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Labour Market Integration and Employability of Automotive Engineering Graduates: A Case of Arusha Technical College

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Abstract: *This study examines the labour market integration and employability of Automotive Engineering graduates from Arusha Technical College (ATC), Tanzania, using data from the Department's Graduate Tracer Study of the December 2024 graduating cohort. A descriptive survey design was employed, with data collected from 32 of 39 graduates enrolled in Automotive Engineering (AE), Auto-Electrical and Electronic Engineering (AEE), and Heavy Duty Equipment Engineering (HDE). Quantitative data were analysed using IBM SPSS Statistics Version 27 through descriptive statistics, while qualitative responses were examined using thematic content analysis. The findings indicate that six months after graduation, 56.3% of graduates were either formally employed (34.4%) or self-employed (21.9%), increasing to 59.4% at the time of the survey, exceeding the institutional average. Employment outcomes, however, varied substantially across programmes. AEE graduates achieved the highest formal employment rate (62.5%) with no unemployment, whereas AE graduates demonstrated the strongest entrepreneurial orientation, with 50.0% engaged in self-employment. In contrast, HDE graduates experienced the weakest labour market outcomes, recording no formal employment and a 62.5% unemployment rate. Employment was concentrated in the private sector and automotive service and repair industry, with fixed-term contracts predominating. Graduates identified teamwork, problem-solving, time management, and practical technical competence as the most valued employability attributes. The study concludes that ATC's Automotive Engineering programmes generally support graduate employability but are constrained by programme-specific disparities, employment precarity, and limited labour market recognition of the HDE qualification. The findings recommend stronger industry partnerships, integrated entrepreneurship education, targeted employability support for HDE graduates, and gender-responsive recruitment strategies to enhance graduate employment outcomes.*

Keywords: *TVET, labour market integration, employability, tracer study, skills mismatch.*

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1. Introduction

Technical and Vocational Education and Training (TVET) is widely acknowledged as a critical driver of human capital development, providing individuals with the practical knowledge, technical competencies, and occupational skills required for productive employment, economic competitiveness, and sustainable national development (Subrahmanyam, 2020). Beyond preparing graduates for labour market participation, TVET contributes to industrialisation, technological innovation, and economic transformation by addressing the demand for a skilled workforce across key productive sectors. Consequently, the employability of TVET graduates has become an important indicator of programme quality,

institutional effectiveness, and the alignment of training with labour market needs.

In Tanzania, Arusha Technical College (ATC), established in 1978 through technical cooperation between the Government of the United Republic of Tanzania and the Government of the Federal Republic of Germany, is accredited by the National Council for Technical and Vocational Education and Training (NACTVET) to offer technical education programmes at National Technical Awards (NTA) Levels 4–8 (Ngaai and Lyimo, 2026). As part of its quality assurance framework, ATC has conducted annual graduate tracer studies since 2018 to assess graduate employment outcomes, evaluate the relevance of its academic programmes, and generate evidence to support curriculum review and institutional planning (Arusha Technical College, 2026).

Within ATC, the Automotive Engineering Department offers three specialised programmes: Automotive Engineering (AE), Auto-Electrical and Electronic Engineering (AEE), and Heavy-Duty Equipment Engineering (HDE). These programmes are intended to produce skilled technicians capable of meeting the growing demand for technical expertise within Tanzania's automotive and transport sector. The sector has experienced sustained expansion in recent years, driven by a growing vehicle population, increased investment in transport and logistics, and rising demand for skilled personnel in vehicle diagnostics, maintenance, repair, and heavy equipment operation (World Bank, 2020). Evaluating the extent to which graduates from these programmes successfully transition into employment is therefore essential for assessing programme relevance, identifying labour market mismatches, and informing evidence-based institutional and policy interventions.

Drawing on the Automotive Engineering Department's Graduate Tracer Study of the December 2024 cohort, this study examines graduates' labour market integration and employability. Specifically, it analyses graduate employment outcomes, programme-level variations in labour market performance, employment trajectories, contractual conditions, and the alignment between acquired competencies and labour market requirements. By extending the Department's descriptive analysis using SPSS and situating the findings within the broader literature on TVET graduate employability in Sub-Saharan Africa, the study provides empirical evidence to inform curriculum enhancement, strengthen industry institution collaboration, and improve graduate employment outcomes.

1.1 Statement of the Problem

Despite substantial national investment in Technical Vocational Education and Training (TVET) as a strategic mechanism for developing a skilled workforce and promoting employment, empirical evidence on the labour market outcomes of graduates from specific technical disciplines remains limited, particularly at the departmental and programme levels. Existing tracer studies are predominantly institution-wide and present aggregated employment indicators that may obscure significant variations across technical specializations. In the field of automotive engineering, for instance, programmes such as Auto-Electrical Engineering, General Automotive Engineering, and Heavy-Duty Equipment Engineering are aligned with distinct occupational markets and therefore may exhibit considerably different employment trajectories.

Preliminary findings from the 2024/2025 tracer study conducted by the Automotive Engineering Department at Arusha Technical College (ATC) indicate substantial programme-level disparities in graduate employability. Although the Department records an overall employment rate that exceeds the institutional average, graduates from the Heavy-Duty Equipment Engineering programme appear to experience comparatively lower employment outcomes, potentially due to structural constraints within the labour market, including limited representation in national employment and job-matching platforms. Furthermore, a large proportion of employed graduates are engaged under fixed-term contracts rather than permanent employment arrangements, raising concerns regarding the quality, stability, and long-term sustainability of employment opportunities secured by graduates.

