The Technology of Tracking System Integrated Big Data based on Tracer Study to Improve Social Networking of Graduates in The Era of Society 5.0

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Abstract—**Currently, the development of digital education resource management continues to increase. In the era of Society 5.0, social networking skills are needed. However, this ability is relatively not maximally owned by graduates. This research aims to (1) develop a tracking system technology; (2) testing the attractiveness level of tracking system technology; and (3) testing the effectiveness of tracking system technology integrated with big data based on tracer studies. The method used in this research is R&D. The stages are carried out starting from literature study, product design, product design, product building, product testing, and analysis of results. This research was centered at state universities in East Java. The results of this study include: (1) the tracking system technology integrated with big data based on the tracer study that was developed has a high level of compatibility with an average score of 95; (2) the average percentage of the attractiveness of refined products is 88% (design aspect), 96% (display aspect), 90% (content aspect), and 92% (workflow aspect); and (3) the percentage level of feasibility of the developed product is 90% (user interface aspect), 86% (target aspect), 86% (usefulness aspect), and 88% (user ease aspect).**

Keywords—education management, education resources management, tracer study, tracking system, social networking

I. INTRODUCTION

The development of digital education resource management continues to increase. This is related to the emergence of the era of society 5.0. In this era, social challenges and problems arise with the use of various digital innovations as a result of the industrial revolution 4.0 era. The community in life 5.0 must possess various essential growing abilities [1], [2]. One of the critical capabilities in the era of society 5.0 is social networking. This ability is essential for students to master to navigate an era full of uncertainty and high complexity in the massification of higher education in Indonesia, marked by the proliferation of new higher education institutions [3], [4].

Especially in technical education, educational institutions must improve to change according to the changing educational paradigm. Technical education as a producer of graduates ready for a career in education and the world of work has an important role. This role is a place for creative and innovative students to emerge. In addition, technical education institutions are required to increase networks with the world of work so that the absorption rate of graduates is high [5], [6].

In addition, mastery of social networking skills for students and alumni is one of the things that must be developed. Attention to the relationship between higher education and changes in industry and corporations in the world of work needs extraordinary and continuous pressure. As a form of responsibility to society, universities need to track graduates to determine the performance and alignment of graduates' abilities with the needs of the world of work [7]–[9].

However, current students in engineering education have not fully mastered social networking skills. This is indicated by the not yet optimal employment absorption of engineering education alumni in a short time. This phenomenon is contrary to the rapid development of technology, especially in the field of digital technology. Various important benefits of the presence of digital technology have not been able to be absorbed by educational institutions [10], [11]. Technical education institutions are not yet fully capable of developing the social networking skills of students and graduates. The success of university graduates (PT) in entering the world of work is one indicator of learning outcomes and the relevance of PT for the community. Thus, universities are responsible for equipping graduates with certain competencies (learning outputs) and facilitating and bridging graduates entering the world of work. [12]–[14]. One way to track the whereabouts and progress of graduates after leaving university, especially related to obtaining information related to the transition from college to work, is to carry out a study known as a tracer study. Tracer study is the study of tracing graduates from higher education institutions [15]–[17].

Social networking skills can be developed by building relationships with many people anywhere. Especially in

education, tracer study is one of the leading programs to increase the absorption of graduates and the usefulness of the competencies possessed by graduates. This study is intended to track the condition of alumni, workplaces, and the use of competencies developed in educational institutions [9], [18]. However, tracking the tracer study system is still done manually by registering directly through the alumni and workplace fields. The effectiveness and efficiency in the study system that is carried out manually cannot provide factual information on the condition of the alumni. One way to dig up information about the transition from education to the world of work is to carry out a tracer study [18], [19]. Tracer studies also provide valuable information on the relationship between higher education and the professional world of work, assessing the relevance of higher education, information for stakeholders, and the completeness of requirements for higher education accreditation.

