture a defined cohort at one point in time, producing a snapshot of employment outcomes together with perceptions of programme relevance, workplace readiness, and institutional support (Creswell & Creswell, 2023). Relative to longitudinal alternatives, this design demands fewer resources and yields timely feedback for curriculum appraisal and policy response (Saunders et al., 2023). It also supports statistical contrasts between employment groups, allowing institutional attributes linked to employability to be examined.

Data collection and reporting were guided by a tracer protocol developed for TUM-TVET. The protocol focused on employment outcomes, labour market absorption, occupational alignment, entrepreneurial activity, further education, and programme responsiveness to changing labour market expectations. The anticipated contribution of the evidence was practical, informing curriculum review, institutional planning, employability initiatives, and collaboration with industry partners (World Bank, 2024).

3.2 Study Population and Setting

The target group comprised TUM-TVET alumni from a public Kenyan institution delivering competency-based technical and vocational training at Artisan, Craft Certificate, Certificate, and Diploma levels. Programmes span fields tied closely to the coastal economy, and the institution contributes to skills formation for sectors including manufacturing, logistics, business, hospitality, and information technology.

Graduates who completed their studies about three to five years before the survey were prioritised. This window was chosen because it balances two considerations: sufficient time for transition into employment, self-employment, or further study, and retention of usable recall about training experiences (OECD, 2023; UNESCO-UNEVOC, 2022). International guidance commonly places graduate follow-up within the early post-graduation period to protect both relevance and reliability of tracer evidence (ETF, 2022).

Eligibility required completion of an Artisan, Craft Certificate, Certificate, or Diploma programme at TUM-TVET, appearance in verified alumni records, informed consent, and confirmation of current employment or education status. Exclusions applied to graduates outside the cohort period, records that were incomplete, deceased alumni, and individuals who did not consent to participate.

3.3 Sample Size and Sampling Procedure

The tracer protocol specified quota-controlled proportional allocation sampling. A target of 160 alumni was set, alongside a 10% reserve (16 additional potential respondents) to address anticipated non-response. Stratification proceeded in two ways. First, representation was distributed proportionally across the four programme levels: Artisan, Craft Certificate, Certificate, and Diploma. Second, alumni were grouped by employment status, namely employed in-field, self-employed, employed out-of-field, unemployed, and those pursuing further studies.

Applying this two-layer structure increased comparability across both programme levels and employment categories, while limiting sampling bias (Saunders et al., 2023). Within each stratum, systematic random sampling was applied. Verified alumni registers served as the sampling frame, a random starting position was selected, and every k th graduate was sampled until the relevant quota was met.

When selected alumni were unreachable or declined participation, replacements were drawn from the reserve list within the same stratum so that proportional representation remained intact. Although the intended sample was 160 respondents, 161 valid questionnaires were ultimately completed and analysed, which was adequate for both descriptive summaries and inferential testing (Creswell & Creswell, 2023).

3.4 Research Instrument

Data were gathered using a structured online tracer questionnaire designed to measure graduate employability, labour market alignment, and programme effectiveness at TUM-TVET. Item selection reflected established tracer frameworks from UNESCO, the International Labour Organization, and the European Training Foundation, all of which emphasise collecting evidence on employment transitions, skills use, career development, entrepreneurship, further education, and employer-related considerations (ETF, 2022; ILO, 2024; UNESCO-UNEVOC, 2022).

Both closed and open response formats were included, organised into thematic blocks. The opening section recorded demographic and educational variables such as programme completed, graduation year, study mode, and motivations for enrolment. Later sections addressed employment outcomes, occupational fit, entrepreneurial engagement, and progression into further education.

A further set of items focused on workplace readiness and programme quality, including curriculum relevance, practical training, digital competence, industrial attachment, institutional standing, employer recognition, student support services, financial assistance, career guidance, and respondents' willingness to recommend the institution. Open-ended prompts created space for suggested improvements in curriculum structure, practical components, digital skills development, industry linkages, facilities, and broader institutional support.

Most perception measures were captured on a five-point Likert scale anchored from 1 (least favourable) to 5 (most favourable). Online administration enabled participation across locations, reduced administrative costs, and shortened follow-up time (Saunders et al., 2023).

3.5 Validity and Reliability of the Instrument

Content validity was addressed by aligning the questionnaire with international tracer guidance and the study objectives, ensuring coverage of core employability dimensions including employment outcomes, workplace preparedness, curriculum relevance, skills use, institutional support, and employer engagement (UNESCO-UNEVOC, 2022; UNESCO, 2024). Construct validity was reinforced by arranging items into domains that reflected the theoretical framework used to guide the investigation.

Reliability, in terms of internal consistency, was tested using Cronbach's alpha. Three composite scales were examined. Programme Readiness and Relevance showed strong reliability ($\alpha = 0.849$). Institutional Reputation and Advocacy achieved excellent reliability ($\alpha = 0.901$). Attachment Outcomes produced moderate yet acceptable reliability ($\alpha = 0.644$), a result consistent with variability in workplace contexts and the limited number of items in the scale. As indicated by Creswell and Creswell (2023), alpha values above 0.70 are commonly treated as adequate in social science measurement.

3.6 Data Analysis

Analysis combined descriptive summaries with inferential testing. Prior to analysis, data cleaning procedures included checks for missingness, standardisation of text entries, consistency verification, and correction of implausible values. One unrealistic graduation year entry (2925) was detected and recoded as missing.

