Tracer Study of Alumni Competencies in Civil Engineering Department Universitas Negeri Surabaya

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Abstract. In order to evaluate performance to increase the competitiveness and quality of universities, it is necessary to make efforts to determine the performance indicators of universities, one of which is the quantity and quality and relevance of graduates. This study aims to optimize the tracer study as an effort to improve the quality of education in the Department of Civil Engineering, Faculty of Engineering, Unesa. Tracer study is research on the situation of alumni, especially in terms of job search, work situations, and the use of competency acquisition while studying at the Department of Civil Engineering, Faculty of Engineering, Unesa. This research is planned for a period of one year 2022, with the target of alumni graduating in 2019 and 2020. The method used in this research is a descriptive method with a quantitative approach. Tracking is done by involving surveyors to move alumni to fill out questionnaires on the tracer study page directly from the university. The results of this tracer study are then analyzed for several components so that they can be used as input for majors in improving future performance. The results of this study vary widely on the competencies they feel are the best they have. For soft skills, ethics is the best competency possessed by alumni of the two study programs in the Civil Engineering Department. The best hard skills of the alumni's competencies are general knowledge for alumni of the Undergraduate Building Construction Education study program and internet skills for alumni of the Undergraduate Civil Engineering study program.

Keywords: Tracer study · Civil engineering · Alumni competencies

1 Introduction

Currently, the challenges of fresh graduates in engineering to get a job are much greater than previous graduates [1]. The fierce global competition has resulted in many companies demanding graduates with competencies and abilities other than academic knowledge. This shows that graduates must equip themselves well before entering the work environment because without the right skills, the participants will not be able to face the demands of the industry [2].

In addition, Industries that originally used conventional methods, are now turning to digital. This makes there is a demand for new skills that must be possessed by Human Resources (HR) in the industry [3]. New skills can be in the form of mastery of digital applications and virtual-based computing technologies and so on [4].

This digital transformation is in line with the industrial revolution 4.0 which changes the concept and structure of work, as well as the competencies needed by the industrial world. This digital transformation has triggered the demand for Human Resources professionals who have competencies that are much different from before. Changes in the characteristics of the industrial world in this era resulted in changes in the types of jobs available. There are many jobs lost and new skills needed [5].

Education organizers must support graduates with knowledge and skills both in terms of soft skills and hard skills that are relevant to the world of work in order to be productive and able to be employed by industry. In addition to technical skills, many companies are looking for workers with several abilities such as in communicating, collaborating, problem solving and being able to think critically [6]. More than 50% of stakeholders cannot find the right competencies in job seekers according to the vacancies provided so more than 80% of job seekers fail to get a job [7].

The tracer study that will be carried out at the Department of Civil Engineering, Faculty of Engineering, Unesa in 2022 aims to improve the work skills needed in the world of work in order to improve the quality of education in the Department of Civil Engineering, Faculty of Engineering, State University of Surabaya. While the specific objectives expected from this study are, getting information about:

1. Types of places to work, to find out the types and types of stakeholders for alumni
2. Relevance between the discipline and the work undertaken
3. Knowing the suitability of alumni competencies to the needs in the field (for example English language skills, teamwork, IT mastery, etc.).

2 Method

This study uses a descriptive method with a quantitative approach [8]. It was conducted from the beginning of 2021 to track graduates of the Department of Civil Engineering at Universitas Negeri Surabaya. This research is part of a curriculum assessment about how the level of competencies of alumni when still graduates are compared with the level of competencies needed in work. From the results of this tracer, it is hoped that we will find out where the competency deficiencies of our graduates are so that improvements can be made to the curriculum.

2.1 Respondents

This tracer survey aims to obtain data on graduates in 2019 and 2020. Of the 216 graduates, 82 have a bachelor's degree from the Building Engineering Education undergraduate study program, and 134 have a bachelor's degree from the Civil Engineering undergraduate study program. The technique used to determine the sample for this study is non-probability sampling or saturated sampling, which uses all population members as a sample.