Therefore, from the presentation on the problem of developing social networking capabilities and the problem of the study tracer system in educational institutions, it must be solved effectively and efficiently. The development of a tracking system integrated big data based on tracer study aims to improve the social networking capabilities of college graduate students in the era of society 5.0. This system can perform the tracking process quickly and accurately according to the actual conditions of graduates by utilizing big data technology so that the effectiveness and efficiency of the study system in higher education can be increased by optimizing students' social networking abilities.

II. METHOD

This research uses Research and Development (R&D) research methods. The model used adapts from various R&D research models proposed by experts according to the research objectives. The stages carried out in this study are shown in Figure 1.
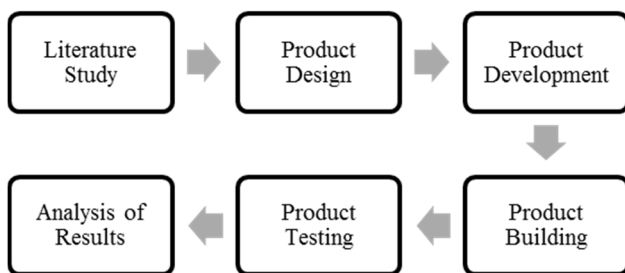

Fig. 1. Stages of research development and technology research

Figure 1 shows the steps of product development through six stages. In the first stage, a literature study on problems and technological developments is carried out. The second stage is an initial product design according to the results of the literature study. The third stage is product development. The fourth stage is building a product according to the initial design and a product development review. The fifth stage is product testing through experts. The last stage is the analysis of the data from the expert validation results. The instrument used in this study was an expert validation questionnaire. The data analysis technique used is quantitative descriptive analysis to determine the level of reliability and product attractiveness.

III. RESULT

The results of product development are in the form of a display of the developed product and the results of expert validation. The results obtained are based on the product development that has been built. The explanation of each result in this study is explained as follows.

A. The results of the development of the Technology of Tracking System Integrated Big Data

The results of developing the big integrated data tracking system technology are shown in Figure 2 below.
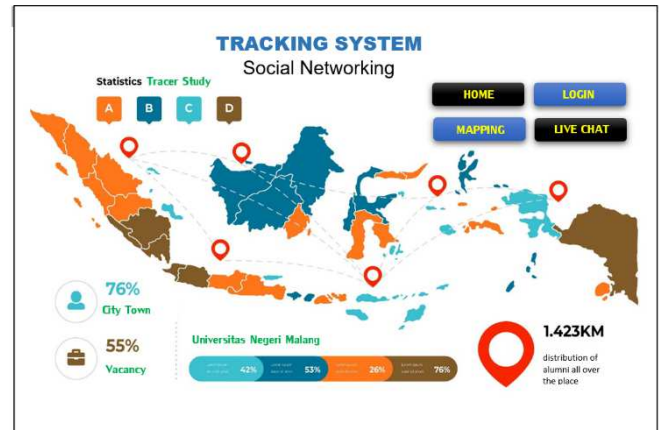

Fig. 2. Display technology of Tracking System Integrated Big Data

Figure 2 shows that the developed technology has essential features in tracking graduates in the world of work. The system developed has main features, including a mapping system, live chat, system login, filling out questionnaires, data networking, and displaying graduate statistics.

B. Expert validation results regarding the compatibility of Technology of Tracking System Integrated Big Data

The exciting development of big data integrated system tracking technology results are shown in Figure 3 below.
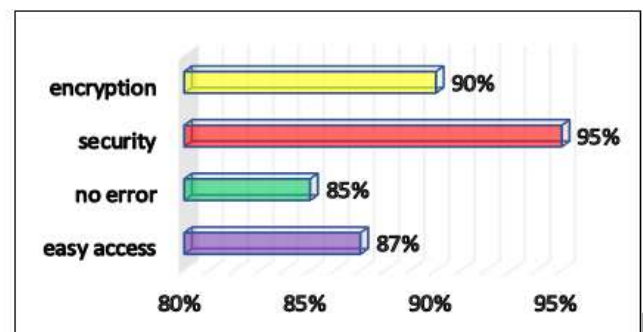

