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EMPLOYABILITY SURVEY OF MECHANICAL ENGINEERING GRADUATES OF UNIVERSITY OF CAGAYAN VALLEY

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ABSTRACT

Tracer studies are essential in higher education as they assess graduates' employability, career outcomes, and the effectiveness of academic programs. These studies provide institutions with valuable feedback for curriculum improvement and quality assurance. This study aimed to determine the employability of Mechanical Engineering graduates of the University of Cagayan Valley. A descriptive research design was employed involving Bachelor of Science in Mechanical Engineering graduates from 2018 to 2024. Total enumeration sampling was used, targeting 299 graduates, of which 156 participated in the survey. Data were gathered using the Commission on Higher Education Graduate Tracer Study (CHED-GTS) questionnaire, enhanced by the researcher and the University of Cagayan Valley. Frequency counts and percentage distributions were utilized to analyze respondents' profiles, employment status, job relevance, and competencies acquired during college. Content analysis was also applied to determine reasons for job changes. Findings revealed that 69.87% of respondents were employed, 16.03% were unemployed, and 14.10% were self-employed. Most employed graduates held jobs related to their degree, indicating that the curriculum effectively prepared them for professional practice. The study recommends conducting regular tracer studies to continuously monitor employment outcomes and support curriculum enhancement and program effectiveness.

Keywords: *Curriculum, Education, Employment, Tracer Study, Unemployment*

INTRODUCTION

Tracer studies have become an essential research approach in higher education institutions as they provide empirical evidence on graduate outcomes, particularly employability, job relevance, and career progression. These studies serve as a key component of institutional quality assurance systems by evaluating the effectiveness of academic programs in preparing graduates for the labor market

(Albert et al., 2020; Anano, 2023). Through systematic tracking of graduates, higher education institutions are able to gather feedback that informs curriculum development and continuous program improvement. In addition, tracer studies contribute to the achievement of the United Nations Sustainable Development Goals (SDGs), particularly SDG 4 (Quality Education), by ensuring inclusive and equitable quality education and promoting lifelong learning opportunities that are responsive to labor market needs.

Globally, tracer studies are widely used to assess the alignment between higher education outcomes and labor market demands. Studies emphasize that graduate employability is influenced not only by technical competencies but also by soft skills such as communication, adaptability, and problem-solving abilities (Bridgstock, 2023; Jackson, 2024). Engineering tracer studies, in particular, reveal that graduates often face challenges in transitioning from academic environments to industry due to rapidly evolving technological demands (Olewnik & Muller, 2025; Akinci-Ceylan & Ahn, 2024). In addition, tracer studies highlight employment patterns, skills utilization, and career mobility, allowing institutions to identify gaps between educational outcomes and workplace expectations (Quintero & Maldonado, 2024; Nakawala et al., 2025). This aligns with the broader perspective of employability as a multidimensional construct involving not only technical competence but also soft skills, adaptability, and career self-management (Bridgstock, 2023; Jackson, 2024). Similarly, international studies and literatures highlight competency gaps in mechanical engineering graduates, particularly in relation to Industry 4.0 requirements and real-world application of skills (Quintero & Maldonado, 2024; Ramadi et al., 2016). These findings demonstrate the importance of continuous curriculum evaluation to ensure graduate readiness for dynamic global labor markets.

Despite the increasing number of tracer studies conducted globally, there remains a strong need to further examine the relationship between education and employability across specific academic programs. Existing literature generally confirms that higher education contributes to employability; however, it also shows that employability outcomes are not uniform across disciplines and institutions (Harvey, 2022; Knight & Yorke, 2021). Studies in engineering education highlight that graduates often experience varying levels of preparedness depending on curriculum design, industry exposure, and skills integration (Akinci-Ceylan & Ahn, 2024; Quintero & Maldonado, 2024). This indicates a gap in understanding how different academic programs translate educational experiences into actual employment outcomes in specific institutional contexts.

In the Philippines, tracer studies have been extensively conducted across various disciplines and institutions to evaluate graduate employability and curriculum relevance. Research findings consistently show that a significant proportion of graduates are employed in fields related to their degree, although some experience challenges in job matching and career alignment (Albert et al., 2020; Anano, 2023). Engineering-related tracer studies also reveal that employability is strongly linked to both academic preparation and practical exposure during college (Bernabe et al., 2023). Moreover, studies emphasize that graduate competencies, including both technical and soft skills, play a crucial role in employment success and job performance (Bautista et al., 2023; Ferolino et al., 2023).