Frequencies, percentages, means, and standard deviations were computed to describe respondent profiles, employment outcomes, and evaluations of programme quality. Inferential

procedures then assessed associations between employment status and graduates' assessments of programme relevance and institutional support.

Given the ordinal nature of Likert responses and unequal group sizes, Kruskal-Wallis H tests were applied to compare distributions across employment categories (Saunders et al., 2023). Chi-square tests were used to test relationships between categorical variables, including employment status and occupational alignment. Open-ended responses were examined through keyword-based thematic analysis, allowing recurring themes concerning employability, curriculum relevance, industry collaboration, and institutional improvement to be identified (Creswell & Creswell, 2023).

3.7 Ethical Considerations

Ethical procedures followed recognised principles for research involving human participants, including voluntary participation, informed consent, confidentiality, anonymity, and secure data management. Institutional authorisation was required to access alumni records and conduct the survey. Participants received study information before responding, consent was obtained electronically, and withdrawal without penalty was permitted. Personally identifiable information was separated from analytic datasets. Responses were coded, stored securely, and accessed only by the research team. Findings were presented in aggregate form. Data management included secure storage, encrypted backup, and documentation of sampling and cleaning processes to support transparency and reproducibility. Risk to participants was minimal given the focus on educational experiences and employment outcomes.

4. Results

4.1 Respondent Profile and Employment Status

Results are based on 161 valid responses from TUM-TVET graduates. The section summarises graduation period, employment status, and labour market transition, setting up later analyses of preparedness, relevance, and alignment.

Respondent Profile

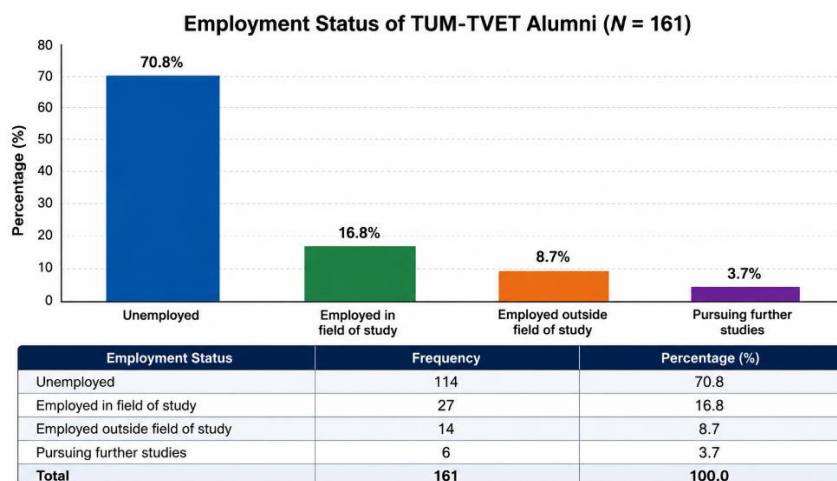
The 161 respondents came from Artisan, Craft Certificate, Certificate, and Diploma programmes. Graduation years ranged from 2016 to 2025, with a median of 2024, indicating that most respondents were recent graduates. Programme labels required standardisation during cleaning due to inconsistent text entry, though this did not affect analysis.

Table 1: Respondent Profile (N = 161)

Characteristics	Description
Total respondents	161
Graduation period	2016-2015
Median graduation year	2024
Planned sample	160
Actual valid responses	161
Response achievement	100.6%

Source: Alumni Tracer Survey (2026).

Employment Status of Graduates



Source: Alumni Tracer Survey (2026).

Figure 2: Employment status

Unemployment was the dominant outcome at 70.8%. Only 16.8% were employed in-field, 8.7% worked out-of-field, and 3.7% pursued further education. From a human capital perspective, this suggests that qualifications alone did not secure employment under prevailing conditions. From a mismatch perspective, it indicates that competencies may not align sufficiently with employer requirements.

Interpretation of Employment Outcomes

The employment distribution suggests a need for stronger institutional mechanisms supporting transition into work, including work-integrated learning, structured attachments, employer partnerships, placement services, and career guidance. Low in-field employment also signals the importance of regular curriculum review informed by employers, occupational standards, labour market intelligence, and tracer evidence. The share of graduates in further education may reflect commitment to lifelong learning, but also the perception that initial qualifications are not competitive enough for employment.

4.2 Job Relevance and Likert-Scale Results

This section reports perceived job relevance and Likert-scale ratings of programme quality, employability dimensions, and institutional support.