Despite these emerging trends, there is limited systematic empirical evidence examining programme-specific differences in employment outcomes within the Automotive Engineering Department. In particular, insufficient attention has been given to the factors influencing graduate employability across the three programmes, the determinants of self-employment among automotive engineering graduates, the adequacy of training in relation to labour market requirements, and the structural barriers affecting transitions into employment. This lack of programme-level evidence constrains the Department's capacity to formulate targeted, evidence-based interventions that address the unique employment challenges of individual programmes, thereby limiting the effectiveness of curriculum enhancement, industry engagement, and graduate support initiatives.
Accordingly, this study seeks to examine the employability of Automotive Engineering graduates at Arusha Technical College by analysing programme-specific employment outcomes, employment conditions, the relevance of

training to labour market demands, and the structural factors influencing graduates' transition into employment across the Department's three constituent programmes.

1.2 Objectives of the Study

This study was guided by the following specific objectives:

1. To assess the employment outcomes of Automotive Engineering graduates six months after graduation and at the time of the survey, disaggregated by programme.
2. To evaluate the relevance of Automotive Engineering training programmes to contemporary labour market requirements.
3. To examine the nature and conditions of employment secured by graduates, with particular emphasis on employment sector, contract type, and job-search experiences.
4. To assess the determinants, characteristics, and perceptions of self-employment among Automotive Engineering graduates.
5. To identify programme-specific factors influencing graduate employability and propose targeted institutional interventions to enhance employment outcomes.

2. Literature Review

2.1 TVET, Automotive Training, and Graduate Employability

Technical and Vocational Education and Training (TVET) is widely recognized as a critical mechanism for enhancing workforce preparedness by equipping learners with practical, industry-relevant competencies that facilitate successful labour market integration (UNESCO-UNEVOC, 2025). Within the automotive sector, the significance of technical training is particularly pronounced because occupations involving vehicle maintenance, repair, and heavy equipment operation rely predominantly on practical competence and workplace experience rather than formal qualifications alone (Maclean *et al.*, 2009). Evidence indicates that countries which closely align automotive training with industrial standards, competency-based curricula, and workplace learning opportunities generally achieve more effective and sustainable school-to-work transitions for graduates (King and Palmer, 2010).

In Tanzania, continued growth in motor vehicle ownership, transportation services, infrastructure development, and light industrialization has increased the demand for skilled automotive technicians (World Bank, 2020; United Republic of Tanzania, 2021). Nevertheless, the capacity of Automotive Engineering programmes to convert this expanding labour demand into meaningful employment opportunities depends largely on the adequacy of practical training facilities, the responsiveness of curricula to evolving automotive technologies, and the strength of partnerships between training institutions and industry (Oketch, 2009; Eberth and Wohlmuth, 2021).

2.2 Tracer Studies as an Evaluation Tool

Tracer studies constitute an established methodological approach for evaluating graduate employability and assessing the effectiveness of educational programmes in meeting labour market needs. They provide systematic evidence regarding graduates' employment status, the relevance of acquired competencies, and existing skills gaps, thereby serving as an important feedback mechanism for curriculum improvement and institutional planning (Sira and Valenciana, 2018). Their principal strength lies in linking specific educational programmes to measurable labour market outcomes, enabling institutions to identify areas of strong performance as well as programmes requiring curricular revision or enhanced industry collaboration (OECD., 2019). Empirical studies conducted across Sub-Saharan Africa further demonstrate that internship experience, professional networking, and access to labour market information significantly influence the speed and success of graduate transitions into employment (Boateng and Ofori-Sarpong, 2002).

2.3 Employment Quality and Contract Conditions

Recent employability research distinguishes between employment quantity the extent to which graduates obtain employment and employment quality, which encompasses employment stability, contractual arrangements, working conditions, and career progression opportunities (World Health Organization, 2020). In many developing economies, technical graduates frequently enter the labour market through temporary, fixed-term, part-time, or informal employment before securing more permanent positions, particularly within private-sector industries characterized by seasonal or project-based demand (ILO, 2021). Consequently, evaluating contract types alongside employment rates provides a more comprehensive understanding of graduate labour market integration than employment status alone.

2.4 Self-Employment and Entrepreneurship in Technical Occupations

Self-employment represents an increasingly important employment pathway for TVET graduates, particularly in labour markets where the formal sector has limited capacity to absorb skilled workers. This trend is especially evident in technical trades such as automotive repair,

transportation services, and heavy equipment maintenance, where entry barriers are relatively low compared to many other industries (World Bank, 2020). However, existing literature emphasizes that self-employment among TVET graduates is frequently driven by necessity rather than entrepreneurial aspiration. Many graduates pursue self-employment primarily because formal employment opportunities are limited rather than as part of a deliberate business development strategy (Psacharopoulos and Patrinos, 2018). Furthermore, inadequate access to start-up capital, entrepreneurial competencies, business management skills, and market information continues to constrain the growth and sustainability of graduate-owned enterprises (ILO, 2018).

2.5 Skills Mismatch and Labour Market Competency Requirements

A substantial body of empirical evidence suggests that employers increasingly value generic employability skills alongside technical competencies. Across Sub-Saharan Africa, employer surveys consistently identify communication, teamwork, problem-solving, adaptability, and time management as competencies that are equally, and in some cases more, important than technical knowledge alone (ILO, 2021; Belinga and Nayihouba, 2024). This reflects the collaborative and service-oriented nature of modern automotive workplaces, where technical expertise must be complemented by effective interpersonal communication, teamwork, and the ability to perform efficiently under operational pressures. Persistent disparities between curricula that emphasize theoretical knowledge and labour markets that prioritize practical and transferable competencies have therefore been identified as a significant contributor to graduate employability challenges in technical disciplines (Allais, 2012).

2.6 Research Gap

Although institutional tracer studies conducted by Arusha Technical College, together with related studies such as (Ngaai and Lyimo, 2026) investigation of female graduate employability, provide valuable institution-wide and gender-disaggregated evidence, there remains limited scholarly research focusing specifically on graduate employability within the Automotive Engineering discipline. Moreover, existing studies rarely disaggregate employment outcomes across the Department's three constituent programmes Automotive Engineering (AE), Auto-Electrical Engineering (AEE), and Heavy Duty Equipment Engineering (HDE). Given that these programmes prepare graduates for distinct occupational segments within the automotive and heavy equipment industries, programme level analysis is essential for identifying discipline-specific employability patterns, understanding the unique challenges faced by graduates, and informing targeted institutional and curriculum interventions. Accordingly, this study addresses this important empirical gap by providing a comprehensive programme-specific analysis of graduate employability within the Automotive Engineering Department at Arusha Technical College.