Moreover, engineering graduates are expected to demonstrate strong technical proficiency alongside problem-solving, communication, and adaptability skills (Akinci-Ceylan & Ahn, 2024; Ramadi et al., 2016). On the other hand, studies have shown that mechanical engineering graduates often experience varying levels of preparedness when transitioning to industry, highlighting the need for continuous curriculum alignment with professional standards (Olewnik & Muller, 2025; Yan & Mohamad, 2025). These findings highlight the importance of continuously evaluating academic programs to ensure alignment with industry needs in the Philippine labor market.

While these studies confirm that education is generally linked to employability, they also reveal persistent issues such as job mismatch, underemployment, and variation in employment rates across programs (Daguplo et al., 2023; Ferolino et al., 2023). However, limited research has critically examined how employability outcomes differ among engineering graduates in private higher education institutions, particularly in regional universities. This creates a gap in program-specific evidence needed to strengthen curriculum responsiveness and alignment with labor market demands. Furthermore, although tracer studies are recognized as important tools for curriculum evaluation and quality assurance, many institutions still lack updated and continuous data on graduate employment outcomes (Gines, 2014; Andeng et al., 2023). There is also limited integration of tracer study findings into systematic curriculum review processes, reducing their impact on educational improvement.

Although tracer studies are strongly supported by higher education policies such as those of the Commission on Higher Education (CHED), many institutions still face challenges in sustaining updated and systematic graduate tracking mechanisms. This limits the effective use of tracer data in curriculum review and program enhancement (Gines, 2014; Andeng et al., 2023). Moreover, rapid advancements in engineering practice and Industry 4.0 technologies continue to widen the gap between academic preparation and actual workplace requirements (Ramadi et al., 2016; Olewnik & Muller, 2025). In response to these gaps, this study aims to assess the employability of Mechanical Engineering graduates of the University of Cagayan Valley from 2018 to 2024. The findings will contribute to SDG 4 and SDG 8 by providing evidence for curriculum enhancement and strengthening the alignment between higher education and labor market needs.

Research Questions

This study aimed to determine the employability of Mechanical Engineering graduates of the University of Cagayan Valley from 2018 to 2024. Specifically, it sought to assess the graduates' profile, employment outcomes, program relevance, and competencies gained during their college education as inputs for curriculum enhancement and program evaluation.

Specifically, this study sought to answer the following questions:

1. What is the profile of the respondents in terms of:
   1.1 Age;
   1.2 Sex;
   1.3 Civil Status;

1.4 Year of Graduation; and
1.5 Professional and/or licensure examinations passed?
2. What is the employment data of the graduates in terms of:
2.1 Employment status;
2.2 Place of work;
2.3 First job position;
2.4 Present job position;
2.5 Monthly salary; and
2.6 Reasons for changing job?
3. How relevant is the Mechanical Engineering program to the current job of the graduates in terms of:
3.1 Job Related to the Degree obtained in college
3.2 Reasons for Staying on Job for those unrelated to their Program
4. What competencies were learned by the graduates during their college education

METHODOLOGY

Research Design

The study utilized a descriptive-survey research design. This design is appropriate for graduate tracer studies because it allows the researcher to systematically collect and describe information regarding the employability of graduates through survey questionnaires. It enables the study to assess the graduates' profile, employment data, relevance of the Mechanical Engineering program to their jobs, and competencies acquired during college.

Studies by Dela Cruz (2022), Camuyong et al. (2023), and Bernabe et al. (2023) support the use of descriptive-survey design in tracer studies as it effectively examines graduate employment outcomes, curriculum relevance, and alignment between education and industry demands. The descriptive-survey research design is therefore suitable for the present study because it aims to assess the employability of Mechanical Engineering graduates of the University of Cagayan Valley from 2018 to 2024. Through this approach, the study provides evidence-based information that may serve as a basis for curriculum improvement, program development, and strengthening the alignment between engineering education and labor market needs.

Study Site and Participants

The target participants of this tracer study were the graduates of the Bachelor of Science in Mechanical Engineering program of the University of Cagayan Valley from 2018 to 2024. The identification of the respondents was primarily based on the official list of graduates obtained from the Registrar's Office. This list served as the basis for locating and contacting the graduates through their social media accounts, particularly through Facebook Messenger, for the distribution of the survey questionnaire.