Job Relevance

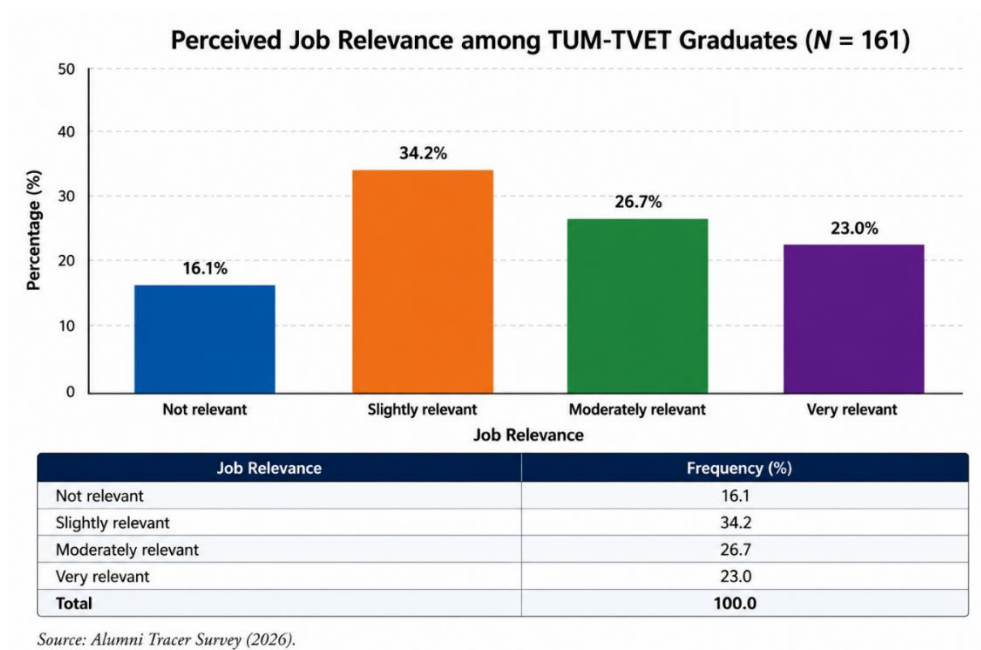


Figure 3: Perceived job relevance

Only 23.0% reported very relevant employment, while many indicated slight or moderate relevance. This suggests limited occupational matching even among those employed, consistent with skills mismatch concerns.

Graduates' Perceptions of Programme Quality and Employability

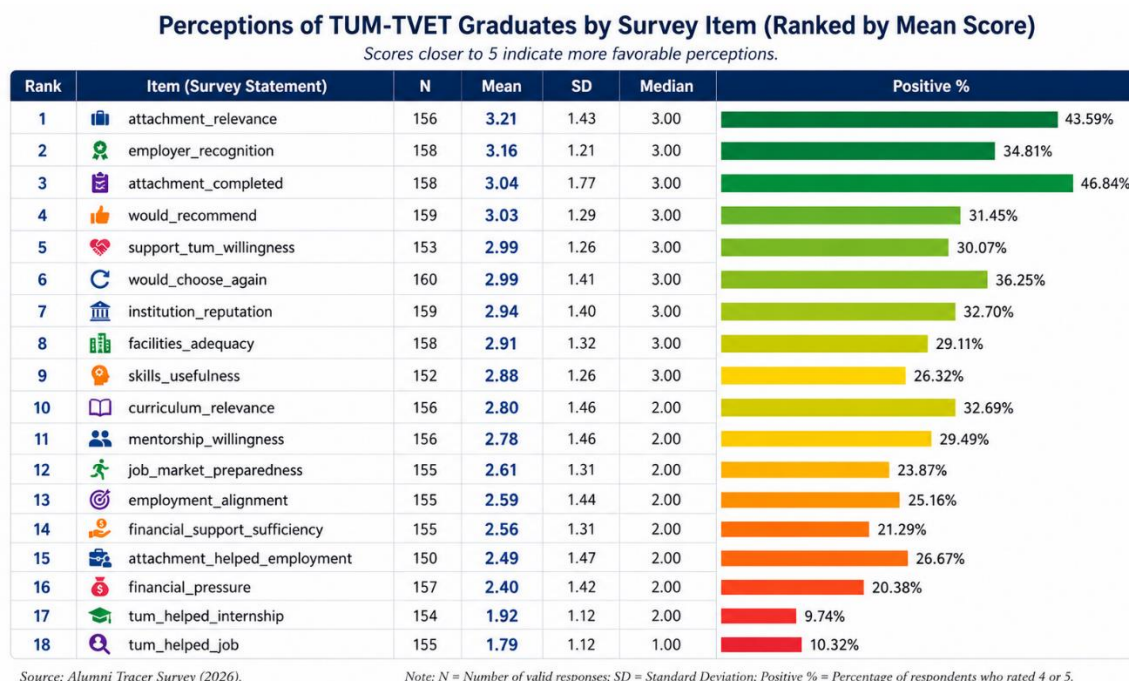


Figure 4: Perceived of Program quality and employability

Attachment relevance and employer recognition were rated highest, indicating graduates found workplace exposure meaningful and recognised in employment contexts. In contrast, ratings were weaker for curriculum relevance, preparedness, and alignment, suggesting perceived gaps between training content and workplace expectations. The lowest ratings related to institutional support for internships and job placement, pointing to a major weakness in career transition systems. Financial support was also rated modestly, and respondents reported notable financial pressure during study.

Positive response rates showed stronger agreement around completing attachment and its relevance, while internship and placement support attracted the lowest positive endorsement, reinforcing the conclusion that career linkage mechanisms require urgent improvement.

4.3 Reliability Analysis and Kruskal–Wallis Test Results

This section reports reliability results and tests whether perceptions differed across employment categories.

Reliability Analysis

Three composite scales showed satisfactory reliability.

Table 2 Reliability Analysis

Scale	Number of Items	Complete Cases	Cronbach's Alpha (α)	Interpretation
Programme Readiness and Relevance	5	149	0.849	Good reliability
Institutional Reputation and Advocacy	4	156	0.901	Excellent reliability
Attachment Outcomes	4	146	0.644	Acceptable (Exploratory)

Source: Alumni Tracer Survey (2026).

