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Employer Skills Demand, TVET Graduate Competence, and Industry–Training Alignment in Mombasa County, Kenya

Anwar H. Ahmed*
School of Business, Technical University of Mombasa, Kenya
**Corresponding Author*

William Kingi
School of Business, Technical University of Mombasa, Kenya

Abstract

This study examined employer skill requirements, perceived TVET graduate competence, skills gaps, workplace-readiness challenges, emerging technology requirements, and opportunities for stronger industry–training collaboration in Mombasa County, Kenya. The article draws primarily on the Industry Employer Survey undertaken as a quantitative component of the Technical University of Mombasa (TUM) feasibility study on market-aligned TVET programmes. Data from 180 complete employer responses covering all six sub-counties of Mombasa County were analysed using descriptive statistics, internal-consistency reliability tests, chi-square tests of association, Kruskal–Wallis analysis, Spearman rank-order correlations, and effect-size measures. Employers placed exceptionally high importance on communication (M = 4.93), customer service (M = 4.91), work ethics (M = 4.90), professionalism (M = 4.90), and teamwork (M = 4.89). Ninety percent of employers had hired TVET graduates during the preceding three years, and 93.3% rated their competence as good or excellent. Nevertheless, quality-control knowledge (M = 3.34), leadership and initiative (M = 3.27), and industry exposure (M = 3.27) were prominent perceived gaps. Recruitment difficulty increased significantly with company size, $H(4) = 26.44$, $p < .001$, $\varepsilon^2 = .125$, while perceived skill gaps were positively associated with recruitment difficulty, $\rho = .319$, $p < .001$. Automation/artificial intelligence was identified by 98.3% of employers as a critical emerging skill area, followed by data analysis (81.7%). Only 25.6% of employers were currently collaborating with a TVET institution, but 99.4% expressed willingness to collaborate more closely with TUM-TVET. The findings support an industry-integrated, competency-based and future-oriented TVET model built around work-based learning, employability skills, digital transformation, structured employer partnerships, and continuous labour-market feedback.

Key Words: TVET; Skills Mismatch; Employer Demand; Employability; Work-Based Learning; Industry Collaboration; TUM-TVET; Mombasa County; Kenya

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1. Introduction

Technical and vocational education and training (TVET) is increasingly expected to function as a direct bridge between education, productive employment, technological change, and inclusive economic development. In Kenya, this expectation is particularly important in counties whose economies are undergoing rapid structural change. Mombasa County combines port and maritime activities, logistics, tourism and hospitality, manufacturing, ICT, construction, retail, and a substantial informal economy. The resulting labour market requires workers who possess not only occupational and technical competence but also communication, professionalism, adaptability, digital literacy, problem-solving capability, and the capacity to learn continuously. (UNESCO, 2022; World Bank et al., 2023).

The proposal underpinning this study was developed in response to concerns about limited alignment between training provision and industry needs, fragmented stakeholder engagement, inadequate market intelligence, skills mismatch, and the need to strengthen the institutional

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sustainability and competitiveness of TUM-TVET. The proposal defines market alignment as a central strategic concern and identifies industry mapping, skills-demand analysis, skills-gap assessment, institutional positioning, learner needs, and resource mobilisation as interconnected components of the wider feasibility study. The present article deliberately narrows that broad agenda to the employer component so that the empirical evidence can be presented as a coherent journal contribution. (Technical University of Mombasa [TUM], 2025; African Development Bank [AfDB] & International Labour Organization [ILO], 2023).

The proposal specifically calls for identification of technical, digital, and soft skills demanded by employers in sectors such as logistics, hospitality, ICT, manufacturing, maritime services, and the creative industries, together with assessment of skills gaps and development of evidence-based recommendations for curriculum redesign and industry engagement. It also proposes engagement of employers and private-sector actors through surveys, interviews, focus groups, and consultative processes. The employer survey therefore represents an important empirical bridge between the strategic problem identified in the proposal and the operational decisions required to reposition TUM-TVET. (ILO, 2023b; UNESCO, 2022).

The central problem addressed in this article is that labour-market alignment cannot be inferred from programme titles or institutional intentions alone. It must be tested against employer expectations and workplace experience. A programme may contain technically appropriate content yet still produce graduates who require substantial retraining if students have insufficient workplace exposure, weak quality-control habits, limited initiative, or inadequate digital capabilities. Conversely, favourable employer assessments of graduates may indicate areas in which existing training is already producing value. Understanding both strengths and deficits is therefore essential for evidence-based curriculum and partnership decisions. (World Bank et al., 2023; OECD, 2023a).

The study addresses five questions: (a) What technical and employability attributes do employers consider most important? (b) How do employers assess TVET graduates and what skill gaps do they observe? (c) What organisational and workplace factors are associated with recruitment difficulty? (d) Which emerging technologies and skills are expected to shape future demand? and (e) What forms of industry–TUM-TVET collaboration are most strongly supported by employers?