3. Methodology

3.1 Research Design

This study adopted a descriptive survey research design to examine the labour market integration and employability outcomes of graduates from the Automotive Engineering Department at Arusha Technical College (ATC). The descriptive survey design is appropriate for systematically describing existing conditions and generating quantitative evidence on graduate employment status, the relevance of acquired competencies, and graduates' perceptions of programme effectiveness within a defined population (Creswell and Creswell, 2017). The design is widely employed in graduate tracer studies because it facilitates the collection of standardized and comparable data from an entire graduating cohort, thereby enabling institutions to assess programme outcomes, evaluate labour market relevance, and inform curriculum improvement in a cost-effective and timely manner (Talucod, 2022).

3.2 Population and Sample

The study population comprised all 39 graduates of the Automotive Engineering Department who completed their studies in December 2024 across three academic programmes: Automotive Electrical and Electronic Engineering (AEE), Automotive Engineering (AE), and Heavy Duty Equipment Engineering (HDE). Given the relatively small size of the target population, a census sampling approach was employed, whereby all eligible graduates were invited to participate in the study. This approach ensured comprehensive coverage of the target population and minimised the potential for sampling error. Of the 39 graduates targeted, 32 responded to the survey, representing a response rate of 82.1%. This response rate was considered adequate for a graduate tracer study and provided a sufficiently robust basis for the subsequent statistical analysis. Among the respondents, 16 (50.0%) were graduates of the AEE programme, while 8 (25.0%) were from the HDE programme and 8 (25.0%) were from the AE programme as shown in Figure 1.

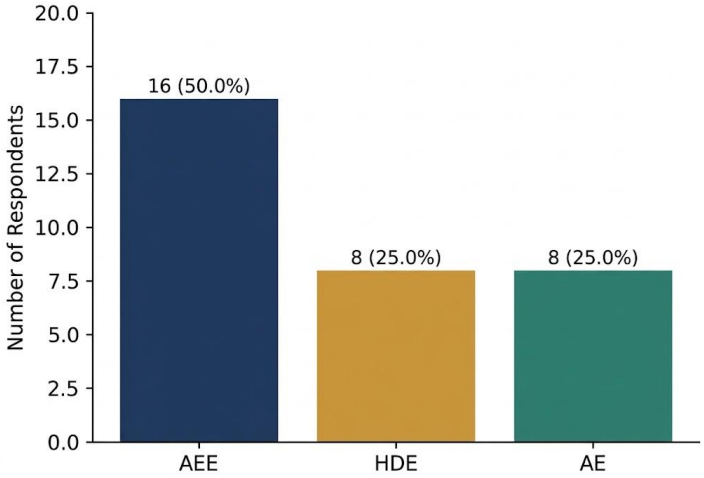


Figure 1. Distribution of respondents by programme (n = 32)

3.3 Data Collection Instruments and Procedures

Data were collected using a structured questionnaire comprising both closed- and open-ended items. The questionnaire was developed in Google Forms and administered through a mixed-mode approach to enhance graduate participation. The online version was distributed via institutional email and alumni WhatsApp groups, while printed questionnaires were disseminated through departmental tracer study coordinators to reach graduates with limited internet connectivity. The instrument captured information on respondents' demographic and academic characteristics, employment status six months after graduation and at the time of the survey, job-search experiences, employment and self-employment characteristics, workplace competency requirements, and satisfaction with the training received.

3.4 Data Analysis

Responses from the closed-ended questionnaire were exported from Google Forms, cleaned and coded in Microsoft Excel, and analysed using IBM SPSS Statistics Version 27. Descriptive statistical techniques, including frequencies, percentages, means, and cross-tabulations, were employed to summarise respondents' characteristics and employment outcomes. Analyses were undertaken for the overall sample and subsequently disaggregated by programme Auto-Electrical and Electronic Engineering (AEE), Automotive Engineering (AE), and Heavy Duty Equipment Engineering (HDE) to facilitate programme-level comparisons.

Perceptions of workplace competency requirements and self-employment were measured using a five-point Likert scale (1 = Very Great Extent to 5 = Not at All). Mean scores were calculated to determine the relative importance of each item, with lower mean values indicating stronger perceived importance. Statistical outputs were presented using tables and figures to enhance interpretation.

Qualitative responses to open-ended questions were analysed using thematic analysis. Responses were reviewed iteratively, manually coded, and organised into recurring themes to identify common experiences, perceptions, and recommendations regarding programme quality and labour market preparedness.

3.5 Ethical Considerations

The study was conducted in accordance with established ethical principles and standards governing social science research. Participation was entirely voluntary, and informed consent was obtained from all respondents prior to the commencement of data collection. To ensure the protection of participants' privacy and confidentiality, no personally identifiable information, including participants' names or student registration numbers, was collected. All responses were anonymised using coded identifiers, and access to the resulting dataset was restricted exclusively to authorised members of the research team.

3.6 Limitations of the Study

Several limitations should be considered when interpreting the findings. First, the tracer survey was conducted six months after graduation, providing an assessment of graduates' initial labour market transition rather than long-term employment outcomes. This relatively short observation period may underestimate career progression, particularly in developing-country labour markets where transitions from education to stable employment are often gradual (Subrahmanyam, 2015). Finally, incomplete graduate contact information and uneven engagement with

alumni communication platforms reduced the potential response rate. These challenges were mitigated through institutional graduate databases, referral-based contact verification, and the use of multiple communication channels.