A reliability assessment was carried out to check how consistently the questionnaire captured the central constructs examined in the study. The focus was internal consistency, estimated through Cronbach's alpha, which reflects how closely related the items in a given scale are in measuring a single latent construct. Across the three composite measures, the coefficients ranged from acceptable to excellent, which supports the use of the instrument in later statistical procedures.

For Programme Readiness and Relevance, Cronbach's alpha was 0.849, a level commonly read as good internal consistency. In practical terms, the five indicators, covering workplace preparedness, curriculum relevance, employment alignment, along with associated employability-related dimensions, behaved coherently as a single scale. The implication is that this measure can be treated as a dependable indicator of graduates' views on programme quality and their readiness for labour market entry.

Institutional Reputation and Advocacy returned the strongest coefficient ($\alpha = 0.901$), signalling excellent internal consistency. The four items, addressing institutional reputation, intention to recommend TUM-TVET, alumni support, and overall satisfaction with the programme, were highly consistent, suggesting that they jointly capture a unified perception of institutional performance.

Attachment Outcomes yielded a Cronbach's alpha of 0.644. While this falls below the frequently cited 0.70 benchmark, it remains within an acceptable range for exploratory work, especially where

the scale is newly assembled or includes only a small number of items. One plausible interpretation is that graduates' industrial attachment experiences differ across host organizations and employment sectors, and that heterogeneity can weaken item intercorrelation.

Taken together, the reliability coefficients point to satisfactory psychometric performance of the questionnaire. The results indicate that the instrument measured the intended constructs with reasonable consistency, which provides a sound basis for proceeding to inferential analysis.

Kruskal–Wallis Test Results

Kruskal–Wallis tests examined differences across employment status groups for five outcomes.

Table 3 Kruskal–Wallis Test Results by Employment Status

Outcome Variable	Kruskal–Wallis Statistic (H)	p-value	Decision
Job-market preparedness	9.287	0.026	Significant
Employment alignment	43.569	<0.001	Significant
Skills usefulness	39.140	<0.001	Significant
Curriculum relevance	30.313	<0.001	Significant
Would recommend TUM-TVET	17.856	<0.001	Significant

To examine whether graduates' perceptions varied by employment status, the study applied the Kruskal–Wallis H test. This non-parametric procedure was appropriate given that the outcomes were recorded on ordinal Likert-type scales and comparisons involved more than two independent groups. The findings show statistically significant group differences across all five variables, implying that employment status is closely tied to how graduates appraise programme quality, employability-related outcomes, and institutional standing.

Job-market preparedness differed significantly across employment categories ($H = 9.287$, $p = 0.026$). This pattern indicates that the sense of being prepared for employment is not uniform across groups. Graduates employed within their field tended to report stronger perceived preparedness than those who were unemployed.

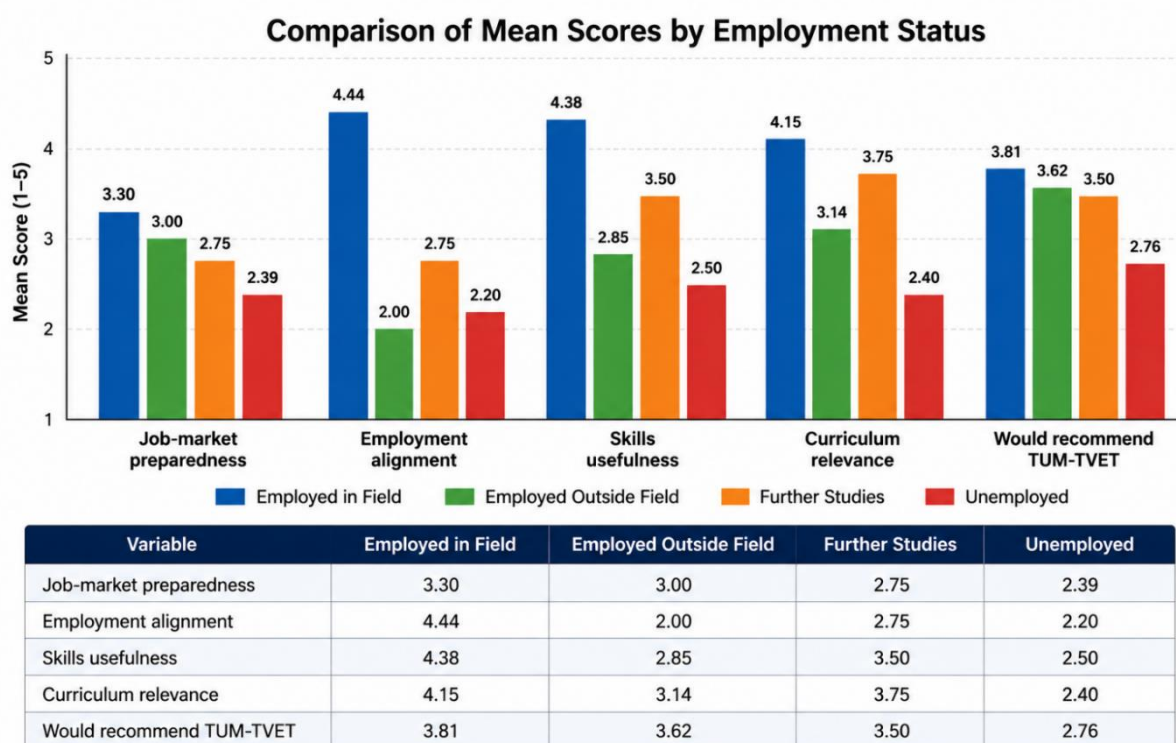
The clearest separation across groups emerged for employment alignment ($H = 43.569$, $p < 0.001$), the largest H statistic among the outcomes. This result points to pronounced variation in how well graduates felt their current work matched their area of training. Those working within their specialization reported markedly stronger alignment than graduates employed outside their field and those without employment.

