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Key Performance Indicators (KPI 1) Achievement and Development Efforts for the Bachelor of Mechanical Engineering Education Study Program with Tracer Study

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ABSTRACT

Objective: The purpose of this study is to determine the profile of S1 Mechanical Engineering Education graduates and the competencies needed by graduate users. Additionally, it will be analyzed in terms of achieving Key Performance Indicators (KPI 1). **Method:** This research employs a qualitative descriptive approach. This research uses an instrument in the form of a questionnaire. The results of the questionnaire are then processed and analyzed in a qualitative descriptive manner. This data analysis technique involves data reduction, data presentation, and conclusion. **Results:** The results indicate that the required competencies encompass both soft skills and hard skills. Those who need to strengthen their graduate competencies to suit the needs of the world of work require soft skills, with the results achieving KPI 1 at 63.93%. **Novelty:** This study examines in depth the condition of graduates in the workforce, focusing on job suitability, soft skills, and specialized hard skills within the Mechanical Engineering Education Study Program. Analyzing soft skills and hard skills that need to be improved and maintained in curriculum development in the Mechanical Engineering education study program adjusted to the current technological developments.

INTRODUCTION

The Key Performance Indicator (KPI) is an implementation of the Independent Learning, Independent Campus policy, as outlined in Permendikbud No. 3 of 2020 on National Higher Education Standards and the Decree of the Minister of Education and Culture of the Republic of Indonesia No. 754/P/2020 on the Key Performance Indicators of State Universities, which are divided into eight indicators. KPI 1 focuses on graduate outcomes, emphasizing the need for graduates to secure decent employment. To support this, each study program must ensure that its graduates attain competencies aligned with the demands of the workforce. A graduate tracer study is essential to measure these achievements. A Tracer Study, commonly known as a track record study or graduate survey, is a study of higher education graduates (Handajani et al., 2020). It provides valuable information for evaluating higher education outcomes, which can then be used for institutional improvement and quality assurance (Dzomeku et al., 2024). Tracer studies are among the most effective methods for gathering input from the workforce to assess the relevance of graduate competencies in the job market. Susiku et al. (2024) and Albina and Sumagaysay (2020) effectively measure and track graduate performance, helping to identify clear indicators for future work profiles and necessary training. Through tracer studies, higher education institutions can develop appropriate curricula to ensure graduates are well-prepared for the workforce (Dzomeku et al., 2024). Additionally, these studies provide insights

Into the relationship between higher education and professional work, assess the relevance of academic programs, inform stakeholders, and fulfill accreditation requirements.

The Bachelor of Mechanical Engineering Education Study Program has a vision of "Developing Superior Vocational Education in Mechanical Engineering Based on Technopreneurship, Adaptability, and Global Insight." To achieve this vision, several key components must be strengthened, including human resources, lecture facilities, information services, and curriculum relevance. A high-quality curriculum is crucial for producing innovative and competitive graduates who meet the demands of the workforce (Berkat et al., 2025; Kraus et al., 2023). Relevance refers to the alignment between curriculum content and societal needs. Relevance concerns two dimensions: the study program and the world of work and the business world (Isnaini, 2020). This principle encompasses two key dimensions: 1) Academic Relevance – ensuring the study program's curriculum aligns with educational goals, and 2) Industry Relevance – ensuring graduates meet the demands of the workforce and business sector (Marabelli & Vaast, 2020; Sahade & Ngampo, 2021), For graduates to succeed, their education level must match job qualifications, and their skills must align with the profile of a Bachelor of Mechanical Engineering Education graduate.