4. Results and Discussion

This section presents the findings of the graduate tracer study, focusing on respondents' demographic and academic characteristics, employment outcomes, job-search experiences, self-employment activities, further study, and graduates perceptions of the relevance of their training to labour market requirements. Consistent with the analytical framework adopted in the study, each subsection first presents department-wide results before examining programme-level patterns across Auto-Electrical and Electronic Engineering (AEE), Automotive Engineering (AE), and Heavy Duty Equipment Engineering (HDE). Findings are presented using descriptive statistics and interpreted in relation to existing empirical evidence.

4.1 Demographic and Academic Profile of Respondents

The demographic and academic characteristics of respondents provide important context for interpreting graduate employment outcomes. Previous studies have shown that variables such as gender, age, and educational pathway influence graduates labour market participation, employment opportunities, and career trajectories. Accordingly, these characteristics are examined prior to analysing employment-related outcomes.

4.1.1 Gender Distribution

Male respondents constituted the majority of the study sample (n = 29, 90.6%), whereas female respondents accounted for only 9.4% (n = 3) as shown in Figure 2. This distribution reflects the persistent gender imbalance in automotive and engineering-related Technical and Vocational Education and Training (TVET) programmes in Tanzania. The finding is consistent with previous research indicating that women's participation in engineering disciplines remains constrained by sociocultural norms, gender stereotypes associated with technical occupations, limited female representation within engineering professions, and social expectations that discourage women from pursuing engineering careers (Mushi and Urassa, 2020; Angela *et al.*, 2026). The continued underrepresentation of women underscores the importance of institutional and policy interventions aimed at improving female participation and retention in engineering education.

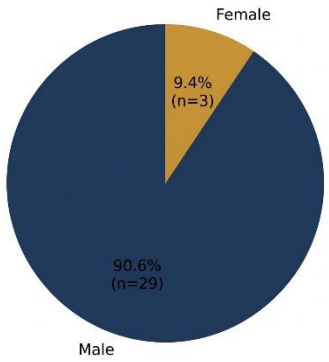


Figure 2. Gender Distribution of Respondents (n = 32)

Programme-specific discussion. Male graduates dominated all three programmes: AEE recorded 15 males (93.8%) against 1 female (6.3%); HDE recorded 7 males (87.5%) against 1 female (12.5%); and AE recorded 7 males (87.5%) against 1 female (12.5%) as illustrated in Figure 3. The near-complete absence of female graduates, particularly in AE and HDE fields widely perceived as the most male-dominated in the Tanzanian labour market owing to their association with heavy machinery and fieldwork signals a clear need for targeted gender-mainstreaming interventions, including scholarships, mentorship schemes, and community sensitisation campaigns to raise female enrolment in automotive-related trades.

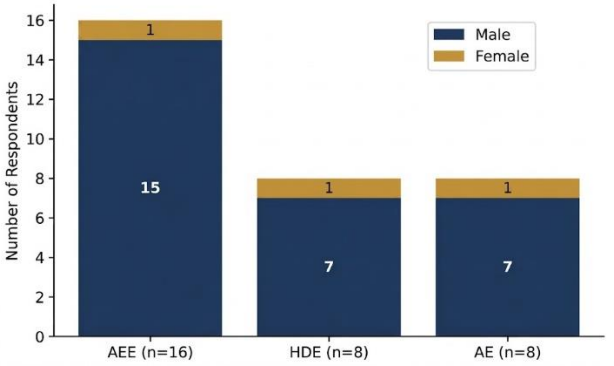


Figure 3. Gender Distribution of Respondents by Programme

4.1.2 Age Distribution

Respondents were predominantly young, with 21 (65.6%) aged 15–24 years, 9 (28.1%) aged 25–34 years, and only 2 (6.3%) aged 35 years and above. This concentration in the youngest age bracket reflects the typical trajectory of NTA Level 4–6 TVET students who enter college directly from secondary education, and represents a productive, adaptable segment of Tanzania's labour force consistent with national development priorities (United Republic of Tanzania, 2021).

Programme-specific discussion. The youthful profile was most pronounced in HDE, where all 8 graduates (100%) fell in the 15–24 bracket, suggesting the programme attracts almost exclusively recent secondary-school leavers. AEE showed a broader spread (56.3% aged 15–24, 37.5% aged 25–34, 6.3% aged 35+), while AE showed the widest range (62.5%, 25.0%, and 12.5% respectively), possibly reflecting a small number of mature entrants with prior automotive-sector work experience.

4.1.3 Pre-Enrolment Status and Entry Qualifications

The large majority of respondents (n = 26, 81.3%) entered ATC directly after completing secondary school, while smaller proportions had been volunteering (9.4%), self-employed (6.3%), or employed (3.1%) prior to enrolment. Correspondingly, 90.6% of graduates entered their programme with the Certificate of Secondary Education Examination (CSEE) as their entry qualification, with only isolated cases entering via a Basic Technician Certificate, an Ordinary Diploma, or a Vocational Training Certificate. Nearly all respondents (96.9%) completed an Ordinary Diploma (NTA Level 6), confirming that the Department's current cohort is overwhelmingly diploma-level, with its first Bachelor's-level graduates expected in the 2025/2026 academic year.

Programme-specific discussion. All HDE graduates (100%) entered directly from secondary school with CSEE, the most homogeneous entry profile among the three programmes. AEE and AE showed slightly more varied pathways, including graduates who had prior self-employment or private/public/NGO-sector employment experience before enrolling a background that may partly explain the comparatively stronger post-graduation employment outcomes observed for these two programmes.

4.2 Employment Outcomes of Graduates

This section presents the study's central findings on graduate employment status, comparing outcomes in the first six months after graduation with the situation at the time of the survey, both overall and disaggregated by programme.