A similarly strong difference appeared in perceived skills usefulness ($H = 39.140$, $p < 0.001$). Graduates who had entered employment, particularly in roles related to their discipline, were more likely to view the competencies obtained during training as directly valuable at work, whereas unemployed graduates reported less favourable assessments. The result is consistent with the idea that labour market entry shapes retrospective evaluation of skills.

Curriculum relevance also varied significantly by employment status ($H = 30.313$, $p < 0.001$). Graduates employed in their field generally rated the curriculum as more aligned with workplace demands than those who were unemployed, suggesting that successful placement is associated with stronger perceptions of programme responsiveness to labour market requirements.

Finally, willingness to recommend TUM-TVET differed significantly across employment groups ($H = 17.856$, $p < 0.001$). Graduates with positive employment outcomes were more inclined to recommend the institution than graduates who remained unemployed, indicating a link between labour market success and alumni advocacy.

Comparison of Group Means



Source: Alumni Tracer Survey (2026).

Figure 5: Employment status

Across employment-status categories, the graph shows a marked separation in how graduates evaluate the programme. Those working in roles aligned with their field of study sit at the top on every outcome measure, with the highest mean for employment alignment (Mean = 4.44). Close behind are skills usefulness (Mean = 4.38) and curriculum relevance (Mean = 4.15), while willingness to recommend TUM-TVET (Mean = 3.81) and job-market preparedness (Mean = 3.30) follow at lower, though still leading, levels. Taken together, this pattern indicates that graduates who transitioned into field-matched employment tended to judge the curriculum, the competencies gained, and institutional preparation as more satisfactory than did their peers in other employment categories.

At the opposite end, unemployed graduates consistently register the weakest evaluations. The lowest mean appears for employment alignment (Mean = 2.20), alongside similarly low ratings for job-market preparedness (Mean = 2.39), curriculum relevance (Mean = 2.40), and skills usefulness (Mean = 2.50). Such results point to comparatively negative views of the programme's capacity to support labour-market entry and readiness. Between these extremes, graduates employed outside their field of study and those continuing with further studies report mid-range scores, consistent with receiving some educational value while experiencing weaker linkage between training and occupational placement.

In aggregate, the distribution of means implies a positive association between obtaining employment within one's field and more favourable assessments of programme quality, workplace

readiness, and institutional standing. This interpretation aligns with the Kruskal–Wallis results indicating statistically significant differences between employment groups. In practical terms, the pattern strengthens the case for tightening curriculum–industry fit and expanding mechanisms that support transition into relevant work, including stronger industry partnerships, more effective career services, and broader work-integrated learning opportunities, all aimed at improving employability and alignment with labour-market demands.

Discussion of Inferential Findings

Employment outcomes shaped graduates' evaluations of training quality and institutional performance. The large gap in employment alignment suggests occupational matching is central to how graduates judge their educational experience. Differences in curriculum relevance and skills usefulness also indicate that successful employment reinforces confidence in training. These patterns fit Human Capital and Employability perspectives while also reflecting mismatch concerns among the unemployed group. Institutionally, the findings point to the need for stronger curriculum responsiveness, expanded workplace learning, employer engagement, placement services, and career support.

4.4 Chi-Square Analysis and Qualitative Themes

This section reports the relationship between employment status and job relevance, and then summarises major themes from open responses.

Association between Employment Status and Job Relevance

A Chi-square test of independence was applied to assess whether graduates' employment status was related to how relevant they perceived their present job to be to the programme they completed at the Technical University of Mombasa (TUM), TVET Institute. This procedure is suited to evaluating whether an association, statistically detectable, exists between two categorical variables.

Table 4 Chi-Square Test of Employment Status and Job Relevance

Variable	χ^2	df	p-value	Decision
Employment Status $\times$ Job Relevance	42.63	9	< .001	Significant

A Chi-square test indicated a statistically significant relationship between graduates' employment status and how relevant they judged their current work to be in relation to their field of training ($\chi^2 (9) = 42.63$, $p < .001$). With the p-value falling below the standard 0.05 threshold, the assumption of no association was rejected. Put differently, assessments of job relevance varied in a non-trivial way across the employment status groupings.