The study contributes by integrating descriptive and inferential evidence into a single employer-oriented assessment. Rather than reporting employer preferences only as percentages, it examines associations among company characteristics, perceived graduate gaps, recruitment difficulty, familiarity with TUM-TVET, and institutional perceptions. The resulting evidence provides a stronger basis for curriculum redesign, work-based learning, employer engagement, and future-skills planning.

The Kenyan policy environment reinforces these arguments. Kenya's Vision 2030 explicitly envisages stronger industry linkages, labour-market information, and improved management of industrial attachment in TVET (Republic of Kenya, 2007). The competency-based education and training framework further states that TVET qualifications should meet industry requirements, be based on occupational standards, and develop strong partnerships between industry and education (TVET CDACC, 2018). The Kenya National Qualifications Framework similarly incorporates TVET and industry sub-frameworks and emphasises knowledge, skills, and competencies as learning outcomes (KNQA, 2024). The employer evidence in this article therefore has direct implications for implementation of established Kenyan policy directions.

Technological transformation further strengthens the case for continuous curriculum updating. UNESCO (2022) calls for TVET systems to anticipate skills requirements associated with digital and

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green transitions, while WEF (2025b) shows that AI, robotics, energy, and network technologies are reshaping major job families. In Kenya, recent labour-market evidence also highlights the importance of addressing mismatches between available skills and employer requirements (World Bank, 2024; ILO, 2026).

The literature also supports the integration of transferable and socio-emotional skills into occupational training. The ILO (2024) notes that core employability skills are often acquired through work experience and are especially important for first-time jobseekers. Global employer evidence similarly places analytical thinking, resilience, flexibility, leadership, social influence, creative thinking, technological literacy, and service orientation among important current and emerging capabilities (WEF, 2025a). These findings provide an external benchmark against which the high employer ratings for communication, professionalism, teamwork, customer service, and work ethics in Mombasa can be interpreted.

A central theme in the literature is the importance of employer participation. The ILO (2023b) reports that employers, workers' organisations, and other social partners are critical to making TVET responsive to labour-market requirements. OECD evidence likewise shows that work-based learning can align programme content with labour-market needs while developing technical and broader employability skills and connecting learners to potential employers (OECD, 2023a). The present study therefore treats employer collaboration not as an auxiliary activity but as a core mechanism of market alignment.

The literature consistently frames TVET as an intermediary between education systems and productive sectors. The World Bank, ILO, and UNESCO (2023) argue that effective TVET systems must be demand-driven, responsive to technological and demographic change, and capable of combining technical, foundational, and transferable skills. Similarly, the African Development Bank and ILO (2023) emphasise that stronger productive-sector linkages are essential if African TVET systems are to improve employability, productivity, and structural transformation.

2. Conceptual and Contextual Framework

The analysis is informed by a labour-market alignment perspective in which the relevance of a training institution depends on the degree to which curriculum content, learning experiences, assessment practices, and graduate competencies correspond with changing occupational requirements. Within this perspective, employer demand is not static. Technological change, regulatory requirements, organisational restructuring, automation, and changing customer expectations alter the competence profile required of workers. TVET institutions therefore need mechanisms through which labour-market signals are continuously translated into curriculum and workplace-learning decisions. (OECD, 2023a; ILO, 2023b; AfDB & ILO, 2023).

The work also emphasises competency-based education and training (CBET), stronger public–private partnerships, digital and blended learning, green skills, entrepreneurship, and continuous feedback through tracer studies, employer surveys, and stakeholder consultations. The employer findings are therefore interpreted not simply as a list of desired attributes but as evidence about the institutional capabilities required to sustain market relevance. (UNESCO, 2022; Kenya National Qualifications Authority [KNQA], 2024; Technical and Vocational Education and Training Curriculum Development, Assessment and Certification Council [TVET CDACC], 2018).

Three linked dimensions are particularly important. First, employers require immediate occupational competence: graduates must be able to perform technical tasks to expected standards.

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Second, employers require workplace competence: graduates must communicate, collaborate, manage time, demonstrate professional conduct, solve problems, take initiative, and work safely. Third, employers increasingly require future-oriented competence: workers must adapt to AI, data-intensive systems, automation, cybersecurity, renewable technologies, and sector-specific digital platforms. A market-aligned TVET system must address all three dimensions simultaneously. (ILO, 2024; World Economic Forum [WEF], 2025a).

3. Method

3.1 Research Design and Setting

The broader feasibility study adopted a mixed-methods design integrating quantitative and qualitative evidence. The present article uses the employer survey component as its primary empirical source. The study covered all six sub-counties of Mombasa County: Mvita, Changamwe, Jomvu, Kisauni, Nyali, and Likoni. The proposal identifies these areas as economically differentiated settings with distinct concentrations of port operations, logistics, manufacturing, petroleum-related activities, tourism, hospitality, ICT, commercial services, transport, and informal-sector activity. (Creswell & Creswell, 2018).

The employer instrument was designed to capture organisational characteristics, workforce and recruitment conditions, technical and soft-skill requirements, perceptions of TVET graduates, observed graduate skill gaps, internship and workplace-readiness challenges, emerging skills, current TVET collaboration, willingness to collaborate with TUM-TVET, and perceptions of TUM-TVET. The present analysis uses 180 complete employer responses.