Population, Sample size, and Sampling Technique

The researcher employed a total enumeration sampling technique. In total enumeration sampling, commonly referred to as a census, every individual within the specified population is included in the study. Instead of selecting a subset of participants, this method involves examining the entire population of interest. This approach minimizes sampling bias and provides a comprehensive representation of the population by ensuring that all members have an equal opportunity to be included in the study. A total of 299 graduates were identified as the target participants of the survey. This includes 15 graduates from Batch 2018, 37 from Batch 2019, 44 from Batch 2020, 7 from Batch 2021, 76 from Batch 2022, 55 from Batch 2023, and 65 from Batch 2024. Invitations to participate in the study were sent to all identified graduates through Google Forms. However, only 156 graduates responded and completed the survey.

Research Instrument

The study employed a structured survey instrument adapted from the Commission on Higher Education (CHED) Graduate Tracer Study (GTS) questionnaire to ensure alignment with standardized tracer study indicators and to establish content validity. The instrument was subjected to expert evaluation by four (4) field specialists, yielding a Scale-Level Content Validity Index (S-CVI/Ave) of 1.00, which indicates excellent content validity (Polit & Beck, 2006).

The questionnaire gathered data on respondents' demographic characteristics, including age, sex, and licensure status, as well as employment-related variables such as occupational level, salary range, and geographic location. It further examined career mobility and the applicability of competencies acquired during undergraduate studies, thereby enabling assessment of the alignment between academic preparation and labor market outcomes. Internal consistency reliability was assessed for the competency-related constructs, yielding a Cronbach's alpha coefficient of 0.881, interpreted as good reliability. These results confirm that the instrument is both valid and reliable for measuring the intended constructs in the context of graduate employability.

Data Gathering Procedure

Prior to data collection, the researcher secured an official list of Bachelor of Science in Mechanical Engineering graduates from 2018 to 2024 through a formal request submitted to the Office of the Registrar of the University of Cagayan Valley.

Initial contact with the graduates was established via Facebook Messenger. Each identified graduate was individually informed about the purpose of the study and invited to participate in the survey. Upon confirmation of willingness to participate, informed consent was obtained prior to data collection. Respondents were likewise provided with essential information regarding the study, including assurances of confidentiality and data protection in accordance with ethical research standards. Following consent acquisition, the survey questionnaire was administered online through Google Forms, with the survey link distributed via Facebook Messenger. This

approach facilitated efficient data collection while maintaining accessibility for respondents.

All collected data were treated with strict confidentiality and used solely for research purposes. Respondents' identities were anonymized to ensure privacy and to uphold ethical considerations throughout the conduct of the study. The data were subsequently analyzed in relation to the research objectives and questions.

Data Analysis Procedure

The study employed frequency count and percentage distribution to analyze the respondents' profile, employment status, perceived relevance of the academic curriculum to their current job, and the competencies acquired during college that are deemed useful in their professional practice. Descriptive statistics were used to summarize and present the quantitative data in a structured manner. In addition, qualitative responses regarding the reasons for job changes under the employment section were analyzed using content analysis. This approach enabled the systematic identification of recurring themes and patterns in the respondents' narratives, providing deeper insights into their employment experiences.

RESULTS

Part 1. Profile of the Respondents

Table 1.
Frequency and percentage distribution of respondents

Age	Frequency	Percentage
31-40	10	6.41%
41-50	1	0.64%
Sex	**Frequency**	**Percentage**
Male	144	92.31%
Female	12	7.69%
Civil Status	**Frequency**	**Percentage**
Single	129	82.69%
Married	27	17.31%
Year Graduated	**Frequency**	**Percentage**
2018	11	7.05%
2019	12	7.69%
2020	20	12.82%
2021	8	5.13%
2022	32	20.51%
2023	34	21.79%
2024	39	25.00%

Professional Examination Passed	Frequency	Percentage
Licensure Examination for Mechanical Engineering	61	31.77%
Civil Service Examination	20	10.42%
Others	52	27.08%
None	59	30.73%

Table 1 indicates that most respondents are aged 20–30 years, reflecting a population largely composed of recent graduates in early career transition. This aligns with tracer study evidence that graduate cohorts are typically concentrated in young adulthood due to immediate entry into the labor market after completion of tertiary education (Schomburg, 2016; Aguilar & Ballena, 2024). The findings also show a pronounced male dominance in Mechanical Engineering, with females representing a minimal proportion. This persistent gender disparity is consistent with STEM-related literature, which attributes low female participation in engineering to structural, cultural, and occupational perceptions of the field (Laguador & Dotong, 2020; Campos et al., 2022).