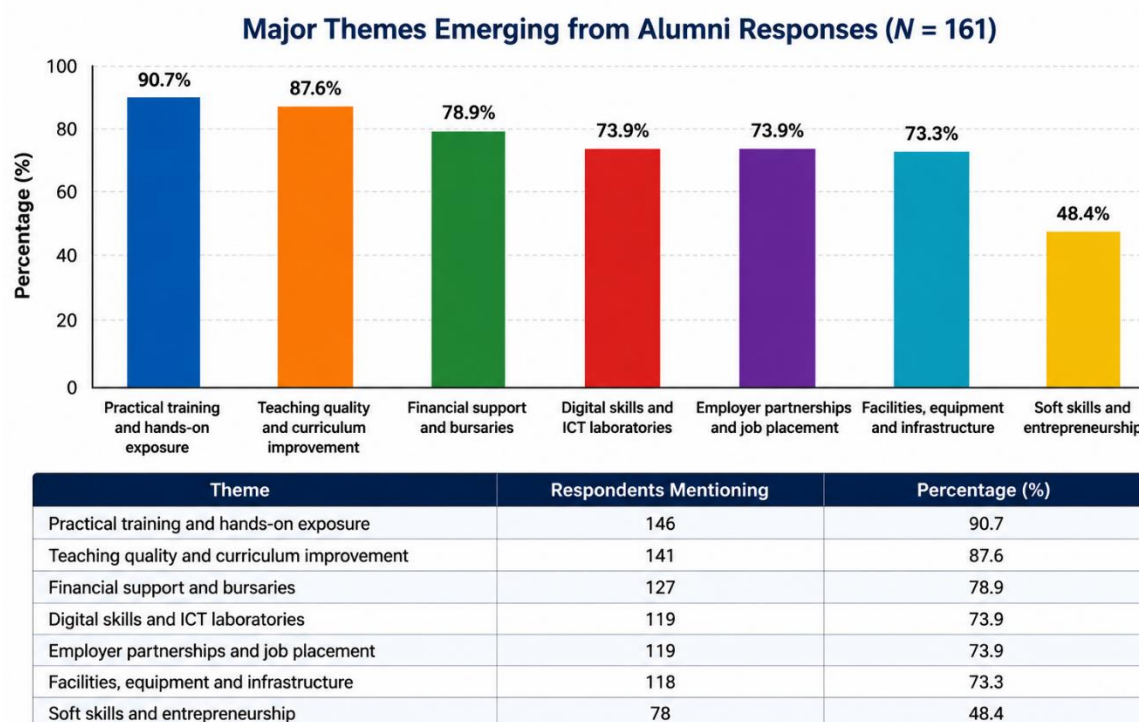
Patterns within the table were clear. Graduates working in roles that matched their field were far more likely to describe their jobs as highly aligned with the competencies developed during training, compared with those employed outside their specialization or those not employed. By contrast, respondents who were unemployed, or who had entered work unrelated to their qualifications, tended to rate relevance lower, suggesting a looser connection between educational preparation and labour market outcomes.

Overall, the results offer empirical support for a close link between employment status and labour market alignment, and they suggest that securing work within one's specialization is associated with stronger perceptions of the practical value and applicability of the education received. These

findings also align with the Kruskal–Wallis results, which indicated that graduates employed within their field consistently reported higher ratings for curriculum relevance, workplace readiness, usefulness of skills, and satisfaction with their institution than other groups. Taken together, the evidence points to the need for stronger curriculum responsiveness, deeper employer linkages, expanded industrial attachment programmes, and more effective career placement support, as mechanisms for improving graduate employability and tightening the fit between TVET provision and labour market needs.

Qualitative Analysis of Open-Ended Responses

Figure 6 illustrates the major themes emerging from graduates' recommendations for improving TVET programmes at the Technical University of Mombasa. Practical training and hands-on exposure was the most frequently cited theme, mentioned by 146 respondents (90.7%), indicating that graduates consider experiential learning to be the most critical factor in enhancing employability. This was followed by teaching quality and curriculum improvement (87.6%), suggesting a strong demand for more relevant and industry-responsive curricula. A substantial proportion of graduates also emphasized the need for financial support and bursaries (78.9%), digital skills and ICT laboratories (73.9%), employer partnerships and job placement (73.9%), and improved facilities, equipment, and infrastructure (73.3%). Although soft skills and entrepreneurship received the lowest proportion of responses (48.4%), nearly half of the respondents still regarded these competencies as important for successful labour market transition. Overall, the findings demonstrate that graduates prioritize practical, industry-oriented training, stronger institutional–industry collaboration, enhanced digital competencies, and improved learning resources as key strategies for strengthening graduate employability and labour market alignment.



Source: Alumni Tracer Survey (2026).

Figure 6 Major Themes Emerging from Alumni Responses

Integration of Quantitative and Qualitative Findings

Open responses reinforced the weakest quantitative dimensions, preparedness, alignment, internship support, and job placement. Calls for curriculum revision corresponded with modest ratings of curriculum relevance and skills usefulness. Emphasis on digital competence mirrored broader labour market shifts towards technology-driven work. Recommendations on facilities and attachments reinforced the importance of competency-based learning and structured employer collaboration.

4.5 Summary of Key Findings and Transition to Discussion

The survey captured a largely recent graduate cohort. Unemployment was high, in-field employment remained limited, and job relevance was often only slight or moderate. Graduates valued industrial attachment and employer recognition, yet rated readiness, alignment, and institutional support for internships and placement as weak. Reliability testing showed the main scales were consistent. Inferential analysis confirmed that employment status shaped perceptions across key variables. Qualitative themes aligned closely with these statistical patterns, emphasising practical learning, curriculum updates, digital skills, employer partnerships, infrastructure, financial support, and soft skills.