3.2 Measures

Employer perceptions were measured largely through five-point ordinal rating scales. Soft-skill importance was rated from 1 (not important) to 5 (very important). Graduate skill gaps were rated from 1 (not observed) to 5 (extremely observed). Similar ordinal scales were used for internship and workplace-readiness challenges. The analysis also included categorical indicators of TVET graduate hiring, competence ratings, current collaboration, willingness to collaborate, company size, familiarity with TUM-TVET, and institutional perception. (Creswell & Creswell, 2018).

Internal consistency was assessed for the principal multi-item constructs. The soft-skills scale had strong reliability (Cronbach's $\alpha = .861$), the 19-item skill-gap scale had very high reliability ($\alpha = .958$), and the 20-item internship-challenge scale had strong reliability ($\alpha = .897$). These coefficients support use of the composite measures for inferential analysis. (Cronbach, 1951).

3.3 Data Analysis

Descriptive analysis comprised frequencies, percentages, means, and rankings. Because many employer ratings were ordinal and the analysis did not require an assumption of interval-level measurement, non-parametric inferential procedures were prioritised. Chi-square tests examined associations between categorical variables, with Cramer's V used as an effect-size measure. Kruskal–Wallis tests examined differences in recruitment difficulty across company-size categories, with epsilon-squared used to estimate effect size. Spearman rank-order correlations assessed monotonic associations among composite and ordinal variables. Statistical significance was evaluated at $\alpha = .05$.

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Findings are interpreted with attention to both statistical significance and practical meaning. (Kruskal & Wallis, 1952; Spearman, 1904; Cohen, 1988).

3.4 Ethical Considerations

The wider feasibility study incorporated informed-consent procedures, voluntary participation, confidentiality protections, and secure handling of research information. The employer survey was part of the broader Technical University of Mombasa feasibility study on market-aligned TVET programmes. In reporting the present findings, organisations and individual respondents are not identified.

4. Results

4.1 Employer Profile

The 180 employers were distributed across all six Mombasa sub-counties. Nyali contributed 38 respondents (21.1%), Kisauni 35 (19.4%), Jomvu 30 (16.7%), Changamwe 30 (16.7%), Mvita 29 (16.1%), and Likoni 18 (10.0%). The sample therefore provides geographical coverage of the entire county rather than concentrating on a single industrial corridor.

Table 1: Distribution of Employers by Sub-County

Sub-county	Nyali	Kisauni	Jomvu	Changamwe	Mvita	Likoni	Total
N	38	35	30	30	29	18	180
%	21.1	19.4	16.7	16.7	16.1	10.0	100.0

Company size was dominated by smaller firms: 103 employers (57.2%) had 1–20 employees. Fifteen (8.3%) had 21–50 employees, 23 (12.8%) had 51–100, 27 (15.0%) had 101–300, and 12 (6.7%) employed more than 300 workers. Thus, although SMEs were the majority, the sample also contained a meaningful group of medium and large employers.

Table 2: Employer Distribution by Number of Employees

Employees	1-20	21-50	51-100	101-300	300+	Total
N	103	15	23	27	12	180
%	57.2	8.3	12.8	15.0	6.7	100.0

4.2 Employer Demand for Soft Skills

Employers expressed exceptionally strong demand for workplace behaviours and employability competencies. Communication recorded the highest mean rating (M = 4.93), followed by customer service (M = 4.91), work ethics (M = 4.90), professionalism (M = 4.90), and teamwork (M = 4.89). Even the lowest-ranked item, dependability, recorded a high mean (M = 4.79). The overall pattern indicates that employability is viewed as integral to occupational performance rather than as an optional supplement to technical training. (ILO, 2024; WEF, 2025a).

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Table 3: Employer-rated importance of soft skills

Rank	Soft skill	Mean rating
1	Communication	4.93
2	Customer service	4.91
3	Professionalism	4.90
4	Work ethics	4.90
5	Teamwork	4.89
6	Time management	4.87
7	Interpersonal skills	4.85
8	Critical thinking	4.85
9	Adaptability	4.83
10	Problem-solving	4.82
11	Dependability	4.79

Note. Ratings were based on a five-point scale from 1 = not important to 5 = very important. Higher values indicate stronger employer demand.

The reliability coefficient for the soft-skills scale was $\alpha = .861$, indicating strong internal consistency. The magnitude and consistency of the ratings suggest that TUM-TVET should embed communication, professionalism, teamwork, customer service, critical thinking, adaptability, and related competencies within technical modules, practical projects, assessment tasks, and workplace learning.

4.3 Recruitment Difficulty and TVET Graduate Competence

Most employers (121; 67.2%) reported moderate difficulty finding employees with the right skills locally. Forty employers (22.2%) reported that finding appropriately skilled workers was easy, while 14 (7.8%) reported difficulty and two (1.1%) reported very great difficulty. Three employers (1.7%) described recruitment as very easy.