To assess how well the curriculum prepares graduates to compete in the workforce, it is essential to analyze the graduate profile of the Mechanical Engineering Education Study Program. This analysis will reveal the alignment between the program's Program Learning Outcomes (PLOs) and the competencies of graduates (Sahade & Ngampo, 2021). Consequently, the Bachelor of Mechanical Engineering Education Study Program should implement graduate tracer studies to systematically track alum outcomes. Therefore, the S1 Mechanical Engineering Education Study Program needs to make an effort to track its graduates. Additionally, a tracer study is an approach that a university can take to gather information about the success of its graduates after they leave or graduate (Brits & Steyn, 2019). These studies must be conducted regularly and systematically to provide up-to-date insights for the Mechanical Engineering Study Program. The results obtained through tracer studies can be utilized by universities, including in study programs, to inform the setting or implementation of policies, especially those related to curriculum development (Noor et al., 2024). Currently, Unesa has an integrated web-based system for tracer study activities, allowing universities to access and utilize the results to evaluate their study programs and obtain graduate data, thereby supporting data tracing related to the achievement of KPI 1 and efforts to develop the S1 Mechanical Engineering Education Study Program.

Based on this background, this research focuses on five key questions that serve as specific objectives: 1) What is the alignment between graduates' field of study and their current employment?; 2) How does graduates' education level correspond to job qualifications?; 3) What types of positions do graduates hold?; 4)How do graduates' competencies compare with industry requirements?; 5) What is the current achievement level of KPI 1 for the study program? The findings will provide valuable insights for Evaluating the learning process, Enhancing academic services, and Informing policy decisions in the Bachelor of Mechanical Engineering Education program at Universitas Negeri Surabaya.

RESEARCH METHOD

Research Design

This research employs a quantitative descriptive approach through a survey method. Therefore, this method is used to describe profiles and jobs, as well as some issues concerning graduates, as illustrated in Figure 1. In general, the implementation of this tracer study includes the following four steps: 1) Preparation, 2) implementation, 3) Analysis, and 4) Evaluation and follow-up.

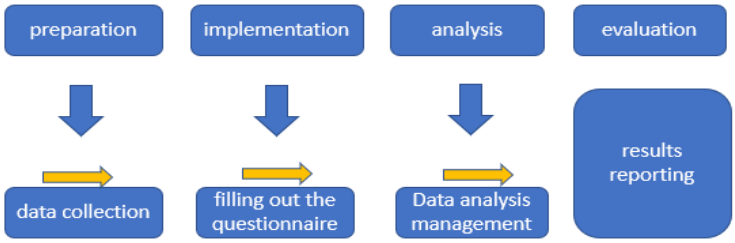

Figure 1. Research procedure.

Subjects

The subjects of this tracer study activity are the 2022 graduates of the Mechanical Engineering Education program at the Faculty of Engineering, Surabaya State University, comprising 61 graduates. All graduates are involved in contributing to this tracer study, so the sampling is saturated (Guest et al., 2020).

Instruments, Data Collection Techniques and Data Analysis

The instrument used in this study was an online questionnaire accessible through the Unesa Tracer web, located at the university's website address: http://tracerstudy.unesa.ac.id/. The data were downloaded from the Unesa Tracer web study in Microsoft Excel format. Data analysis techniques encompass data reduction, data presentation, and conclusion (Campos et al., 2020). The data obtained will undergo a data reduction process to be selected and sorted according to the needs of solving research problems. After being reduced, the next step is to present the data in a way that organizes it into a pattern of relationships, making it easy to understand.

RESULTS AND DISCUSSION

Results

The results of the research and discussion are focused on five categories, namely: 1) The Relationship of Study Fields with Work; 2) Education level with job qualifications; 3) Type of Job; 4) The level of competency required by graduates; 5) Achievement of KPI 1 Study Program.

The Relationship of Study Fields with Work

Alumni of the Mechanical Engineering Education Study Program who graduated in 2022 and have found employment have a level of closeness between their field of study and the work they are currently undertaking. As many as 42.9% of respondents assessed that the field of study and the work they are currently doing is very close. There were 18.4% who felt that the closeness between the field of study covered in lectures and the work they were currently doing was close, while as many as 24.5% considered it quite close between the field of study and the work they are currently

undertaking. There were 4.2% of alums who rated it as not close, and the rest, who rated it not as close at all, were as many as 10.2%. For more details, you can see in Figure 2.