4.6 Discussion

The study assessed labour market alignment and employability among TUM-TVET alumni and identified four dominant issues: high unemployment, weak alignment between training and labour market demands, moderate views of curriculum quality and attachment, and limited institutional support for internship placement and employment. These results inform TVET practice and policy discussions in Kenya, and they add to the broader literature on graduate employability.

Graduate Employment Outcomes and Labour Market Alignment

Unemployment reached 70.8%, while only 16.8% secured in-field employment. This indicates limited labour market absorption, consistent with concerns that training systems often lag behind changing workplace requirements. Joint policy analyses by UNESCO, ILO, and the World Bank similarly highlight institutional responsiveness, labour market intelligence, and employer involvement as central challenges in many low- and middle-income contexts. From a theoretical standpoint, the evidence offers only partial support for Human Capital Theory, since education investment did not automatically translate into employment without stronger institutional alignment and labour market demand.

Curriculum Relevance and Skills Mismatch

Ratings for curriculum relevance, skills usefulness, preparedness, and alignment were modest, indicating perceived gaps between training and work. These results closely match Skills Mismatch Theory, which explains how unemployment can persist among qualified graduates when competence does not match employer demand. In Kenya, CBET aims to reduce such gaps, yet the findings suggest ongoing implementation challenges, especially around curriculum responsiveness, practical exposure, and employer participation.

Industrial Attachment and Workplace Learning

Attachment relevance and employer recognition were rated more favourably than other dimensions. This pattern aligns with literature emphasising work-based learning as a core contributor to readiness and employability. The results fit Employability Theory in demonstrating that practical exposure supports not only technical skills but also workplace-oriented behaviours and transferable competencies.

Institutional Support for Graduate Transition

The weakest ratings concerned institutional support for internships and job placement. This indicates that the most fragile point in institutional performance lies in the education-to-work transition. International guidance repeatedly recommends strengthening career services, employer networks, placement mechanisms, and graduate tracking so that training providers can respond to labour market realities.

Employment Status and Graduate Perceptions

Graduates employed within their field consistently rated curriculum relevance, skills usefulness, readiness, and reputation more highly than unemployed graduates. This fits Labour Market Signalling Theory, as successful employment can strengthen confidence in the credibility and value of institutional qualifications. It also reflects the human capital expectation that the perceived returns to education are shaped by labour market outcomes.

Qualitative Findings and Institutional Improvement

Graduate recommendations concentrated on practical training, curriculum improvement, financial support, digital competence, employer partnerships, and infrastructure. The prominence of digital competence is particularly significant given the rapid integration of technology across sectors. The convergence of these themes with quantitative findings suggests a clear set of actionable priorities.

Overall Interpretation

The evidence indicates that TUM-TVET has strengths in competency-based technical training and industrial attachment, but faces constraints in turning training into sustained employment. The theoretical frameworks operate together here, skills acquisition matters, but so do institutional support, employer collaboration, mismatch reduction, and signalling strength. Improvements will likely require integrated reforms, continuous curriculum updating, stronger work-integrated learning, employer advisory structures, routine tracer studies, expanded digital and entrepreneurial competencies, and more effective career development services.

5. Conclusion, Implications and Recommendations

5.1 Conclusion

Using a tracer survey of 161 alumni, this study examined labour market alignment and employability among TUM-TVET graduates. Employment outcomes were weak, with 70.8% unemployed and only 16.8% employed in-field. Graduates valued industrial attachment and employer recognition, yet rated curriculum relevance, preparedness, alignment, financial support, internship coordination, and job placement support more negatively. Inferential results showed that employment

status significantly shaped perceptions of programme relevance and institutional reputation, with in-field employed graduates holding more favourable views. Open-ended responses converged on a clear set of improvement priorities, practical training, curriculum updates, employer partnerships, digital competence, financial support, and upgraded facilities.

The findings support the idea that skills development is necessary but not sufficient. Employability depends on how well training matches employer demand, how effectively institutions support transition into work, and how credentials and competence are signalled to employers. Regular tracer studies provide a practical evidence base for continuous improvement. Future work can extend this design through longitudinal tracking and multi-institution studies across Kenya.

5.2 Practical implications

The results have practical relevance for institutions, employers, policymakers, funders, and development partners. Evidence points to a need for coordinated interventions rather than isolated adjustments.

Implications for Universities

Universities offering TVET should move towards more market-oriented curriculum development, supported by regular use of labour market intelligence, employer feedback, and tracer evidence. Work-integrated learning needs expansion through attachments, cooperative programmes, and simulation-based training. Career development services require strengthening, including counselling, employability preparation, and active placement support. Digital competence should be integrated into programme delivery. Tracer studies should become routine within quality assurance systems.

Implications for TVET Institutions

Competency-based delivery should be reinforced through stronger practical learning, upgraded equipment, and workplace simulations. Employer advisory committees can support curriculum validation and attachment supervision. Alumni systems should be strengthened to support mentoring, workplace links, and labour market intelligence. Performance metrics should include employment outcomes and employer satisfaction rather than only enrolment and completion.

Implications for Employers

Employers should engage directly in curriculum processes and expand opportunities for internships, apprenticeships, and mentoring. Collaborative initiatives such as joint projects, certification schemes, and innovation hubs can strengthen relevance and graduate readiness. Structured feedback on graduate performance can guide institutional improvement.