The result should not be interpreted as evidence that the labour market is functioning without skills constraints. Rather, the concentration in the moderate category indicates that many employers experience some degree of difficulty, while a smaller group experiences acute difficulty. Importantly, recruitment difficulty differed significantly by company size. A Kruskal–Wallis test was statistically significant, $H(4) = 26.44$, $p < .001$, $\varepsilon^2 = .125$, indicating a meaningful difference across organisational-size categories. Larger firms tended to report greater difficulty obtaining appropriately skilled workers. (World Bank, 2024; ILO, 2026).

Table 4: Difficulty Finding Employees With the Right Skills Locally

Sub-county	Very easy	Easy	Moderate	Difficult	Very difficult	Total
N	3	40	121	14	2	180
%	1.7	22.2	67.2	7.8	1.1	100.0

TVET graduates were nevertheless viewed favourably overall. A total of 162 employers (90.0%) had hired TVET graduates during the preceding three years. Across the full sample, 168 employers (93.3%) rated TVET graduate competence as good or excellent. A chi-square test showed a significant association between TVET hiring experience and competence ratings, $\chi^2(2) = 26.58$, $p < .001$, $V = .384$. The moderate effect suggests that direct workplace experience with TVET graduates is

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associated with more favourable assessments of their competence. (World Bank et al., 2023; ILO, 2026).

4.4 Observed TVET Graduate Skill Gaps

Despite favourable overall competence ratings, employers identified specific areas in which graduates require strengthening. The highest-rated gap concerned understanding of quality standards and quality control (M = 3.34), followed by leadership and initiative-taking (M = 3.27) and lack of industry exposure or workplace experience (M = 3.27). Attention to detail and self-management/accountability each recorded M = 3.19. Difficulty applying theory to real-world tasks, creativity and innovation, and confidence performing tasks independently each recorded approximately M = 3.18.

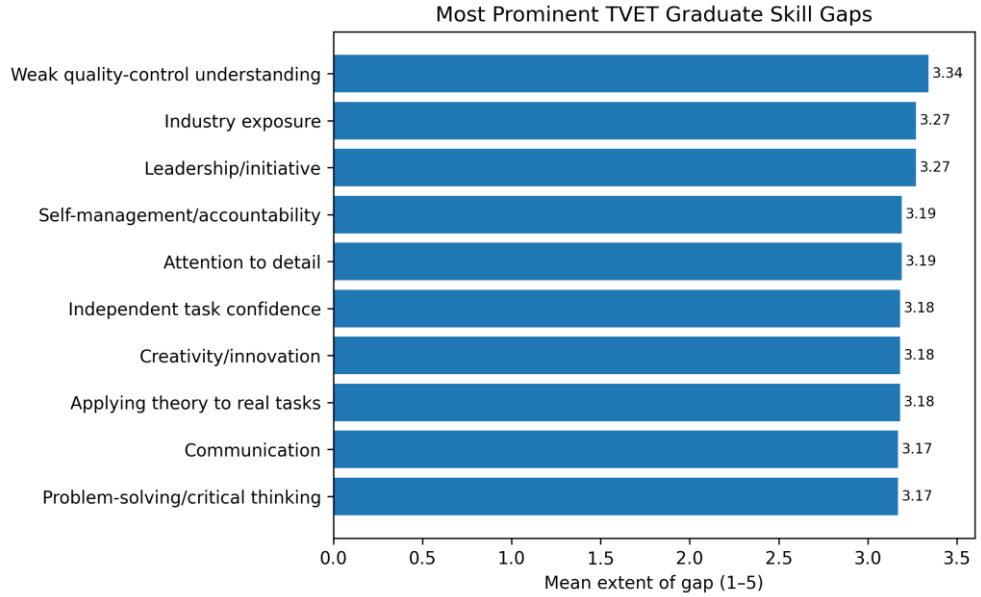


Figure 1: Most prominent TVET graduate skill gaps

Note. Items are ranked by mean extent to which the gap was observed, where 1 = not observed and 5 = extremely observed.

The 19-item scale demonstrated very high internal consistency (α = .958). More importantly, the overall skill-gap score was positively associated with recruitment difficulty, ρ = .319, p < .001. Employers reporting more pronounced graduate skill deficiencies were therefore also more likely to report difficulty finding appropriately skilled employees. This relationship provides inferential support for the proposition that the quality and relevance of graduate competencies are connected to labour-market recruitment conditions.

4.5 Internship and Workplace-Readiness Challenges

The employer survey also identified challenges affecting the effectiveness of internships and workplace learning. The leading concern was the significant compliance training required of interns (M = 3.47), followed by the amount of training time relative to short-term productivity gains (M = 3.43), limited supervisor time for mentoring (M = 3.42), unclear intern career goals (M = 3.42), and

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difficulty adapting to organisational culture and expectations (M = 3.41). The scale demonstrated strong reliability (α = .897).

These findings suggest that work-based learning cannot simply be expanded by increasing the number of placements. Effective placements require preparation of both parties. Students need workplace-readiness, compliance, safety, communication, and professional-conduct preparation before placement, while host organisations need clear learning outcomes, supervision guidance, structured assessment tools, and realistic expectations regarding intern productivity.