4.2.1 Employment Status Six Months after Graduation

In the first six months after graduation, 11 respondents (34.4%) were formally employed, 7 (21.9%) were self-employed, 7 (21.9%) were pursuing further academic studies, and 7 (21.9%) remained unemployed and seeking work. The resulting combined employment rate (formal plus self-employment) of 56.3% substantially exceeds the 39.6% combined rate (27.1% formal plus 12.5% self-employed) recorded in the College-wide 2022/2023 tracer study (Ngaai and Lyimo, 2026), indicating strong labour market absorption of automotive technical graduates, particularly within the private automotive service and repair sector.

Programme-specific discussion. As shown in Table 1, AE graduates recorded the strongest first-six-month performance, with a combined employment rate of 75.0% (50.0% employed, 25.0% self-employed) the highest of the three programmes reflecting the versatile, market-responsive character of the AE curriculum. AEE graduates achieved a combined rate of 62.5% (37.5% employed, 25.0% self-employed), consistent with strong demand for auto-electrical competencies in Tanzania's expanding vehicle fleet. HDE graduates recorded the weakest outcomes, with only 12.5% employed and 12.5% self-

employed, while fully half (50.0%) remained unemployed and seeking work the highest early unemployment rate of any programme, and one respondents linked partly to limited public recognition of the HDE programme title among employers.

Table 1. Employment Status in the First Six Months by Programme

Programme	Employed	Self-Employed	Further Studies	Seeking Employment	Total
AEE	6 (37.5%)	4 (25.0%)	4 (25.0%)	2 (12.5%)	16
HDE	1 (12.5%)	1 (12.5%)	2 (25.0%)	4 (50.0%)	8
AE	4 (50.0%)	2 (25.0%)	1 (12.5%)	1 (12.5%)	8
Total	11 (34.4%)	7 (21.9%)	7 (21.9%)	7 (21.9%)	32

4.2.2 Employment Status at Time of Survey

By the time of the survey, formal employment had risen to 40.6% (n = 13), self-employment had declined slightly to 18.8% (n = 6), further studies had increased to 25.0% (n = 8), and unemployment had fallen to 15.6% (n = 5). This shift raised the combined employment rate from 56.3% to 59.4%, and reduced unemployment from 21.9% to 15.6%, reflecting continued, positive labour-market absorption of graduates over the survey period as presented in Figure 4.

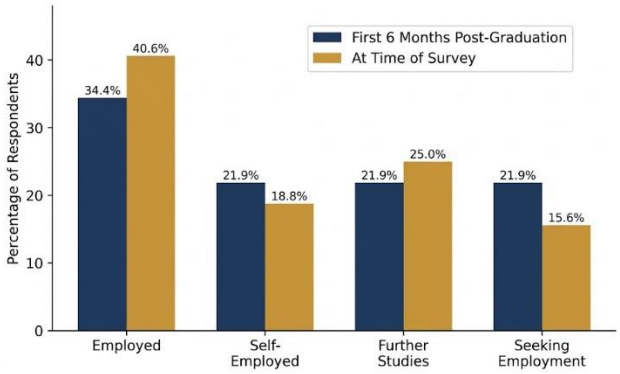


Figure 4. Employment Status Trajectory: First Six Months vs. Time of Survey (n = 32)

Programme-specific discussion. Programme-level trajectories diverged sharply as shown in Table 2. AEE recorded the highest current formal employment rate (62.5%) and zero graduates still seeking employment a strong indicator of sustained labour market demand for auto-electrical competencies. AE displayed the highest combined employment rate overall (87.5%), driven by an exceptional 50.0% self-employment rate, confirming AE as the most entrepreneurially oriented programme in the Department. HDE presented the most critical outcome: no graduates were formally employed at the time of the survey, and 62.5% remained unemployed and actively seeking work the most acute programme-level employment gap identified in this study and one requiring urgent institutional attention.

Table 2. Current Employment Status by Programme

Programme	Employed	Self-Employed	Further Studies	Seeking Employment	Total
AEE	10 (62.5%)	1 (6.3%)	5 (31.3%)	0 (0.0%)	16
HDE	0 (0.0%)	1 (12.5%)	2 (25.0%)	5 (62.5%)	8
AE	3 (37.5%)	4 (50.0%)	1 (12.5%)	0 (0.0%)	8
Total	13 (40.6%)	6 (18.8%)	8 (25.0%)	5 (15.6%)	32

4.2.3 Duration of Job Search

Among the 13 formally employed graduates, 12 (92.3%) secured their first job within 0–6 months of graduation, and only 1 (7.7%) took more than 12 months. This exceptionally high rate of rapid transition exceeds the wider ATC institutional average and aligns with ILO (2020) benchmarks that treat employment within six months as a key indicator of TVET programme effectiveness. Programme-specific discussion: among the 10 formally employed AEE graduates, 9 (90.0%) found work within six months; all 3 formally employed AE graduates did so within six months (100%); HDE had no formally employed graduates to assess on this measure.

4.2.4 Sources of Employment Information

Among the 13 formally employed graduates, the leading source of employment information was family, friends, or relatives (n = 5, 38.5%), followed by internet and online job portals (n = 4, 30.8%), work contacts or networks (n = 2, 15.4%), and print/broadcast media (n = 2, 15.4%) as shown in Table 3. The dominance of informal personal networks (family, friends, and work contacts combined: 53.8%) is a distinctive feature of automotive graduate job search, likely reflecting the private-sector, small business character of the automotive service and repair industry, where word of mouth hiring is common. Online platforms nonetheless remain important, underscoring the continued relevance of digital literacy and professional online presence.

Table 3. Sources of Employment Information among Employed Graduates (n = 13)

Source	Frequency	Percentage
Family, friends or relatives	5	38.5%
Internet and online job portals	4	30.8%
Work contacts or networks	2	15.4%
Print/broadcast media	2	15.4%
Total	13	100.0%

Programme-specific discussion. Among AEE's employed graduates (n = 10), family and friends (n = 5) were the leading channel, followed by internet portals (n = 3), work contacts (n = 1), and newspapers (n = 1), reflecting strong reliance on social capital within the sector. AE's three employed graduates used a more diverse mix of internet portals, work contacts, and print media."