Most respondents are single, which corresponds with their early career stage and supports prior findings that graduates prioritize employment establishment before family formation (Harvey, 2022; Tomlinson, 2024). In terms of graduation year, the highest representation from the 2024 cohort suggests stronger participation among recent graduates, while lower representation from earlier cohorts may be influenced by accessibility and post-pandemic employment transitions (Anano, 2023).

Regarding professional qualifications, a portion of respondents have passed the Licensure Examination for Mechanical Engineers, while others hold civil service eligibility or no certifications. Although this indicates partial professional readiness, the presence of non-licensed graduates highlights potential gaps in licensure preparation. Given that licensure is strongly associated with improved employability and career advancement, the findings underscore the need to strengthen review and career support programs within the institution (Yan & Mohamad, 2025; Gines, 2014; Maclean & Wilson, 2025).

Part 2. Graduate's Employment Data

Table 2.
Frequency and percentage distribution of respondents in terms of Employment.

Employment Status	Frequency	Percentage
Employed	109	69.87%
Self-employed	22	14.10%
Unemployed	25	16.03%
Place of Work	**Frequency**	**Percentage**
Within the Region	81	61.83%
Outside the Region	38	29.01%

Abroad	12	9.16%
Monthly Income	**Frequency**	**Percentage**
P10,000 to less than P15,000	29	22.14%
P15,000 to less than P20,000	28	21.37%
P20,000 to less than P25,000	20	15.27%
P25, 000 and Above	40	30.53%
Is this your first Job after Graduation?	**Frequency**	**Percentage**
Yes	76	58.02%
No	55	41.98%
Methods of applying in their first Job	**Frequency**	**Percentage**
Response to an Advertisement	18	13.74%
As walk-in applicant	53	40.46%
Recommended by someone	33	25.19%
Information from friends	10	7.63%
Family Business	9	6.87%
Others	8	6.11%
Length of time land on finding first Job	**Frequency**	**Percentage**
Less than a month	30	22.90%
1 to 6 months	62	47.33%
7 to 11 months	17	12.98%
1 years to less than 2 years	17	12.98%
2 years to less than 3 years	3	2.29%
3 years to less than 4 years	2	1.53%
Reasons for Accepting on the Job	**Frequency**	**Percentage**
Salaries and benefits	47	25.82%
Career challenges	46	25.27%
Related to special skills	35	19.23%
Related to course or program of study	29	15.93%
Proximity to residence	12	6.59%
Others	13	7.14%
Length of Stay on their First Job	**Frequency**	**Percentage**
Less than a month	14	10.69%
1 to 6 months	21	16.03%
7 to 11 months	25	19.08%
1 years to less than 2 years	41	31.30%
2 years to less than 3 years	20	15.27%
3 years to less than 4 years	10	7.63%

The results in table 2 presents that most graduates are employed within the region, reflecting strong local labor absorption and limited outward mobility, consistent with findings that graduates often remain in their training locality due to available opportunities and established networks (Anano, 2023). Income distribution shows

wide variation, indicating differences in job quality, sector placement, and professional qualifications, supporting the view that employability should be assessed beyond employment status alone (Harvey, 2022). Job search patterns highlight the continued importance of walk-in applications and personal referrals, emphasizing the role of social capital in employment access (Tomlinson, 2024). Most graduates secured employment within 1 to 6 months, suggesting relatively smooth school-to-work transition, although some experienced delays likely due to labor market frictions and skill mismatches (Anano, 2023).

Motivations for job acceptance are driven by both extrinsic (salary, benefits) and intrinsic (career growth, skill alignment) factors, consistent with employability literature emphasizing multidimensional career decision-making (Burns & Natale, 2020). Job tenure results show moderate stability with early career mobility, reflecting typical graduate exploration and adjustment in initial employment stages (Harvey, 2022). Furthermore, the findings suggest positive employability outcomes, though variations in income, job stability, and employment pathways highlight the need for stronger industry alignment, career readiness enhancement, and improved professional certification support.