4.6 Emerging Skills and Future Labour-Market Requirements

The future-skills findings reveal a substantial technological transition. Automation and artificial intelligence were selected by 177 employers (98.3%) as critical emerging skill areas. Data analysis was identified by 147 employers (81.7%), renewable-energy technologies by 112 (62.2%), cybersecurity by 94 (52.2%), robotics/mechatronics by 87 (48.3%), and blue-economy/maritime technology by 50 (27.8%). (WEF, 2025a; WEF, 2025b; UNESCO, 2022).

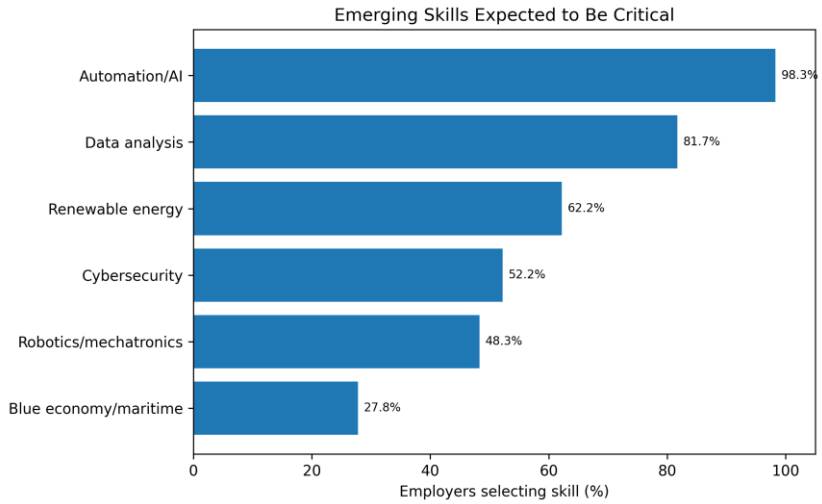


Figure 2: Emerging skills expected to be critical

Note. *Employers could select multiple emerging skills; percentages therefore do not sum to 100%.*

The findings are reinforced by organisational change indicators: 92.8% of employers reported planned expansion or automation that could affect future skill requirements, while 90.6% reported current investment in staff upskilling or reskilling. The evidence therefore points to a labour market in which the relevance of technical education increasingly depends on the ability to combine occupational skills with digital and adaptive capabilities.

4.7 Industry Collaboration With TUM-TVET

Only 46 employers (25.6%) reported current collaboration with a TVET institution, while 134 (74.4%) did not. In sharp contrast, 179 employers (99.4%) expressed willingness to collaborate more closely with TUM-TVET. This difference represents a substantial untapped partnership opportunity. (ILO, 2023b; OECD, 2023a).

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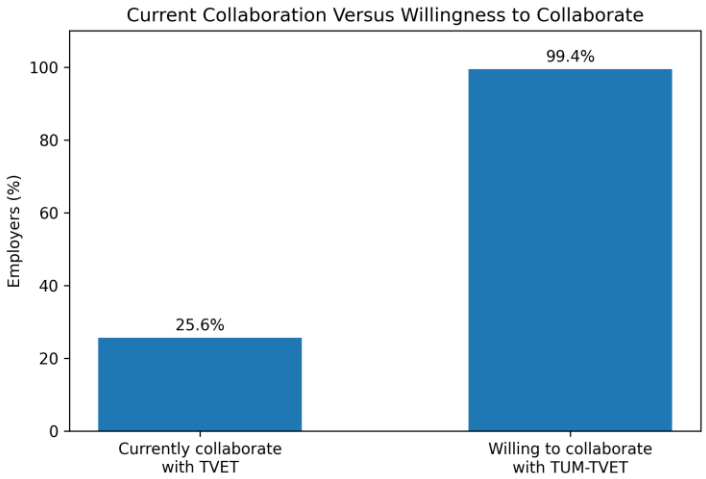


Figure 3: Current collaboration versus willingness to collaborate

Note. Percentages are based on N = 180 employers. Current collaboration refers to collaboration with a TVET institution; willingness refers specifically to closer collaboration with TUM-TVET.