4.2.5 Job Applications before Securing Employment

Among formally employed graduates, 7 (53.8%) secured their job after only one application, while 6 (46.2%) made between two and four applications; no graduate reported more than four applications. This low application count, together with the short job-search duration reported above, indicates that automotive technical skills are strongly valued in the local labour market, with technical assessment and personal referral often taking precedence over formal, competitive selection processes.

4.2.6 Employer Category, Economic Sector, and Contract Type

Among formally employed graduates, 9 (69.2%) were employed in the private sector and 4 (30.8%) in the public sector, as shown in Figure 5. This represents the inverse of the pattern typically observed in other ATC departments. The finding is consistent with the predominantly private character of the automotive industry, including independent garages, workshops, dealerships, and manufacturing.

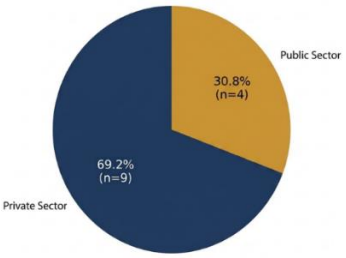


Figure 5. Employer Category of Formally Employed Graduates (n = 13)

By economic sector, Automotive Service and Repair was the leading employer (n = 8, 61.5%), followed by Manufacturing (n = 3, 23.1%), Education (n = 1, 7.7%), and Trade (n = 1, 7.7%) (Figure 6), confirming strong and direct alignment between programme content and the sector that most prominently absorbs graduates.

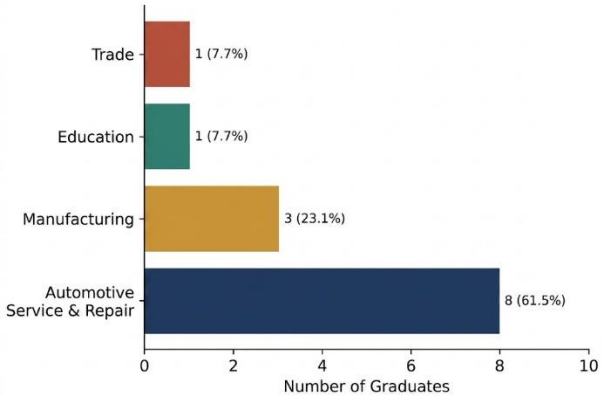


Figure 6. Employment by Economic Sector (n = 13)

Regarding contract type, the majority of employed graduates (n = 9, 69.2%) held fixed-term contracts, 3 (23.1%) held part-time contracts, and only 1 (7.7%) held a permanent or full-time contract as shown in Figure 7. This contract profile signals a pattern of employment precarity: workshops and dealerships in the automotive service sector commonly engage graduates on short-term or trial-based arrangements before considering permanent placement, with implications for graduates' income stability and long-term career development.

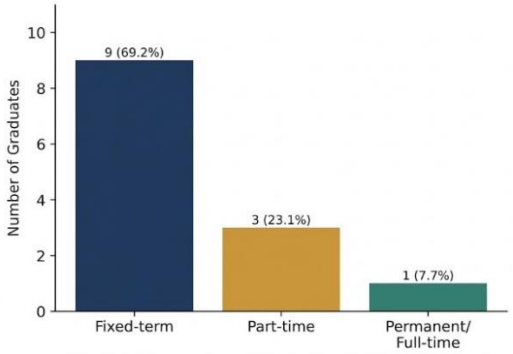


Figure 7. Type of Employment Contract (n = 13)

Programme-specific discussion. AEE's employed graduates (n = 10) were predominantly private-sector (70.0%) and on fixed-term contracts (90.0%). AE's employed graduates (n = 3) showed the most diverse contract profile, including the single permanent-contract holder identified in the entire sample. HDE had no formally employed graduates and therefore could not be assessed on employer category, sector, or contract type itself a critical finding underscoring the programme's disconnect from the formal labour market.

4.2.7 Alignment between Employment and Programme of Study

Among formally employed graduates, 6 (46.2%) reported their job as closely related to their programme of study, and 7 (53.8%) as somewhat related; critically, no graduate reported their employment as entirely unrelated. This confirms that all formally employed Automotive Engineering graduates are working in roles that draw at least partially on their academic training, even where the relationship is not exclusive. Programme-specific discussion: AE graduates reported the strongest alignment (66.7% closely related), consistent with their concentration in automotive repair and maintenance roles, while AEE graduates more often reported 'somewhat related' employment (60.0%), reflecting the applicability of auto-electrical training to broader manufacturing and technical roles.

4.3 Self-Employment Characteristics and Perceptions

This section examines the nature of self-employment among automotive graduates, including sector distribution, business scale, and graduates' perceptions of self-employment as a career pathway.

Among the six currently self-employed graduates, activity was concentrated in Transport and Logistics (n = 3, 50.0%), with single graduates in Construction Plant/Heavy Equipment maintenance, Automotive Service and Repair, and Furniture Upholstery and Repair (each 16.7%) (Figure 8). The majority (n = 5, 83.3%) operated as solo entrepreneurs without employees, while one (16.7%) had established an enterprise employing others. Four graduates (66.7%) reported their self-employment as closely related to their programme of study, one (16.7%) as somewhat related, and one (16.7%) as unrelated. The dominance of Transport and Logistics reflects graduates leveraging their technical vehicle knowledge to operate transport and fleet-related businesses, while the presence of self-employment in heavy equipment maintenance and automotive repair confirms direct application of programme competencies.