Part 3. The Relevance of the Mechanical Engineering Program to the Job of the Graduates

Table 3.
Frequency and Percentage Distribution on the Graduates Employment Data of the Participants in terms of their Job Related to the Degree obtained in college

Jobs Related to the Degree Obtained in College	Frequency	Percentage
Yes	102	77.86%
No	29	22.14%

Table 3 shows that most respondents (77.86%) are employed in jobs related to their Mechanical Engineering degree, while 22.14% are working in unrelated fields. This indicates a generally strong alignment between graduates' academic preparation and their current employment. This result suggests that the Mechanical Engineering program is largely effective in equipping graduates with competencies that are applicable to industry requirements.

Degree–job alignment is commonly used as an indicator of curriculum relevance in tracer studies, where strong alignment reflects effective integration of academic training and labor market needs (Schomburg, 16; Aguilar & Ballena, 2024). However, the presence of graduates working outside their field indicates that not all respondents were fully absorbed into discipline-specific roles. This may reflect limited job availability, competitive labor markets, or individual career choices, consistent with studies noting that early career transitions often involve temporary or alternative employment pathways (Harvey, 2022).

Table 4
Frequency and Percentage Distribution on the Graduates Employment Data of the Participants in terms of their Reasons for Staying on Job

Reasons for staying on the job	Frequency	Percentage
Salaries and benefits	34	30.63%
Career challenges	29	26.13%
Related to Special Skills	25	22.52%
Proximity to residence	11	9.91%
Others	12	10.81%

Table 4 shows that salaries and benefits (30.63%) are the primary reason respondents remain in jobs not related to their degree, followed by career challenges (26.13%) and utilization of special skills (22.52%). Smaller proportions cite proximity to residence and other factors. This finding indicates that extrinsic factors, particularly compensation, are the strongest drivers of employment decisions. Graduates tend to prioritize financial stability, especially during early career stages when economic independence is a key concern. This aligns with employability literature emphasizing that job choice is often influenced more by income security than field alignment (Burns & Natale, 2020; Harvey, 2022). In addition, career challenge and skill utilization reflect the importance of intrinsic motivations in job retention. Graduates may remain in non-aligned jobs when these positions still offer learning opportunities and professional growth. This supports findings that employability is multidimensional, involving both economic and developmental considerations rather than strict adherence to academic specialization (Tomlinson, 2024).

Part 4. Competencies Learned by the Graduates during College.

Table 5
Frequency and Percentage distribution on the Competencies Learned by the Graduates during College

Competencies Learned in college	Frequency	Percentage
Communication skills	97	21.37%
Human Relation Skills	73	16.08%
Technopreneur Skills	38	8.37%
Critical Thinking Skills	92	20.26%
Engineering Related Skills	125	27.53%
Others, please specify;	29	6.39%

Table 5 shows that engineering-related skills (27.53%) are the most developed competency among graduates, indicating that the curriculum is highly effective in strengthening technical and discipline-specific competencies required in mechanical engineering practice. This suggests strong alignment between academic training and core professional standards in the field. Communication skills (21.37%) and critical

thinking skills (20.26%) also rank highly, reflecting that the program extends beyond technical instruction to include essential transferable skills. These competencies are critical in modern engineering practice, where problem-solving, collaboration, and effective communication are increasingly required in multidisciplinary work environments (Sarsale et al., 2024; Yan & Mohamad, 2025).

However, human relation skills (16.08%), technopreneur skills (8.37%), and other competencies (6.39%) received lower ratings, indicating comparatively limited emphasis on entrepreneurial and innovation-related competencies. This suggests a potential curriculum gap in fostering technopreneurship and adaptive industry skills, which are increasingly important in Industry 4.0 environments. Strengthening these areas may further enhance graduate employability and responsiveness to evolving labor market demands (Albert et al., 2020; Quintero & Maldonado, 2024)

DISCUSSION

I. Profile of the Respondents

The findings reveal that the majority of respondents are young adults, indicating that most participants are recent graduates transitioning from academic training to employment. This pattern is consistent with tracer study literature, which shows that graduates typically enter the labor market immediately after completing their degree programs (Schomburg, 2016; Aguilar & Ballena, 2024). Similarly, tracer studies emphasize that early-career graduates dominate employability surveys due to their active job-seeking stage and stronger engagement with institutional follow-ups (Anano, 2023; Dela Cruz, 2022). In terms of sex distribution, Mechanical Engineering remains a male-dominated program. This gender imbalance reflects long-standing patterns in engineering education, where women remain underrepresented due to structural, cultural, and perceptual barriers in STEM fields (Campos et al., 2022; Laguador & Dotong, 2020).