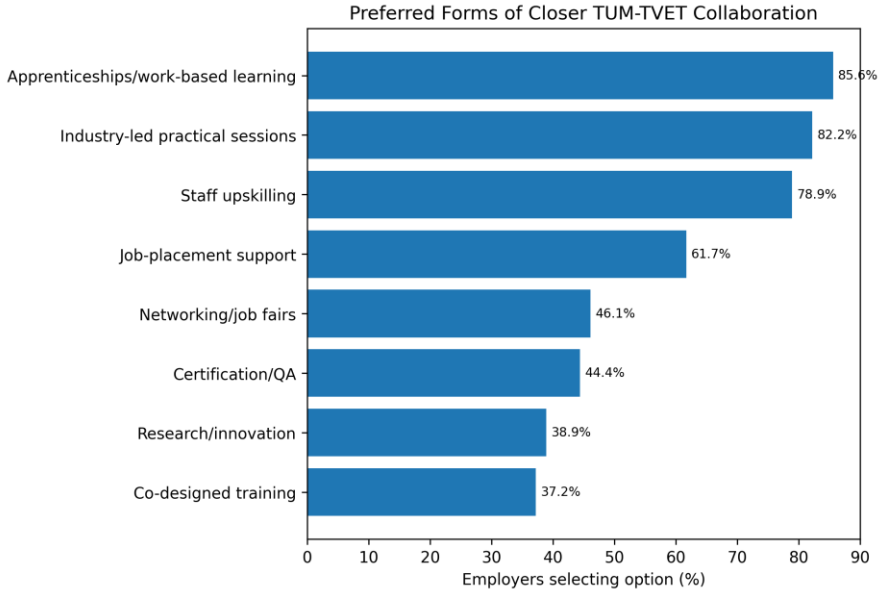


Figure 4: Preferred forms of closer TUM-TVET collaboration

Note. Employers could select multiple options; percentages therefore do not sum to 100%.

The preferred forms of collaboration were apprenticeships or work-based learning (85.6%), industry-led practical sessions, demonstrations or laboratories (82.2%), tailor-made short courses or staff upskilling (78.9%), and job-placement support (61.7%). Networking events and job fairs (46.1%), certification and quality-assurance support (44.4%), research or innovation partnerships (38.9%), and co-designed training programmes (37.2%) were also supported.

The alignment between the identified skill gaps and the preferred collaboration mechanisms is notable. Employers identify lack of workplace exposure as a major graduate gap and simultaneously prioritise apprenticeships and practical sessions. This convergence suggests that the partnership

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agenda should focus first on mechanisms capable of directly changing students' workplace experience rather than relying only on formal memoranda or occasional consultation meetings.

4.8 TUM-TVET Familiarity and Institutional Perception

Only seven employers (3.9%) were not familiar with TUM-TVET, while 100 (55.6%) were somewhat familiar and 73 (40.6%) were very familiar. Institutional perception was similarly favourable: 159 employers (88.3%) held a positive perception, 14 (7.8%) held a very positive perception, and seven (3.9%) were neutral.

Familiarity with TUM-TVET was positively associated with institutional perception, $\rho = .288$, $p < .001$. The relationship should be interpreted as correlational rather than causal. Nevertheless, it indicates that stronger employer exposure to TUM-TVET tends to coincide with more favourable perceptions, providing a rationale for sustained employer engagement, employer forums, industry visits, graduate showcases, joint projects, and structured communication.

4.9 Discussion

The employer evidence presents a nuanced picture of TVET relevance in Mombasa County. On one hand, the results are strongly positive: most employers have experience hiring TVET graduates and most rate their competence favourably. On the other hand, employers identify gaps that are precisely the competencies needed to convert classroom knowledge into reliable workplace performance. The combination of favourable overall competence ratings and specific gaps is therefore not contradictory. It suggests that the central issue is not whether TVET graduates possess useful skills, but whether their training consistently produces the depth of workplace competence required by different employers. (World Bank et al., 2023; AfDB & ILO, 2023).

This pattern is consistent with the broader TVET literature, which cautions that favourable graduate outcomes can coexist with persistent relevance problems when curricula, occupational standards, equipment, and workplace exposure do not keep pace with employer requirements (World Bank et al., 2023). It also supports African evidence that effective TVET depends on stronger connections between training institutions and productive-sector actors (AfDB & ILO, 2023).

The exceptionally high ratings for communication, customer service, work ethics, professionalism, and teamwork reinforce the proposal's emphasis on market alignment. These competencies should not be relegated to general studies units that students can pass without demonstrating workplace application. Instead, they should be embedded in occupational tasks and assessed through observable behaviour. For example, a hospitality student can be assessed on customer communication while performing a service task; a logistics student can be assessed on communication and documentation during a simulated shipment; and an engineering student can be assessed on teamwork, safety communication, quality control, and problem-solving during a practical project.

The graduate-gap findings also point to a distinction between exposure and capability. Employers identified lack of industry exposure and difficulty applying theory to real-world tasks as important concerns. These findings support the proposal's emphasis on strengthening industry linkages and CBET. A stronger workplace-learning model should provide students with repeated opportunities to encounter real standards, constraints, customer expectations, safety procedures, quality requirements, equipment, digital systems, and production targets before graduation. (OECD, 2023a; ILO, 2024).

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Quality control emerged as the most prominent graduate gap. This is strategically important because quality is a cross-sector competency. Whether graduates enter manufacturing, hospitality, logistics, ICT, maritime operations, construction, or services, employers expect work to meet standards. TUM-TVET can respond by strengthening practical quality-assurance tasks, occupational standards, inspection procedures, troubleshooting, documentation, error detection, and continuous-improvement activities across programmes.

Leadership and initiative also emerged strongly. This does not necessarily imply that entry-level graduates should be prepared for managerial positions. Rather, employers appear to value graduates who can recognise a problem, take responsible action, ask appropriate questions, work independently when possible, and accept accountability for outcomes. Curriculum and assessment can develop these capabilities through project-based assignments, problem-based learning, student-led practical tasks, enterprise projects, and workplace supervisors' assessments.