2.2 Data Collection Techniques

Tracer studies are conducted through the university's tracer study website http://tracer study.unesa.ac.id/. The surveyor team also uses the WhatsApp group of graduates to collect tracer survey data. The survey uses the 5 rating scale contains five response options that will consist of two extreme sides. The option is 1 for very low and 5 for a very high level of each competency.

The alumni are questioned about 26 skills or competencies, including soft and hard skills. The first question is on which level the competencies are owned when still graduated, and the second question is about the level of competencies needed in work. The soft skills competencies are the behaviour of someone who acts or conducts oneself, especially toward others, when in the workplace. Besides that, hard skill competencies refer to employees' job-related knowledge and abilities to perform their duties effectively. After the data is collected, analyze whether what lack of graduate competencies, so the curriculum of program studies in the Civil Engineering Department needs to develop.

3   Results and Discussion

The graduate's skills, including soft and hard skills, are the skills possessed by alumni when they graduate from the Civil Engineering Department. These skills are acquired during lectures, both academic and non-academic. The civil engineering department has two study programs, namely the Civil Engineering Undergraduate Study Program and the Undegraduate program of Building Construction Education. The results of the average skills owned by alumni in Civil Engineering Undergraduate Study Program based on the questionnaire can be seen in Figs. 1, 2, 3 and 4.

According to Fig. 1 and Fig. 2, the alumni of the Civil Engineering Undergraduate Study Program feel they have a high level of competence in Ethics, Tolerance, Loyalty, Teamwork, Integrity, and Adaptation. It is evidenced by the average value of more than 4 out of 5. Otherwise, they think lack of competencies are Problem Solving, Time Management, and Negotiation.
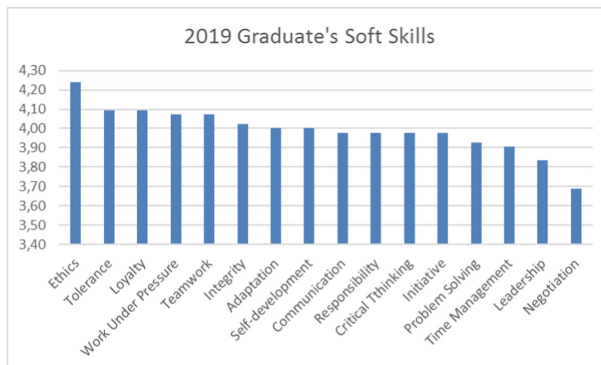
Fig. 1. The Average 2019 Graduate's Soft Skills Based on Alumni in Civil Engineering Undergraduate Study Program.
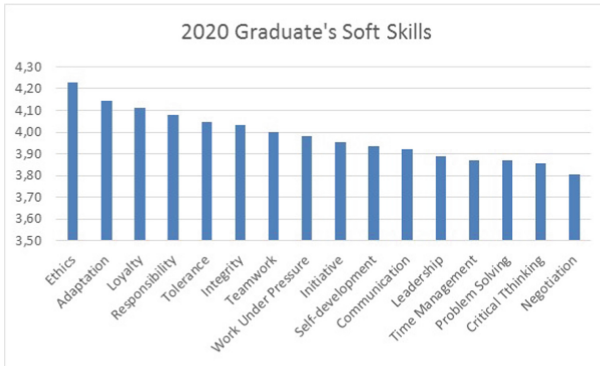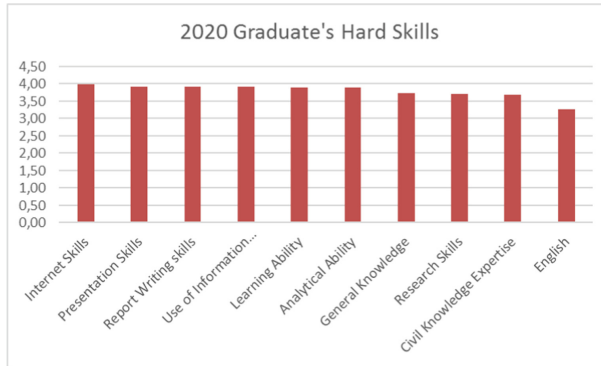
Fig. 2. The Average 2020 Graduate's Soft Skills Based on Alumni in Civil Engineering Undergraduate Study Program.
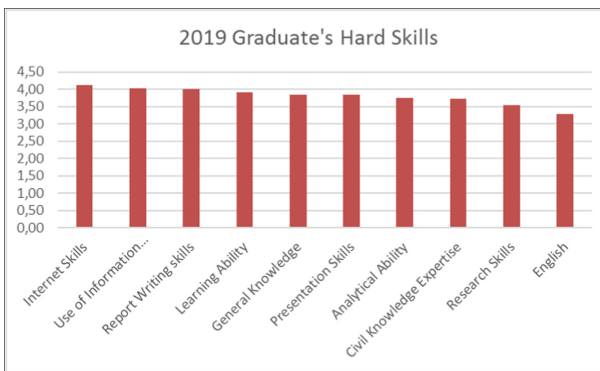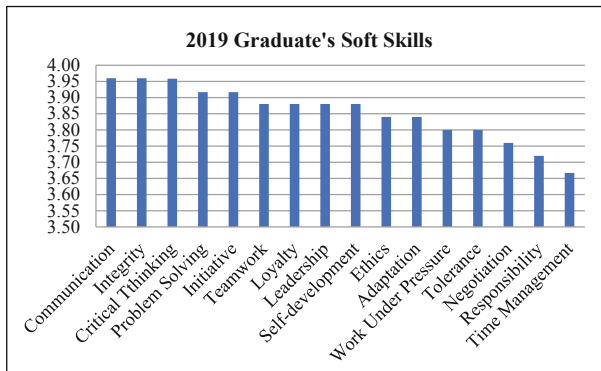