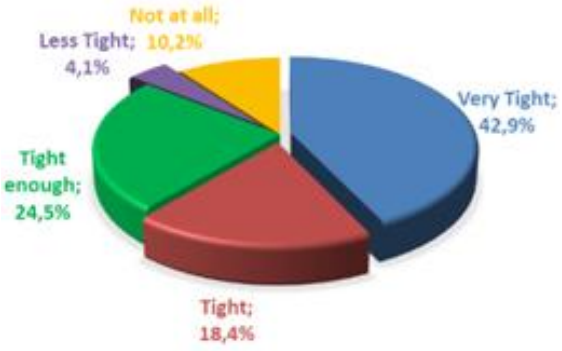

Figure 2. Relationship between study program and work.

Education Level with Job Qualifications

Job qualifications are a standard that a graduate must possess to secure a job that aligns with their level of education. Figure 3 illustrates the relationship between the education level and job qualifications of graduates from the 2022 cohort.

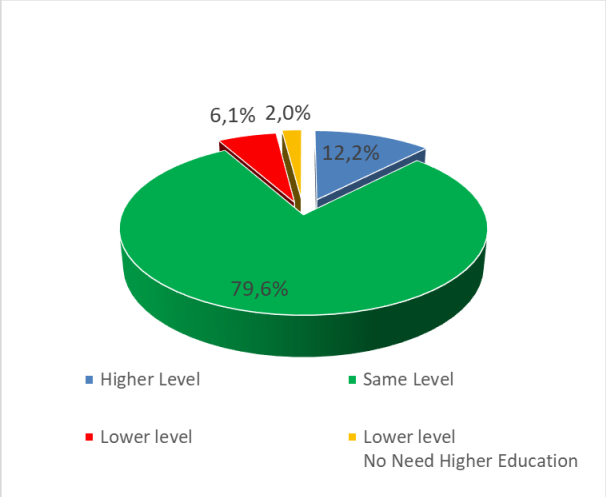

Figure 3. Education level with graduate job qualifications.

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Graduates of Unesa's Mechanical Engineering Program in 2022 are currently seeking jobs that align with their level of education and expertise. They have a high level of accuracy between their current job position and the level of education they have attained. As many as 79.6% of respondents reported that their current job aligns with their level of education. Twelve percent of respondents stated that their jobs required a higher level of education. Meanwhile, 6.1% of respondents' jobs are a level lower than their education level. Additionally, 2.00% stated that their current job is not necessary for their college education.

Types of Graduate Jobs

There are several types of jobs held by graduates. According to tracer studies, the majority of graduates work as teachers or educators. The figure below shows the types of jobs graduates graduated in 2022.

Table 1. Types of graduate jobs.

Types of Graduate Jobs 2022	Sum	Percentage
Drafter	1	2.0%
Teacher/Educator	27	55.1%
Operator/Technician	10	20.4%
Supervisor	6	12.2%
Admin	3	6.1%
Others	2	4.1%

The types of jobs available to graduates of Mechanical Engineering Education in 2022 include Drafter, Teacher/Educator, Operator/Technician, Supervisor, Administrator, and others. Moreover, most graduate jobs involve becoming teachers or educators in schools, at a rate of 55.1%, and jobs not related to the PLO from the mechanical engineering education study program, at a rate of 10.2% (including administration and others).

The Level of Competence Required of a Graduate

Based on the tracer study questionnaire, as shown in Figure 4, the level of mastery of soft skills possessed by mechanical engineering graduates is evident, as indicated by perceptions from 2022 graduates.

Figure 4. The level of soft skill competence required by graduates.

The results of the comparison between the soft skills possessed by graduates of the S1 Mechanical Engineering Education Study Program and the skills required by the workforce are presented in Figure 4. In the graph, a gap exists between the competencies required and those possessed by graduates; most of the soft skills possessed by graduates fall below the required level.