Such trends are also observed in other engineering tracer studies in the Philippines and internationally, which consistently report low female participation in mechanical and technical disciplines (Bernabe et al., 2023) Most respondents are single, indicating that graduates are primarily focused on career establishment during their early professional stage. This aligns with employability studies suggesting that graduates prioritize labor market entry before long-term family commitments (Tomlinson, 2024; Harvey, 2022). The predominance of recent graduates, particularly from 2024, also suggests higher response rates among newer cohorts, a common limitation in tracer studies due to difficulties in tracking older graduates (Schomburg, 2016; Camuyong et al., 2023). Regarding professional qualifications, only a portion of graduates have passed the licensure examination for Mechanical Engineers, while others hold civil service eligibility or no certification. This indicates varying levels of professional readiness. Licensure is widely recognized as a key factor influencing employability and career advancement, as it validates technical competence and increases labor market competitiveness (Akinci-Ceylan & Ahn, 2024). Strengthening board examination preparation is therefore essential to improve graduate outcomes and professional mobility.

II. Graduates' Employment Data

The employment results show that most respondents are employed, while a smaller proportion are self-employed or unemployed. This indicates generally favorable employability outcomes among Mechanical Engineering graduates. Similar findings are reported in tracer studies where engineering programs consistently produce high employment rates due to strong industry demand for technical skills (Albina & Sumagaysay, 2020; Bernabe et al., 2023). Most graduates are employed within their local region, reflecting strong local labor absorption but limited international mobility. This pattern is consistent with tracer studies indicating that graduates often remain in their home regions due to available opportunities, social networks, and economic considerations (Aguilar & Ballena, 2024; Anano, 2023). Limited employment abroad may also reflect global competitiveness requirements and additional certification barriers (Nakawala et al., 2025).

Income distribution suggests that most graduates are in moderate income levels, indicating early career positioning rather than senior professional status. Employability literature emphasizes that employment quality, not just employment rate, is a critical indicator of graduate success (Harvey, 2022; Tomlinson, 2024). Variations in income may be linked to differences in licensure status, job role, and industry placement (Sarsale et al., 2024). Most graduates reported that their first job was their initial employment after graduation, suggesting a relatively smooth school-to-work transition. However, some graduates experienced job changes, which is consistent with modern career patterns characterized by mobility and non-linear career paths (Akkermans et al., 2020). Job search strategies were largely driven by walk-in applications and personal referrals, highlighting the importance of social capital and networking in employment access (Bridgstock, 2023; Tomlinson, 2024).

Furthermore, most graduates secured employment within one to six months after graduation, indicating a relatively efficient transition to the labor market. This reflects positive employability outcomes, although delayed employment among some respondents may be attributed to job mismatch or limited available positions (Ferolino et al., 2023). The primary reasons for job acceptance include salary and benefits, career challenges, and alignment with special skills. This indicates that both extrinsic and intrinsic motivations influence employment decisions. Similar findings suggest that graduates balance financial stability with professional growth opportunities in their career choices (Burns & Natale, 2020; Yan & Mohamad Nasri, 2025). Job tenure results also show early career mobility, reflecting typical exploration stages among new graduates (Harvey, 2022).

III. Relevance of the Mechanical Engineering Program to Employment

The results show that most graduates are employed in jobs related to their degree, indicating strong curriculum relevance and alignment with labor market demands. This supports tracer study findings that curriculum relevance plays a crucial role in graduate employability and career success (Sarsale et al., 2024; Daguplo et al., 2023). Degree–job alignment is widely used as an indicator of program effectiveness in higher education institutions (Schomburg, 2016).

However, some graduates are employed in unrelated fields, which may be attributed to limited job availability, personal career choices, or competitive labor markets. Similar findings are reported in engineering tracer studies where not all graduates secure discipline-specific employment immediately after graduation (Bernabe et al., 2023; Ferolino et al., 2023). Among those working in unrelated jobs, salary and benefits emerged as the primary reason for job retention, followed by career challenges and skill utilization. This suggests that economic considerations strongly influence employment decisions, even when jobs are outside the field of study. This aligns with literature emphasizing that employability is multidimensional and influenced by both financial and developmental factors (Burns & Natale, 2020; Tomlinson, 2024).