Fig. 3. The Average 2019 Graduate's Hard Skills Based on Alumni in Civil Engineering Undergraduate Study Program.

For the Hard Skills, the 2019 and 2020 Alumni in Civil Engineering Undergraduate-Study Program indicates the need for improved Civil Knowledge Expertise, Research Skills, and English. It shows in Fig. 3 and Fig. 4. They have good competencies in Internet Skills, Use of Information Technology, and Report Writing Skills.

The results of the average softskills owned by alumni in the Undegraduate program of Building Construction Education based on the questionnaire can be seen in Figs. 5 and 6. Based on Fig. 5 and Fig. 6, alumni of the Undergraduate Program of Building Construction Education feel they have high competence in communication, integrity, and teamwork. This is evidenced by the results of the answers with the highest average value. Meanwhile, they consider that the competencies that are lacking are negotiation, responsibility, and time management.
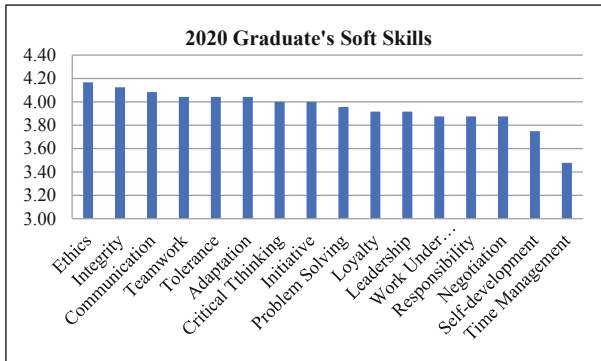
Fig. 4. The Average 2020 Graduate's Hard Skills Based on Alumni in Civil Engineering Undergraduate Study Program.
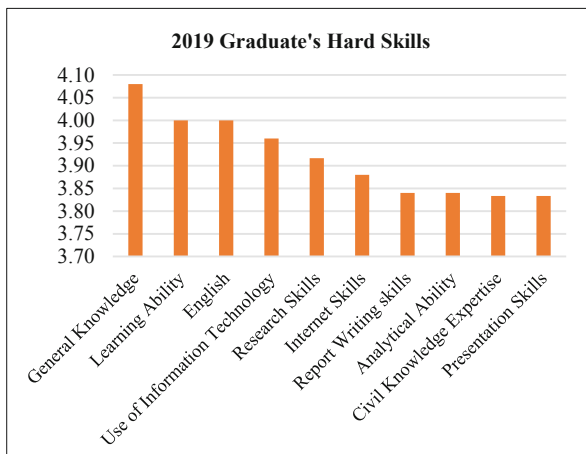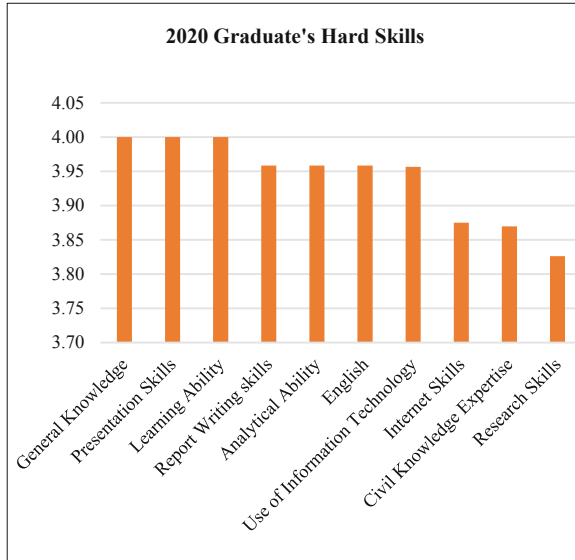