The future-skills findings are perhaps the clearest signal for curriculum transformation. With 98.3% of employers selecting automation/AI and 81.7% selecting data analysis, TUM-TVET should treat digital transformation as a cross-cutting institutional issue rather than limiting it to specialist ICT programmes. AI literacy, data interpretation, digital documentation, automation awareness, and the use of sector-specific software increasingly belong within technical occupations themselves. (WEF, 2025a; WEF, 2025b).

The strong employer willingness to collaborate offers an unusual strategic opportunity. The gap between 25.6% current collaboration and 99.4% willingness suggests that the problem is unlikely to be widespread employer resistance. Instead, the institution may need stronger coordination mechanisms that make collaboration easy, structured, predictable, and beneficial to both parties. A dedicated industry partnership office, sector-based advisory boards, standardised placement agreements, employer contact databases, joint practical sessions, and annual employer skills reviews could convert willingness into sustained institutional relationships. (ILO, 2023b; UNESCO, 2022; African Union Commission, 2014).

The significant association between company size and recruitment difficulty also has practical implications. Larger firms may have more specialised occupational roles, higher compliance requirements, more sophisticated technologies, or greater expectations regarding prior experience. TUM-TVET should therefore avoid designing a single generic employer-engagement model. Large industrial and logistics firms may require structured apprenticeships and specialised technical partnerships, while SMEs may benefit more from shared training, short courses, pooled apprenticeship schemes, and flexible industry projects.

The positive association between familiarity and institutional perception provides further justification for increasing visibility among employers. However, the evidence should not be interpreted causally. Familiarity may improve perceptions, but employers with already favourable views may also be more likely to interact with TUM-TVET. Longitudinal employer-engagement studies could test whether structured exposure to TUM-TVET actually changes institutional perceptions and recruitment behaviour.

5. Conclusion, Implications and Recommendations

5.1 Conclusion

This study demonstrates that labour-market alignment of TVET in Mombasa County depends on more than the availability of technically oriented programmes. Employers expect graduates to

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combine occupational competence with strong communication, professionalism, teamwork, work ethics, adaptability, problem-solving, and independent performance. The results are encouraging because 90.0% of employers had hired TVET graduates and 93.3% rated graduate competence as good or excellent. However, important gaps remain in quality control, leadership and initiative, industry exposure, attention to detail, self-management, and the application of theory to real workplace tasks.

The inferential evidence reinforces the strategic importance of addressing these gaps. Recruitment difficulty differed significantly by company size, and greater perceived skill gaps were associated with greater recruitment difficulty. At the same time, the future skills environment is changing rapidly, with automation/AI and data analysis dominating employer expectations. TUM-TVET therefore needs to combine CBET with a stronger digital and future-skills orientation.

Most importantly, the study identifies a major opportunity for institutional transformation. Although only 25.6% of employers reported current collaboration with a TVET institution, 99.4% expressed willingness to collaborate more closely with TUM-TVET. Employers' preferred mechanisms—apprenticeships, industry-led practical training, staff upskilling, and job-placement support—closely match the weaknesses identified in graduates. The strategic implication is therefore clear: TUM-TVET should move decisively toward an industry-integrated model in which employers participate not only after training, but throughout curriculum design, practical learning, assessment, staff development, innovation, and graduate transition to employment.

5.2 Implications for TUM-TVET Programme Development

First, work-based learning should be expanded and redesigned around explicit competency outcomes. Apprenticeships, industrial attachment, employer-led practical sessions, workplace projects, and joint assessment should form a coherent pathway rather than isolated activities. This direction is consistent with evidence that work-based learning strengthens technical and employability skills while improving connections to employers (OECD, 2023a; ILO, 2023b).

Second, employability should be embedded in technical curricula. Communication, teamwork, professionalism, customer service, work ethics, adaptability, critical thinking, problem-solving, and time management should appear in course learning outcomes and assessment rubrics.

Third, quality assurance and independent performance should become explicit graduate competencies. Practical assessments should require students to meet workplace standards, identify defects, document processes, troubleshoot problems, and demonstrate accountability.

Fourth, digital and emerging skills should be integrated across programmes. Priority areas suggested by employers include AI and automation, data analysis, renewable-energy technologies, cybersecurity, robotics/mechatronics, and maritime technologies. This is consistent with global employer forecasts that AI and big data, cybersecurity, technological literacy, and related capabilities are among the fastest-growing skill areas (WEF, 2025a).

Fifth, internship design should be standardised. TUM-TVET should establish pre-placement preparation, safety and compliance induction, supervisor guidance, learning contracts, structured logbooks, mid-placement feedback, and joint final assessment.

Sixth, TUM-TVET should establish a formal employer partnership mechanism. Sector-specific advisory boards could meet regularly to review skill demand, curriculum relevance, equipment needs, internship performance, emerging technologies, and graduate outcomes.

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5.3 Strengths and Limitations

A major strength is the geographical coverage of all six Mombasa sub-counties and the inclusion of employers of different organisational sizes. The study also benefits from the use of multiple analytical techniques, reliability testing, and effect-size reporting rather than relying solely on descriptive percentages. The alignment between the descriptive results and the inferential relationships strengthens the practical interpretation of the findings.