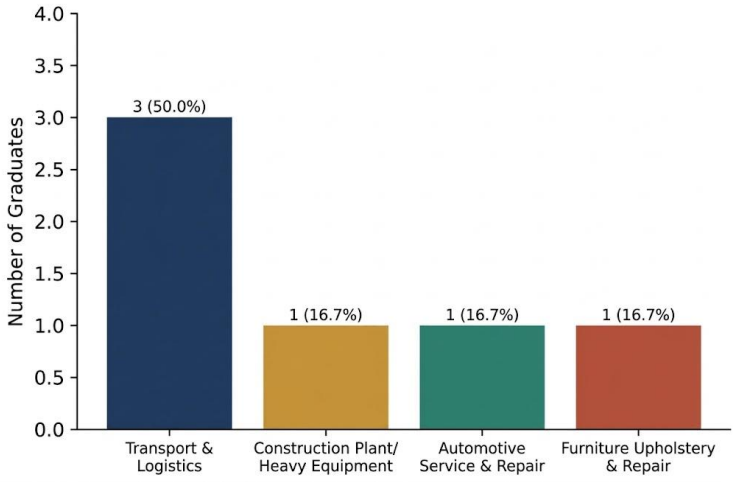


Figure 8. Self-Employment Sector Distribution (n = 6)

Table 4 presents graduates' mean perception scores regarding self-employment, on a scale of 1 (very great extent) to 5 (not at all). Graduates strongly agreed that self-employment involves long working hours (mean = 1.50) and offers favourable long-term job prospects (mean = 1.67), but also strongly agreed that they entered self-employment mainly because they had not found other employment (mean = 1.67) indicating that, for many automotive graduates, self-employment functions as a necessity-driven strategy rather than a purely voluntary entrepreneurial choice. The moderate agreement that education does not fully prepare graduates for employed jobs (mean = 2.17) reinforces the case for embedding entrepreneurship and business-development training within the automotive curriculum.

Table 4. Perceptions of Self-Employment (n = 6, Scale: 1 = Very Great Extent, 5 = Not at All)

Statement	Mean	Interpretation
Self-employed achieve relatively high income	2.00	Great Extent
Self-employed have long working hours	1.50	Very Great Extent
Entered self-employment mainly due to lack of other employment	1.67	Very Great Extent
Favourable long-term job prospects exist for the self-employed	1.67	Very Great Extent
Education does not fully prepare graduates for employed jobs	2.17	Great Extent

Programme-specific discussion. AE graduates accounted for four of the six self-employed respondents, half of the entire AE cohort the defining feature of the programme's employment profile and evidence of its strong entrepreneurial orientation within the automotive and transport sector. The single self-employed HDE graduate operated in construction-related heavy equipment maintenance, a directly programme-relevant activity, while AEE recorded only one self-employed graduate, suggesting AEE graduates preferentially pursue formal employment given strong demand for certified auto-electrical technicians.

4.4 Further Academic Studies and Reasons for Unemployment

Among the eight graduates (25.0%) pursuing further academic studies at the time of the survey, fields included Automotive Electronics Engineering, Mechanical Engineering, Mechatronics and Materials Engineering, and Civil Engineering, reflecting a strong overall commitment to upgrading within engineering fields. Half (50.0%) continued their studies at ATC itself, underscoring the College's central role in the vertical academic progression of its own graduates. The large majority (87.5%) confirmed that their further-study field aligned with their prior academic background, consistent with the national TVET framework's emphasis on diploma-to-degree articulation.

Programme-specific discussion. AEE contributed five of the eight further-study graduates, most pursuing degree-level automotive or electronics engineering programmes, often at ATC itself. HDE contributed two further-study graduates, suggesting that academic upgrading functions as an alternative labour-market strategy for HDE graduates unable to secure immediate employment.

Among the five graduates (15.6%) unemployed and actively seeking work at the time of the survey, all were from the HDE programme. The primary barriers cited were a mismatch between qualifications and job requirements, limited job opportunities within the heavy equipment field in the Arusha region, high competition for available positions, and most critically the HDE programme's apparent absence from the government's Ajira job-matching portal, which structurally excludes its graduates from applying for many public-sector vacancies. This finding represents the single most urgent, actionable issue identified in this study: a targeted institutional advocacy effort to register the HDE programme on the Ajira Portal could materially improve employment access for this cohort without requiring curriculum change.

4.5 Relevance of Training to Labour Market Demands

Graduates rated the extent to which 14 competencies are required by the labour market and their current work, on a scale of 1 (very great extent) to 5 (not at all); lower means indicate competencies perceived as more strongly demanded. Overall, Teamwork was rated the most demanded competency (mean = 1.31), followed by Time Management (mean = 1.38), Problem-solving (mean = 1.41), Creativity (mean = 1.47), and Practical skills (mean = 1.59) as shown in Figure 9. These findings are consistent with the ILO (2021) global competency framework, which identifies collaboration, time efficiency, applied skill, and problem-solving as cornerstone employability competencies. By contrast, Mathematical skills (mean = 2.59) and Theoretical knowledge (mean = 2.31) were the least demanded, indicating that the automotive labour market places considerably greater weight on applied, collaborative competencies than on abstract theoretical or mathematical knowledge.

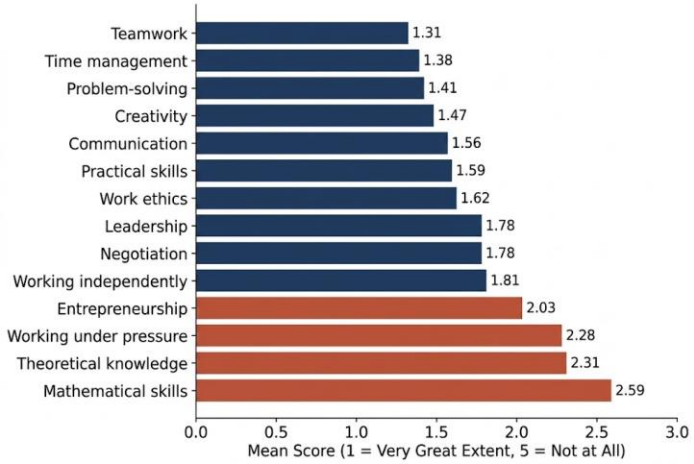


Figure 9. Labour Market Competency Requirements — Overall Mean Scores (n = 32, Scale: 1 = Very Great Extent, 5 = Not at All)

Programme-Specific Discussion

Auto-Electrical and Electronic Engineering (AEE). AEE graduates rated Teamwork (1.31), Time Management (1.44), Problem-solving (1.44), and Creativity (1.50) as most demanded, reflecting the diagnostic, deadline-driven workshop environment in which auto-electrical technicians operate. Mathematical skills (2.88) were the least demanded competency among AEE graduates.