Fig. 5. The Average 2019 Graduate's Soft Skills Based on Alumni of the Undegraduate program of Building Construction Education.

The results of the average hardkills owned by alumni in the Undegraduate program of Building Construction Education based on the questionnaire can be seen in Figs. 7 and 8.

For the Hard Skills, the 2019 and 2020 Alumni of the Undergraduate Program of Building Construction Education indicates the need for improved civil knowledge expertise, and research skills. It shows in Fig. 7 and Fig. 8. They have good competencies in general knowledge and learning ability.

Fig. 6. The Average 2020 Graduate's Soft Skills Based on Alumni of the Undegraduate program of Building Construction Education.


Fig. 7. The Average 2019 Graduate's Hard Skills Based on Alumni of the Undegraduate program of Building Construction Education.

The competencies required by the industry ideally are similar to or close to the competencies owned by graduates [9–12]. This ideal must be gained so that graduates have no difficulty in finding work and adapting to the workplace. The results of the comparison between the skills owned by graduates in Civil Engineering Undergraduate Study Program the skills needed by the industry can be seen in Figs. 9, 10, 11 and 12.
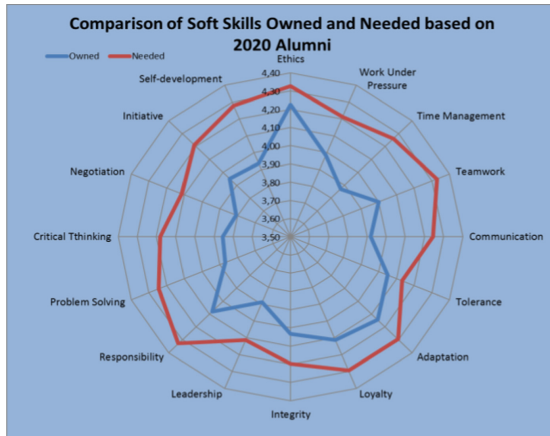
Fig. 8. The Average 2020 Graduate's Hard Skills Based on Alumni of the Undegraduate program of Building Construction Education.
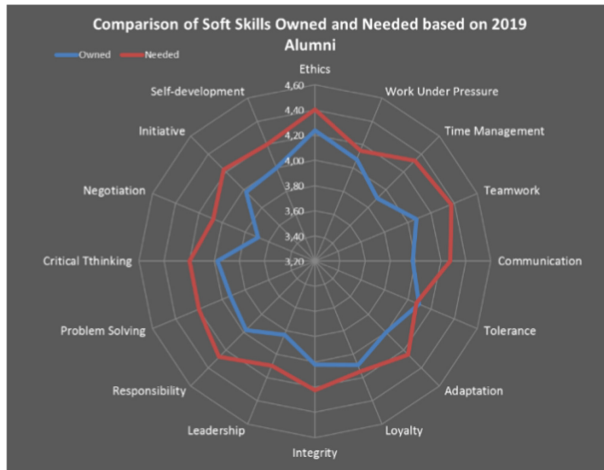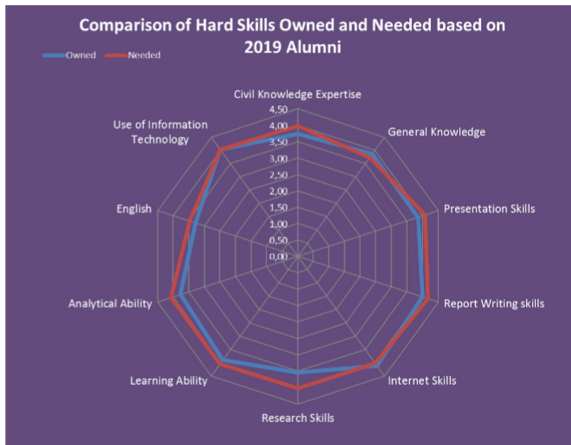