Implications for County Governments

Counties can support local labour market alignment by building partnerships with institutions and industry, investing in labour market information, and supporting entrepreneurship programmes and incubation spaces. Procurement policies may also be designed to encourage local internship opportunities.

Implications for TVETA

TVETA can strengthen accreditation criteria by incorporating labour market responsiveness, employability outcomes, and tracer evidence. Standardised national tracer instruments and reporting frameworks would allow benchmarking. Continuous professional development for trainers, including industrial exposure, remains essential.

Implications for the Ministry of Education

Policy support is needed for regular curriculum review with employer participation, and for funding approaches that value outcomes such as employability and partnerships. Digital infrastructure investments can strengthen institutional capacity. Cross-ministry coordination can improve national skills planning.

Implications for HELB

Financial support influences student experiences and readiness. Expanded bursaries and targeted support for disadvantaged learners, including attachment-related expenses and certification costs, can reduce barriers. Loan products may also be adapted to support entrepreneurship transitions.

Implications for Development Partners

External support can prioritise institutional capacity, curriculum updating, digital infrastructure, trainer development, tracer systems, and entrepreneurship environments. Research support can target future skills areas and regional collaboration.

Overall Practical Implications

Improving employability requires integrated action across curriculum, practical learning, employer collaboration, digital capacity, entrepreneurship support, career services, and graduate tracking.

5.3 Policy Implications

Policy reforms should prioritise implementation, monitoring, employer engagement, and evidence-based adjustment.

Curriculum Review and Labour Market Responsiveness: Curriculum review can be established as a continuous policy expectation, informed by tracer studies, employer satisfaction data, labour market intelligence, occupational standards, and technological change.

Strengthening Digital Competencies: Digital competence should be embedded across programmes and supported by investment in digital infrastructure, simulations, and online platforms.

Institutionalisation of Employer Advisory Boards: Policies can require employer advisory boards at programme level, with clear responsibilities for curriculum review, attachment planning, and recruitment linkage.

National Graduate Tracer Systems: A coordinated national graduate tracer system, led by TVETA with relevant agencies, can provide comparable data on outcomes and support evidence-based policymaking.

Reforming Internship and Industrial Attachment Policy: National standards for attachment duration, supervision, assessment, and employer responsibilities can strengthen workplace learning. Incentives may encourage employers to host more students.

Outcome-Based Funding: Funding frameworks can incorporate employment outcomes, employer satisfaction, partnerships, innovation, and tracer compliance as performance indicators.

Entrepreneurship Support: Given high unemployment, entrepreneurship development requires stronger policy emphasis through incubation, mentoring, seed funding, and structured enterprise support.

Labour Market Information Systems: Strengthened labour market information systems can guide curriculum planning, admissions, standards, and funding priorities.

Public–Private Partnerships: Partnership models can be strengthened to support curriculum development, equipment sharing, attachments, research, and recruitment.

Monitoring and Evaluation: National KPIs for employability, including employment within six months, in-field employment, satisfaction measures, internship completion, and digital competence, can improve accountability.

Overall Policy Implications: A comprehensive policy approach is required, integrating curriculum updating, employer engagement, digital transformation, tracer systems, structured workplace learning, entrepreneurship support, labour market intelligence, outcome-linked funding, and performance monitoring.

References

- African Union. (2025). African Continental Technical and Vocational Education and Training (TVET) strategy (2025–2034): Skills for Africa's future. African Union Commission.
- Becker, G. S. (1964). Human capital: A theoretical and empirical analysis, with special reference to education. University of Chicago Press.
- Creswell, J. W., and Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). Sage.
- European Training Foundation. (2022). Tracer studies: Measuring the relevance of vocational education and training. European Training Foundation.
- International Labour Organization [ILOa]. (2024). Global employment trends for youth 2024: Decent work, brighter futures. International Labour Office.
- International Labour Organization [ILOb]. (2024). Skills and lifelong learning strategy: Building inclusive labour markets. International Labour Organization.
- International Labour Organization. (2025). World employment and social outlook: Trends 2025. International Labour Office.
- Organisation for Economic Co-operation and Development. (2023). OECD skills outlook 2023: Skills for a resilient and sustainable future. OECD Publishing. <https://doi.org/10.1787/dededfcf-en>
- Saunders, M., Lewis, P., and Thornhill, A. (2023). Research methods for business students (9th ed.). Pearson.
- Schultz, T. W. (1961). Investment in human capital. The American Economic Review, 51(1), 1–17.
- Spence, M. (1973). Job market signaling. Quarterly Journal of Economics, 87(3), 355–374.
- Technical and Vocational Education and Training Authority. (2023). Competency-based education and training implementation framework in Kenya. TVETA.

- UNESCO. (2024). Global education monitoring report 2024/25: Leadership in education. UNESCO Publishing.
- UNESCO. (2025). Transforming learning and skills development in Africa: Second continental report. Paris: UNESCO.
- UNESCO-UNEVOC. (2022). Transforming TVET for successful and just transitions: Trends and issues in TVET. UNESCO-UNEVOC International Centre.
- World Bank. (2023). Kenya economic update: Jobs for youth and skills development in Kenya. World Bank.
- World Bank. (2024). Skills development and labour market outcomes in Sub-Saharan Africa. World Bank.
- World Economic Forum. (2025). The future of jobs report 2025. World Economic Forum.