Figure 5. The level of hard skills required by a graduate.

Based on Figure 5, the comparison of hard skills possessed and needed yields quite good results; namely, the difference is not too noticeable. In contrast, the comparison of soft skills possessed and needed shows high inequality. Upon analysis, graduates of the S1 Mechanical Engineering Study Program are required to enhance their general knowledge and English language skills.

Achievement of KPI 1 Study Program

The achievement of KPI 1 related to graduates is assessed from 3 aspects, namely: 1) entrepreneurial graduates, 2) graduates who continue their education, 3) graduates who work less than 6 months after graduating and get a wage of 1.2 minimum wage at work, search results related to the achievement of KPI can be seen in Figure 6.

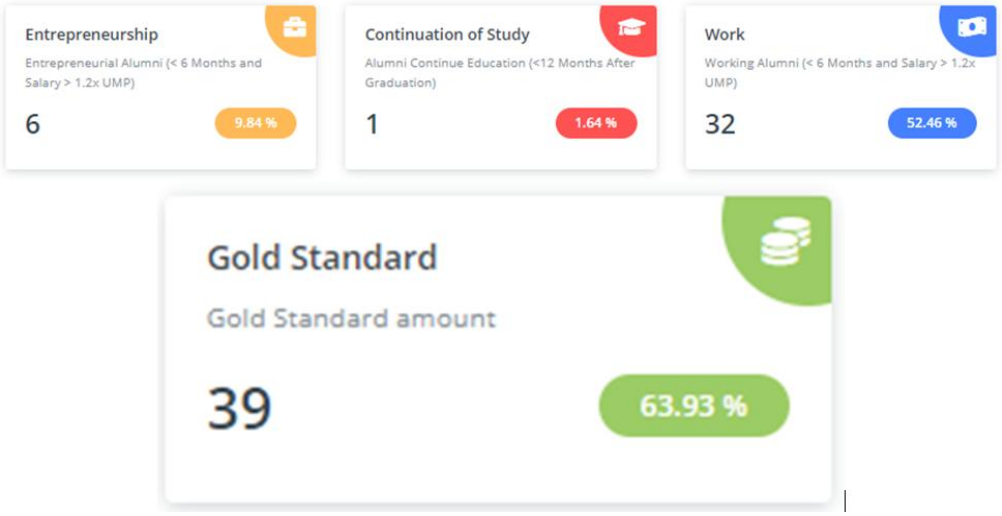

Figure 6. KPI 1 observations.

Based on Figure 6, it can be seen that 39 out of 61 graduates, or 63.9%, support the achievement of KPI 1. The Study Program consists of 6 entrepreneurial graduates, one graduate pursuing continuing education, and 32 graduates who work according to established standards. Based on this result, it is necessary to improve the achievement of KPI 1, as many graduates still receive salaries below the standard. It is also necessary to increase the number of graduates who are entrepreneurial in their field and to

motivate or create programs that encourage graduates to be enthusiastic about continuing their education to a higher level.

Discussion

The Relationship of Study Fields with Work

The study's results show that the majority of alums have a perfect match between their field of study and the field of work they are currently pursuing. The relevance of curriculum implemented in the Unesa Mechanical Engineering Education study program is highly relevant to the field of work of its alums, aligning with previous research (Arif et al., 2022).