Fig. 9. The Comparison of Soft Skills Owned and Needed Based on 2019 Alumni in Civil Engineering Undergraduate Study Program

From the graph in Fig. 11 and 12, the comparison of hard skills owned and needed shows promising results that the differences are not too much. It is different from the comparison of the soft skills owned and needed that shows high dissimilarity. When analyzed, it is found that soft skills in time management must be improved for our graduates. Following next, problem-solving and negotiation skills also need to improve.

Fig. 10. The Comparison of Soft Skills Owned and Needed Based on 2020 Alumni in Civil Engineering Undergraduate Study Program.
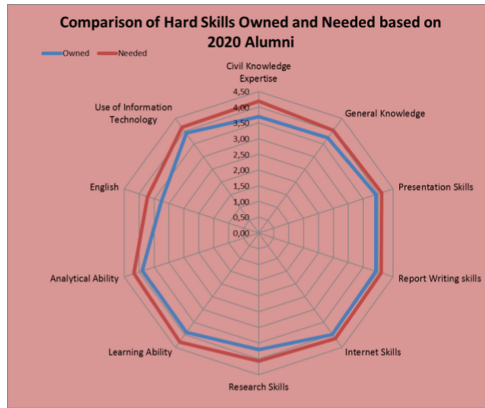

Fig. 11. The Comparison of Hard Skills Owned and Needed Based on 2019 Alumni in Civil Engineering Undergraduate Study Program

Moreover, for the hard skills, the alumni of the Civil Engineering Undergraduate Study Program must upgrade in Research Skills, Civil Knowledge Expertise and English. Everything can be seen in Fig. 13.

The results of the comparison between the skills owned by graduates in the Undergraduate program of Building Construction Education the skills needed by the industry can be seen in Figs. 14, 15, 16 and 17.

Fig. 12. The Comparison of Hard Skills Owned and Needed Based on 2020 Alumni in Civil Engineering Undergraduate Study Program
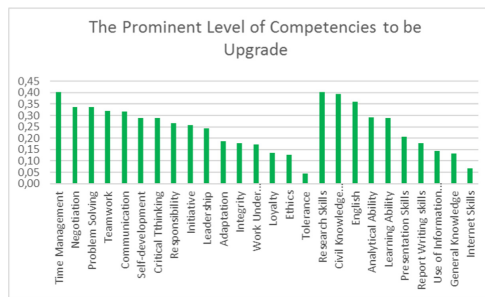

Fig. 13. The Prominent Level of Competencies to be Upgrade Based on Alumni in Civil Engineering Undergraduate Study Program

Fig. 14. The Comparison of Soft Skills Owned and Needed Based on 2019 Alumni in the Undegraduate program of Building Construction Education.