Heavy Duty Equipment Engineering (HDE). HDE graduates showed the most demanding overall competency profile, led by Work Ethics (1.12), Communication (1.25), and Teamwork (1.25), reflecting the safety-critical, procedurally regulated nature of heavy equipment operation, where strict protocol adherence and clear supervisor communication are non-negotiable.

Automotive Engineering (AE). AE graduates presented the most distinctive profile, rating Creativity (1.25), Leadership (1.25), and Entrepreneurship (1.25) as most demanded the highest (most demanded) entrepreneurship rating across the entire study consistent with the programme's strong self-employment orientation (50.0%). Theoretical knowledge (3.00) was the least demanded competency of the entire study, reinforcing the applied, business-oriented character of AE outcomes.

4.6 Discussion: Cross-Programme Synthesis

Taken together, the findings reveal a Department whose overall labour market performance a 59.4% combined employment rate against an ATC institutional average markedly lower for formal and self-employment combined is strong, but whose aggregate figures conceal sharply divergent programme-level realities. AEE most closely resembles a conventional formal-employment pathway, with the highest formal employment rate and zero current unemployment. AE most closely resembles an entrepreneurial pathway, with the highest combined employment rate driven by self-employment and the strongest entrepreneurship and leadership competency demands. HDE, by contrast, exhibits the profile of a programme structurally disconnected from both the formal and informal labour markets: zero current formal employment, the Department's only unemployed graduates, and an apparent exclusion from the national Ajira job-matching platform. This divergence suggests that Department-wide employability strategies alone are insufficient; policy and institutional responses must be tailored to the distinct labour market realities of each constituent programme.

The predominance of fixed-term over permanent contracts among the formally employed (69.2%) also qualifies the otherwise positive employment-rate findings: rising employment does not automatically imply rising employment security, and the Department should track contract quality, not only employment incidence, in future tracer cycles. Finally, the consistent labour-market preference for teamwork, time management, problem-solving, and practical skills over theoretical knowledge and mathematics across all three programmes affirms that curriculum reform should continue to prioritise applied, collaborative, workshop-based learning over classroom-based theoretical instruction.

5. Conclusion and Recommendations

5.1 Conclusion

This study assessed the labour market integration and employability outcomes of graduates from the Automotive Engineering Department at Arusha Technical College (ATC) who completed their studies in December 2024. The findings demonstrate that the Department achieved a graduate employment rate of 56.3% within six months of graduation, increasing to 59.4% at the time of the survey, exceeding the institutional average reported for ATC. These results indicate that the Department's programmes are generally responsive to labour market needs and contribute positively to graduate employability.

However, the analysis revealed substantial disparities across programmes. Graduates of Auto-Electrical and Electronic Engineering (AEE) achieved full employment, while Automotive Engineering (AE) graduates exhibited comparatively strong entrepreneurial engagement, with self-employment emerging as an important labour market pathway. In contrast, Heavy Duty Equipment Engineering (HDE) graduates experienced significantly weaker labour market outcomes, characterised by high unemployment and the absence of formal employment. The findings suggest that institutional factors, including the programme's exclusion from the national Ajira job-matching system, may have contributed to these disparities.

The study further identified gender differences in labour market outcomes, with male graduates demonstrating higher rates of employment and self-employment than female graduates, who were more likely to continue with further education. Although most employed graduates secured work within six months of graduation, employment quality remained a concern, as the majority were engaged on fixed-term contracts. Graduate employment was concentrated in the private sector, particularly in automotive service and repair enterprises, reflecting the structure of the national automotive labour market. Employers and graduates consistently identified practical competence, problem-solving ability, teamwork, and time management as the most valued employability attributes, while theoretical knowledge was assigned relatively lower importance. These findings reinforce the importance of competency-based technical education and highlight the need to strengthen practical learning experiences and industry engagement within engineering programmes.

Overall, the study concludes that the Automotive Engineering Department is making a positive contribution to graduate employability. Nevertheless, programme-specific inequalities, particularly affecting HDE graduates, together with concerns regarding employment quality and gender disparities, indicate the need for targeted institutional and policy interventions to improve equitable labour market outcomes.

5.2 Recommendations

Based on the findings, the study suggests the following recommendations:

1. **There is need to strengthen competency-based training and foster closer collaboration with industry**: Curriculum delivery should place greater emphasis on practical competencies through enhanced laboratory facilities, updated equipment, structured industrial attachments, and stronger partnerships with automotive industries to ensure continued alignment with labour market requirements.

2. **Promote entrepreneurship as a complementary employment pathway**: Entrepreneurship education should be systematically integrated into Automotive Engineering curricula to equip graduates with the competencies required for successful self-employment, particularly given the significant contribution of entrepreneurial activities to graduate employment.

3. **Address structural barriers affecting Heavy Duty Equipment Engineering graduates**: Immediate action should be taken to facilitate the inclusion of the HDE programme in the national Ajira job-matching system and to strengthen partnerships with employers in construction, mining, agriculture, and heavy transport sectors to improve graduate employment opportunities.

4. **Enhance graduate employability support systems**: Career guidance, graduate placement services, and alumni networks should be strengthened to facilitate school-to-work transitions and improve access to employment opportunities.

5. **Improve graduate monitoring and future research**: ATC should institutionalise regular graduate tracer studies that assess not only employment rates but also employment quality, career progression, and skills utilisation. Future research involving multiple technical institutions and longitudinal data would provide a broader

understanding of graduate employability dynamics in Tanzania.

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