To address the issue of graduates who lack a close connection between their study program and the field of work in the workplace, it is necessary to examine further the factors that cause and overcome this disconnect. The countermeasures can be implemented in the following ways: 1) Increased Cooperation between Universities and Industry: Strengthening the relationship between industry and universities can ensure that the curriculum taught is relevant to the job market's needs (Gustina et al., 2024; Evans et al., 2023). 2) Internship and Training Programs: Encouraging students to participate in internship and training programs can provide them with practical experience and the skills required in the workforce (Kwan et al., 2025; Baert et al., 2021). 3) Additional Skills Development: Encourage students to develop additional skills outside their field of study, such as digital skills, foreign languages, and soft skills, to enhance their adaptability to changes in the job market (Romanenko et al., 2024; Emanuel et al., 2021). 4) Implementation of the Independent Learning-Independent Campus Program: This program provides students with the flexibility to take courses outside their primary study program, enabling them to acquire broader knowledge and skills that align with industry needs (Conner, 2024; Septiana et al., 2024). With these efforts, it is hoped that university graduates in Indonesia will be better equipped to meet the job market's needs, thereby reducing the mismatch between fields of study and employment.

Education Level with Job Qualifications

According to the research results, the work of alums is currently commensurate with their level of education. These results demonstrate that the work pursued by alums is highly relevant to their level of education, which aligns with the findings of a tracer study (Wiranto & Slameto, 2021). However, there are still around 20.0% of alums whose jobs are in the same qualifications. To reduce the discrepancy between education and job qualifications, synergy between the government, educational institutions, and industry is needed. The government can facilitate training and certification programs that align with the job market's needs (He et al., 2024; van Assen, 2021). Educational institutions need to adjust their curricula to remain relevant to industry developments. Meanwhile, the industry can play an active role in providing input on the skills needed and offering internship programs for students (Evans et al., 2023). With this holistic approach, it is expected that individuals will obtain an education that meets the needs of the job market, thereby increasing their chances of securing a job that matches their qualifications and enhancing their overall economic well-being.

Types of Graduate Jobs

Choosing a study program at a university is a crucial decision that affects future career prospects. Each study program offers a specific graduate profile, which then determines the type of work that its graduates can access. Understanding the relationship between study programs and job opportunities is essential for prospective students to plan their careers effectively (Creed et al., 2022; Jackson, 2024). The results of the study show that most graduates work in fields related to their studies in the UNESA Mechanical Engineering Education study program. In other words, the Mechanical Engineering study program has successfully delivered graduates for careers that align with the specialization chosen previously. To ensure that the mechanical engineering education study program maintains and collaborates more closely with the world of education, the business world, and the industrial world, thereby improving the quality of graduate work. Additionally, it strengthens the bond between alums, enabling them to accelerate their job search.

The Level of Competence Required of a Graduate

The competencies required by the world of work should ideally be similar to or closely aligned with the competencies possessed by graduates. The soft skill competencies required by the industry must be well-prepared so that graduates do not face difficulty finding jobs and are easily adaptable in the workforce (Susiku et al., 2024; Pang et al., 2019). The results of the comparison between the soft skills possessed by graduates of the S1 Mechanical Engineering Education Study Program and the skills required by the workforce are presented in Figure 4. There is a gap between the competencies needed and those possessed by graduates of the S1 Mechanical Engineering study program. Most of the soft skills possessed by graduates fall below the required skills.

The data serves as input for the S1 Mechanical Engineering study program to inform curriculum improvements aimed at enhancing the competence of graduates. The results of data analysis indicate that only one competency, namely Loyalty, exceeds the expected competencies among graduates. At the same time, for other soft skills, it is necessary to find solutions to improve these competencies. Among the Soft skill competencies possessed by graduates, only 1 of the 13 indicators used for assessment met the needs of the world of work, namely Loyalty.

Therefore, for other soft skills, it is necessary to improve by creating a lecture atmosphere as in the world of work such as 1) increasing discipline in lectures and completing tasks so that they can improve soft skills in good time management; 2) the implementation of project-based learning which is expected to improve the soft skills possessed by students in the form of communication, critical thinking, leadership, integrity, Loyalty, adaptation, tolerance, analysis, negotiation, etc.; 3) Integrating soft skill development into the academic curriculum can be done through collaborative learning methods, group projects, and case studies. This approach encourages students to interact, communicate, and collaborate in teams, thereby refining their interpersonal skills (Gillies, 2023). For example, project management courses can involve collaboration, communication, and creativity skills; 4) Encouraging students to get involved in social activities or volunteering can help them develop empathy, communication skills, and adaptability. This experience also broadens their horizons and improves their ability to work in a team (Zhang et al., 2024; Cai et al., 2024).