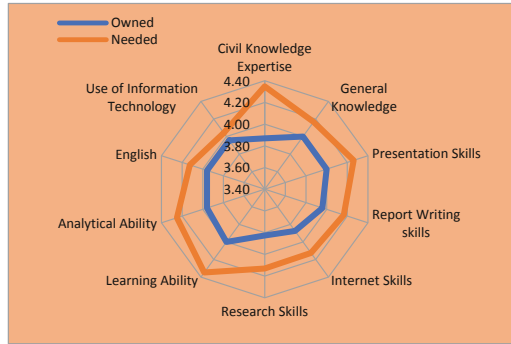**Fig. 15.** The Comparison of Soft Skills Owned and Needed Based on 2020 Alumni in the Undegraduate program of Building Construction Education
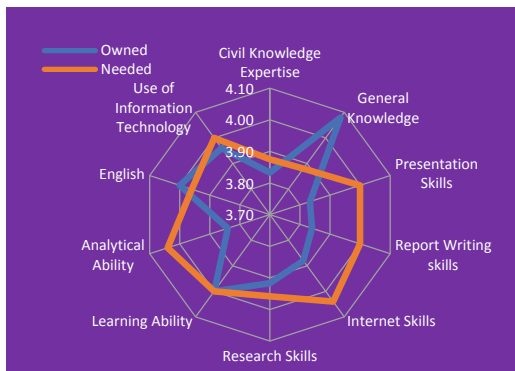

Fig. 16. The Comparison of Hard Skills Owned and Needed Based on 2019 Alumni in the Undegraduate program of Building Construction Education.

From the Fig. 14, 15, 16 and 17, the comparison of skills possessed and needed shows different results between hard skills and soft skills. Softskills shows that there is not too much difference between the skills possessed and those needed by the industry. While on hard skills there are quite a lot of differences. However, there is also something that is more than what the industry needs, namely general knowledge. If analyzed, it was found that soft skills in time management, negotiation, and loyalty also need to be improved. As for hard skills, alumni must upgrade civil knowledge expertise, analytical abilities, and presentation skills. Everything can be seen in Fig. 18.

Based on the description above, shows that the competencies owned by graduates get an average value below the average value of work skills required by the industry. Concluded that there are differences in skills or competencies between graduates and industrial needs, so it is necessary to improve skills to suit the needs of the industry. One of the ways is by integrating the work skills required by industry into the university curriculum.

Fig. 17. The Comparison of Hard Skills Owned and Needed Based on 2020 Alumni in the Undegraduate program of Building Construction Education.
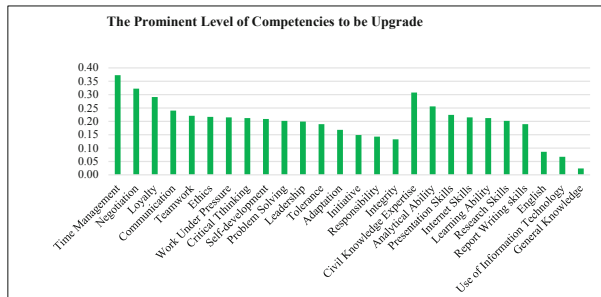
Fig. 18. The Prominent Level of Competencies to be Upgrade Based on Alumni in the Undegraduate program of Building Construction Education.

4   Conclusions

This tracer research intends to find out alumni's competencies are when they have just graduated and when they are already working. The results of this study vary widely on the competencies they feel are the best they have. For soft skills, ethics is the best competency possessed by alumni of the two study programs in the Civil Engineering Department. The best hard skills of the alumni's competencies are general knowledge for alumni of the Undergraduate Building Construction Education study program and internet skills for alumni of the Undergraduate Civil Engineering study program.

In addition to knowing how alumni possess the best competencies, the most important thing is also to find out which competencies are felt to be lacking. The alumni of the Undergraduate Civil Engineering Study Program, they are lacking in Research Skill Issues, moreover, the alumni of the Undergraduate Building Construction Education do not have the Civil Knowledge Expertise enough. That before is about the alumni's hard skills, as for their soft skills, both the alumni of different study programs have as bad as how they manage the time management in the job. Information about how the alumni competencies still lacking from what the industries want has become the input

for the future improvement of the curriculum of each of the study programs in the Civil Engineering Department.

Authors' Contributions.   Wulandari and Nusantara are responsible in instrumentations and data collection. Rahmadyanti and Mulyono are responsible in data analysis and article presentation.

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