Fig. 3. Product compatibility expert validation results

Figure 3 above shows the level of compatibility of the developed product with a score above 75%. This can be interpreted that technology development has high compatibility. Furthermore, the results of expert validation related to product attractiveness are shown in Figure 4 below.
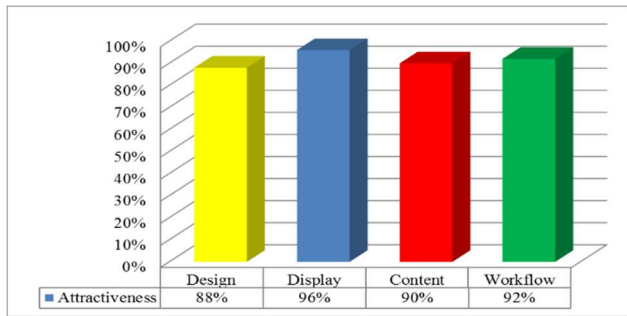
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Fig. 4.   Expert validation results regarding product attractiveness

Figure 4 above shows the results of expert validation related to the attractiveness of the product being developed. The results of expert validation show that the product developed has high attractiveness with a score above 75%. The results of expert validation regarding product feasibility are shown in Figure 5 below.
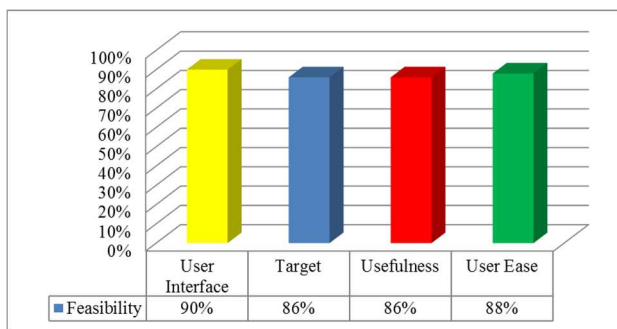

Fig. 5.   Expert validation results regarding product feasibility

Figure 5 above shows the results of expert validation regarding the feasibility of the product being developed. The results of expert validation show that the product developed has high feasibility with a score above 75%. The expert validation results show that the product developed is very attractive and feasible to be implemented in the field.

IV.   DISCUSSION

A.   The technology of Tracking System Integrated Big Data as an innovation in recruiting millennial graduates

The appearance of tracking system technology integrated with big data based on tracer studies has a level of attractiveness that is by the rules of developing digital technology products. The development of digital technology-based products and paying attention to technological sophistication must be easy to use by the target user. This is very important to increase the usability value of the developed product. The product developed can be used by many users because it is integrated with big data systems. The big data system in the developed technology can process and analyze large amounts of alumni data quickly and accurately.

The attractiveness of tracking system technology integrated with big data based on tracer studies fulfills the principles of developing digital technology. The development of good digital technology can be viewed from various aspects: design, content, display, and workflow. The design aspect is one of the factors that must be considered in technology development [20], [21]. Judging from the design

aspect of the big integrated data tracking system technology based on the tracer study, it has an intuitive and user-friendly design that makes it easier for university graduates to enter data accurately and efficiently. Furthermore, the content aspect becomes another critical determining factor in the development of technology. Judging from the content aspect, the tracking system technology integrated with big data based on tracer studies has exciting and interactive content that is comfortable to watch. According to graduate data collection, various contents were developed, such as column filling in identity, job status, job location, and salary ranges obtained. Furthermore, the display aspect is another determining factor in the development of digital technology [22], [23].

The tracer study-based integrated tracking system technology display technology based on the developed tracer studies can be seen from various devices with low specifications with a good user experience. Furthermore, the system workflow aspect is the last factor determining the usefulness of digital technology development. The workflow of tracking system technology integrated with big data based on tracer study has a series of well-organized menus and sub-menus. Alumni data recording and tracking automation systems are rapidly forming. The order of menus and sub-menus in the application has functions that are by its use, and the language presented is easy to understand [24], [25].