Among the complex skill competencies possessed by graduates, the English competence of graduates is the weakest among all alums. Therefore, it is necessary to

emphasize the application of the use of English for every lecture and outside of lectures. The frequent use of English during the lecture process is expected to improve student's English language skills; besides that, it can also make student exchange programs or internships in English-speaking countries provide direct experience in using the language in everyday contexts (Rahmanu & Molnár, 2024).

Achievement of KPI 1 Study Program

From the results of the study, it can be seen that the graduates who support KPI 1 are 39 out of 61 graduates, or 63.9% of graduates who support the achievement of the KPI 1 Strudi Program, which consists of: 6 graduates are entrepreneurs, one graduate continues education, and 32 graduates who work according to the set deadline. Based on this result, it is necessary to improve the achievement of KPI 1, as many graduates still receive salaries below the standard. It is also necessary to enhance the skills of graduates who are entrepreneurs in the field, as well as to motivate or create programs that encourage graduates to be enthusiastic about pursuing further education to a higher level. Based on this result, it is necessary to improve the achievement of KPI 1, as many graduates still receive salaries below the standard. It is also necessary to enhance the entrepreneurial skills of graduates in their respective fields, as well as to motivate or create programs that encourage graduates to pursue further education at a higher level.

Some of the programs that can be used to improve the achievement of KPI 1 are as follows: 1) To encourage graduates to continue their education to a higher level, universities can provide information and access to scholarship programs, such as the Brilliant Affirmation Scholarship (Rachman, 2023; Mulyaningsih et al., 2022). 2) Cooperation with industry through internship programs provides students with practical experience and functional professional networks after graduation (Thompson et al., 2021; Baert et al., 2021). 3) The Independent Campus Program, for example, allows students to study for three semesters outside the regular program, enhancing their competencies in accordance with industry needs (Mudjisusatyo et al., 2024; Anggarwati, 2022). 4) Career counseling services can help students plan their career paths, whether in entrepreneurship, continuing education, or working (Chuang et al., 2020; Carvalho et al., 2023). 5) Soft skills training such as communication, leadership, and problem-solving is also important to ensure graduates are ready to face challenges in the professional world (Espina-Romero et al., 2023). In addition, the Past Learning Recognition program allows individuals who have had work experience or non-formal education to pursue formal studies, such as those applied at Advanced Universities.

CONCLUSION

Fundamental Finding: The results of the research can be written the following conclusions : (1) Mechanical Engineering graduates who have found a job have an excellent level of closeness between the field of study and the current work, with 42.9% of graduates answering very closely, (2) Today's graduate jobs require the same level of education as job qualifications, (3) Types of graduate work according to the profile of graduates of the S1 Mechanical Engineering Education study program, (4) Need to strengthen the competence of graduate to suit the needs in the world of work, especially soft skills for graduates, (5) Graduates who support KPI 1 are 39 out of 61 graduates who support the achievement of KPI 1 Strudi Program consisting of: 6 graduates in entrepreneurship, one graduate continuing education, and 32 graduates who work according to the established standards. **Implication:** This research can provide valuable

input for study programs to enhance the quality and relevance of graduates, particularly by strengthening soft skills, periodically revising the curriculum, and fostering increased cooperation with various stakeholders. Thus, graduates will have high competitiveness and be able to contribute optimally to the workforce. **Limitation:** The limitations of this study are specific to graduates of the S1 mechanical engineering education program, and therefore, it cannot be generalized to other study programs. **Future Research:** For future research, it is also necessary to conduct surveys on graduate users to obtain more accurate data from graduates who have worked.

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