IV. Competencies Learned by the Graduates During College

The results indicate that engineering-related skills are the most highly developed competencies among graduates, demonstrating strong alignment between the curriculum and technical requirements of the profession. This reflects the importance of discipline-specific competencies in engineering education, which are essential for professional practice (Akinci-Ceylan & Ahn, 2024). Communication skills and critical thinking skills also ranked highly, highlighting the importance of transferable skills in modern engineering workplaces. These competencies are increasingly recognized as essential for career success, particularly in multidisciplinary and globalized work environments (Yan & Mohamad Nasri, 2025; Sarsale et al., 2024). However, technopreneurial and human relation skills received lower ratings, suggesting gaps in entrepreneurial and soft skills development. This aligns with literature emphasizing that future-ready engineers must possess not only technical knowledge but also innovation, leadership, and entrepreneurial competencies (Quintero & Maldonado, 2024; Bridgstock, 2023). Strengthening these areas may enhance graduate adaptability in Industry 4.0 environments and improve long-term employability outcomes.

Conclusions

Engineering graduates from higher education to the labor market, offering insights into employability patterns, curriculum relevance, and competency utilization. Beyond descriptive outcomes, the study contributes to the broader discourse on graduate employability by highlighting the multidimensional nature of employment success, which includes job relevance, job quality, career mobility, and skill applicability rather than employment status alone. In terms of practical contribution, the findings emphasize the need for stronger alignment between engineering education and evolving industry requirements. While graduates demonstrate strong technical preparation, the variability in employment outcomes suggests that additional emphasis on soft skills, digital literacy, and techno-entrepreneurship is necessary to enhance adaptability in dynamic labor markets. Strengthening experiential learning through internships, industry immersion, and applied projects may further improve the school-to-work transition.

From a policy standpoint, the study reinforces the importance of institutionalizing tracer studies as a continuous quality assurance mechanism in higher education. The results support policies that promote outcome-based education, industry-academe collaboration, and data-driven curriculum review. Moreover,

licensure examination performance should be considered a key indicator of program effectiveness, warranting sustained institutional support through structured review programs and academic interventions.

In the field of education, the findings highlight the need to move toward an integrated competency framework where technical, cognitive, and transferable skills are developed simultaneously. Engineering curricula should not only focus on discipline-specific expertise but also on communication, collaboration, innovation, and entrepreneurial thinking to ensure graduate competitiveness in Industry 4.0 and beyond. For research implications, this study opens opportunities for longitudinal tracer studies that examine long-term career trajectories, income progression, and professional mobility of graduates. Future studies may also adopt comparative multi-institutional designs to identify best practices in engineering education and employability enhancement. In addition, qualitative investigations involving employers and alumni may provide deeper insights into skills mismatch, workplace expectations, and emerging competency gaps.

Furthermore, the study underscores that graduate employability is a shared responsibility between higher education institutions, industry stakeholders, and policymakers. Continuous feedback loops through tracer studies are essential in ensuring that academic programs remain responsive, adaptive, and capable of producing graduates who are not only employable but also resilient, innovative, and prepared for lifelong career development in an evolving global workforce.

Recommendations

Based on the findings, conclusions, and implications of the study, the following recommendations are presented to strengthen graduate employability, program quality, and institutional responsiveness:

1. The university should strengthen board exam review and career guidance programs to improve licensure passing rates among Mechanical Engineering graduates.
2. The university should enhance industry partnerships and regularly review the curriculum to improve graduate employability and job placement opportunities.
3. The university should invest in upgrading laboratory facilities to ensure graduates acquire industry-relevant skills and competencies.
4. The university should conduct regular tracer studies to monitor graduate outcomes and support continuous program improvement.

Compliance with Ethical Standards

The researcher strictly observed ethical standards throughout the conduct of the study. Prior to data gathering, informed consent was secured from all respondents after clearly explaining the purpose, nature, and significance of the study. Participation in the research was entirely voluntary, and the respondents were informed of their right to withdraw from the study at any time without any consequence or penalty. Confidentiality and anonymity were maintained by ensuring that no identifying personal information was disclosed in any part of the research.

The researcher also ensured that the respondents' welfare, privacy, and dignity were safeguarded throughout the data collection process. Furthermore, the study was conducted with honesty, transparency, and academic integrity. No conflict of interest existed in the conduct of the research, and all gathered data were treated objectively. Plagiarism was strictly avoided through proper citation and acknowledgment of all sources used in the study. The interpretation of findings was carried out impartially and without bias to ensure the accuracy and credibility of the results. Lastly, all information and findings obtained from the respondents were utilized solely for academic and research purposes.

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