Several limitations should nevertheless be recognised. First, the analysis is cross-sectional and therefore cannot establish causality. Associations between familiarity, perception, skill gaps, and recruitment difficulty should not be interpreted as causal effects. Second, the data are based on employer perceptions, which may reflect differences in organisational expectations, sectoral standards, or respondent experience. Third, the survey forms one component of a broader mixed-methods feasibility study; the present article does not integrate the student, alumni, funder, institutional, or qualitative evidence. Fourth, the sample was not presented as a probability sample of every employer in Mombasa County, so generalisation beyond the participating employers should be made cautiously. Future research should combine repeated employer surveys with graduate tracer data, workplace performance assessments, and sector-specific longitudinal studies.

5.4 Recommendations

The findings point to actions that need to be taken together by TUM-TVET management and programme teams, employers and industry partners and TVET stakeholders relevant to each priority. The recommendations below therefore specify the primary actor responsible for each priority (although several actions require joint implementation).

Expand structured apprenticeships and work-based learning. TUM-TVET (in partnership with employers and industry partners) should expand and restructure apprenticeships, industrial attachments, employer-led practical sessions, workplace projects etc around clearly defined competency outcomes; employers should give students meaningful opportunities to experience real workplace standards, equipment, procedures, customer expectations, safety requirements and production targets; TUM-TVET should ensure that workplace learning is integrated into programme outcomes and assessment. This recommendation is supported by the fact that 85.6% of employers preferred apprenticeships or work-based learning and lack of industry exposure was identified as one of leading graduate skill gaps.

Integrate employability skills into technical curricula and assessment. TUM-TVET programme teams and lecturers should embed communication, customer service, work ethics, professionalism, teamwork, time management, adaptability, critical thinking and problem solving directly into technical modules (e.g., practical projects), workplace tasks and assessment rubrics; they should not be seen as general skills to be added on top of other general skills but rather students should demonstrate them in observable workplace behaviour during their occupational training (this recommendation is supported by the exceptionally high employer ratings for communication M = 4.93; customer service M = 4.91; professionalism M = 4.90; work ethics M = 4.90; teamwork M = 4.89).

Quality-control and workplace practice training. TUM-TVET needs to strengthen practical training and assessment so that graduates can apply quality standards, detect defects, document work processes, troubleshoot problems, maintain accuracy and accountability in realistic workplaces. Programme teams need to work with industry practitioners to ensure that quality-control

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requirements match actual occupational standards (manufacturing, hospitality, logistics, ICT, maritime operations, construction and services). This priority is justified by the finding that understanding of quality standards and quality control was the most prominent graduate skill gap (M = 3.34).

Integrate AI, data analysis, automation, robotics and other emerging technologies into programmes. TUM-TVET should consider digital and emerging technologies as institutional priority (not just specialist ICT programmes). Programme teams need to progressively include AI literacy, data interpretation, digital documentation, automation awareness, sector specific software, cybersecurity, robotics, renewable energy technologies and maritime technologies according to relevance for occupations. This recommendation is based on the fact that 98.3% of employers identified automation/artificial intelligence as a critical emerging skill area; 81.7% data analysis and 92.8% planned expansion or automation affecting future skill requirements.

Formal and sustained employer partnership structures should be established. TUM management and TUM-TVET should develop formal mechanisms for systematic engagement with employers (sector-based advisory boards, employer databases, standardised placement arrangements, industry-led practical sessions, joint projects, staff development and regular employer forums). Employers should not only provide placements but also review curriculum, deliver practical training, assess students, innovate and graduate into employment. This recommendation addresses the yawning gap between 25.6% of employers that are collaborating with a TVET institution today and 99.4% who say they are willing to work more closely with TUM-TVET (see Figure 1).

Redesign internship preparation and supervision as shared responsibility. TUM-TVET and host employers should jointly redesign internship and industrial-attachment arrangements to improve workplace readiness (pre-placement preparation on conduct, safety, compliance, communication and expected learning outcomes; learning contracts, structured logbooks, monitoring & assessment) and quality of learning during placement (M = 3.47 compliance training; M = 3.43 time spent in training compared to short term productivity; M = 3.42 supervisor mentoring time; M = 3.42 unclear intern career goals; M = 3.41 difficulty adapting to organisational culture). Compliance training (M = 3.47), training time vs short term productivity (M = 3.43), limited supervisor time for mentoring (M = 3.42), unclear intern career goals (M = 3.42) and difficulty adapting to organisational culture (M = 3.41) are identified as internship challenges.

Set up an annual employer skills-feedback and curriculum review cycle. TUM-TVET should institutionalise an annual process through which employers systematically provide feedback on graduate competencies, emerging skill requirements, recruitment challenges, internship performance, equipment needs and curriculum relevance; programme teams and employer advisory structures should review these findings and translate them into curriculum updates, practical training improvements, staff development priorities and future skills planning (this recommendation is particularly relevant because perceived graduate skill gaps were positively correlated with recruitment difficulty ($\rho = .319$, $p < .001$); persistent skills deficiencies are linked to employers' difficulties in getting the right workers).

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