The feasibility of tracking system technology integrated with big data based on tracer studies meets the development of appropriate digital technology. The development of digital technology with high feasibility can be viewed from the user interface aspect, the target aspect, the usability aspect, and the ease of use aspect. The tracking system technology integrated with big data based on tracer study is suitable for educational institutions to obtain information about alumni. This is very important for the development of service and quality to students and alumni. This explanation shows the many benefits obtained by universities through tracer study activities [11], [25], [26]. The benefits are related to the use of tracer study information for the graduates themselves, but what is essential can also be input for the improvement and improvement of the educational process carried out in universities, especially at the level of majors/programs study. The increase in the number of students who later become alumni indicates the high public trust, especially the people in the Indonesian region, towards this study program, maintain this trust, it is necessary to carry out tracer studies [17], [18].

B.   The Technology of Tracking System Integrated Big Data based on Tracer Study to improve social networking of graduates in the era of Society 5.0

Social networking skills are one of the essential skills to be developed in the era of society 5.0. This ability plays a role in the success of the implementation of education in a country. Especially in engineering education, this ability is essential to be developed so that the graduates produced have broad connections in the industrial sphere. In addition, the graduates produced can compete with various graduates from other universities. The success of education can be seen from the absorption of graduates in the world of work. The development of social networking capabilities in the field of engineering education is a key pillar of the development of the quality of graduates. One of the challenges facing

universities today is the competition for graduates between universities. The increasing number of public and private universities in Indonesia has the consequence of a higher level of graduate competition [11], [26], [27].

The technology of tracking system integrated big data based on tracer study is the initial strategy for improving the quality of graduates/alumni through improving the quality of education in higher education [19], [28]. Through the technology of tracking system integrated big data based on tracer study, universities will obtain information on various matters concerning alumni, such as waiting period for graduates, fields of work occupied, and user community responses to alumni. The results of the technology of tracking system integrated big data based on tracer study can be used to improve and improve the quality of higher education through one of them, namely the curriculum.

The technology of tracking system integrated big data based on tracer study can effectively improve student's and graduates' social networking skills. This is due to the ease with which institutions can obtain accurate information about the condition of graduates. In addition, the feedback provided by graduates can be used as important information for the development of key competencies needed in the real-time world of work. Another impact is the high absorption of engineering education graduates in the era of society 5.0. The tracer study results can also be used as input to improve the learning process in higher education. Improving the use of lecture methods, developing lecture materials, and improving the implementation of process evaluation and learning outcomes should be a follow-up to the tracer study results. [14], [17].

The difficulty of alumni in displaying professional performance at work or in the community may occur because the learning process they experience during lectures does not provide opportunities to develop their potential to the fullest and does not equip them to become professional graduates. While studying in college, students who are trapped in rigid classrooms or study spaces will become graduates who are afraid that they will repeat the experiences they have gone through when serving at work or in their lives in the community. [11], [29].

In society 5.0, the success of the implementation of engineering education can be optimized by focusing on student development and digital technology. This is following the principles of the era of society 5.0, which is centered on humans and technology [1], [2], [30].

The development of student abilities can be done by prioritizing adaptability and competence in the world of work. This is intended to solve various challenges of social problems in the workplace by utilizing technology such as big data. Information about the acceptance of graduates/alumni in the world of work obtained through tracer studies is essential in improving or perfecting study program management [31]–[33]. This is closely related to the preparation of strategic plans and work plans for study programs and their implementation. The development of various programs to increase student potential and the implementation of these programs will be very effective if they can shape graduates to be accepted in the world of work. Besides being able to be used to improve and improve the quality of higher education, the results of the tracer study can also be used by external parties, in this case, the government related to decision making in the field of education itself and the field of employment [34], [35].

V. Conclusion

The tracking system technology integrated with big data based on tracer studies can improve social networking capabilities effectively. The integration of technology in education needs to pay attention to aspects of usability and ease of use. Student social networking can develop according to the information provided by alumni with tracking system technology integrated with big data based on tracer studies.

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