

TRACER STUDY INFORMATION SYSTEM

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Abstract

This study investigates the developments of research in relation to information systems of tracer study in higher education are reviewed in terms of country, year, and types of information systems used. Content analysis is used to conduct an in-depth review of the 14 articles regarding information systems in the tracer study. The results of the study show that the countries that discuss this study the most are from Asia, especially Indonesia. In the meantime, the types of information systems used by those studies are Android-based, big data, Geographic Information Systems (GIS), social networks, data warehouses, and web-based. Web-based learning is a system that is widely used in information systems because the development in this system is very rapid, programming language is easy and the display is easy for users, but in using this web users must connect their devices to the internet. The advantage of an information system using Android is that it is more flexible to use because it supports mobile phones so that users can easily access it. Then the system using GIS is more interesting because through the geographic system one of its features makes it easier for users to see or track the area where alumni or companies are located. The largest and most comprehensive network is also used for this information system, such as the use of LinkedIn, where alumni or institutions can find alumni data quickly. The output of this study is expected to contribute to the knowledge on information systems in tracer studies in higher education, which can be useful for academics, developers, alumni, and related parties.

Keywords: Android-based, GIS, Higher education, Information system, Social networks, Tracer study, Web-based.

1. Introduction

Tracer study is an activity of tracing serving to obtain data sources for graduates. It is not only useful for universities in developing their educational process, but also provides information about the relationship between the educational service process and the world of work. For tertiary institutions, information about competencies relevant to the world of work can help efforts to improve curriculum and learning systems [1]. In addition, the tracer study aims to determine educational outcomes in the form of a transition from higher education to the world of work [2]. Alumni tracer study alumni is one of the strategic things that must be done by every educational institution. There are at least three benefits that can be obtained from the implementation of this activity, namely [3]: 1) Knowing the satisfaction of stakeholders, in this case graduates, related to the learning experiences they have experienced, to serve as a tool for evaluating institutional performance; 2) Obtaining relevant input as the basis for institutional development, related to competitiveness, quality, and work experience of graduates that can be used to seize opportunities and overcome future threats; and 3) Improving the relationship between graduates and their alma mater, because when viewed from the experience of well-known educational institutions, a strong bond between graduates and alma mater will bring many benefits to the alma mater along with the recognition of graduates' work in the community.

Several universities have attempted to create a system to facilitate the management of alumni data, one of which is the use of information systems [4]. An information system is an integrated system that combines physical and human resources to provide information that supports the planning function [5]. Furthermore, an information system is a collection of hardware and software designed to convert data into useful information [6]. Information systems have been widely integrated in education such as in education management [7] and managing alumni databases [8] without any limitations of space and time [9]. Integration and collaboration of information system technology have made it easier to manage information, one of which is in the study tracer, several applications of information systems have been studied previously, such as the use of SMS gate way [10], website-based [11] and android-based [3]. The information systems used are very diverse, especially in the tracer study, previous research only focused on one information system. Therefore, it is necessary to conduct a broader study related to the information system that has been used in the tracer study, in addition, it is necessary to conduct a study to review the development of research in the context of this tracer study information system. The purpose of this study is to see how the development of research related to information systems in the study tracer is reviewed by country and type of information system from year to year and what types of information systems and how the information system works based on the results of the study.

2. Methods

This study uses content analysis to examine content related to information systems in the tracer study. Content analysis is a method for subjectively interpreting the content of text data through a systematic classification process, coding and identifying themes and patterns. The purpose of using content analysis as a research method is to provide new insights and improve understanding of a particular phenomenon, and to obtain a broader and concise picture of the phenomenon, as

well as to describe and quantify a phenomenon [11]. In this study, we want to examine the contents of articles containing information systems in the context of tracer studies.

This study was conducted in several stages and the data search process in this study utilizes the Scopus database as it is one of the largest databases with more than 20,000 data. Scopus is also one of the most influential databases and provides publication information in the academic field with high standards and quality that accommodates all types of articles, indexes, institutions, references, DOI, Affiliates and others [12]. During the search, the author entered all possibilities related to information systems in the study tracer, this is to reduce the possibility of losing documents along with the keywords used in this study: "tracer study" OR "tracer alumni" OR "alumni career" OR "Tracing graduates " OR "Tracing Alumni" OR "Tracing postgraduate" OR "graduate tracer study" OR "career alumni" OR "Tracing job alumni" OR "alumni data" OR "career data" OR "information alumni" OR "alumni record" OR " Surveillance Studies" OR "alumni survey" OR "records study" OR "doctoral graduate") AND ("information system" OR "web based" OR web OR website OR application OR e-learning OR platform OR e-platform OR information OR system OR "automated information system" OR "support system" OR "big data" OR "tracking system" OR "data mining" OR "technology-based" OR "technology system") AND ("higher education" OR university OR institute OR polytechnic OR academy OR collage OR institution OR "educational institution" OR "college education" OR campus OR faculty)). The results obtained were 568 research data limited by year, namely from 2002 to 2022. The filtering process was also carried out by taking documents in the type of journals and conference proceedings and documents using English. The results were obtained as many as 379 documents that were filtered, but after reviewing there were still articles and procedures that did not discuss the information system, so that they were filtered again, by examining one by one article. So that the final result is 14 documents, which will be reviewed.

3. Results and Discussion

This study aims to investigate research trends related to the use of information systems in the tracer study along with the filtered data obtained as many as 14 articles that will be studied, the 14 articles can be seen in Table 1.

Table 1. Distribution of the number of articles by year.

No.	Year	Type of information system	Country	Reference
1	2010	Geographic Information Systems (GIS)	United States	[13]
2	2010	Web-based	United States	[14]
3	2013	Web-based	Finland	[15]
4	2014	Web-based	Bosnia and Herzegovina	[16]
5	2018	Android	Indonesia	[17]
6	2018	Geographic Information Systems (GIS)	Indonesia	[18]
7	2019	Warehouse Data	Indonesia	[19]
8	2020	Social networking	Indonesia	[20]
9	2020	Warehouse Data	Indonesia	[21]
10	2020	Web-based	Philippines	[22]
11	2020	Web-based	Indonesia	[23]
12	2021	Big data	Indonesia	[24]
13	2021	Social networking	United States	[25]
14	2021	Web-based	Indonesia	[26]

This study also explores the documents that design, use, and develop information systems, especially in tracer studies. This is important because we want to see how far the development of research related to information systems in the tracer study is by looking at systems that are currently developing and countries that have developed many information systems. From the results of the search data as shown in Table 1 above, there were 14 documents that discussed information systems in the tracer study, collected data from 2010 to 2021 that appeared in the Scopus database. It can be seen the use of various information systems with various systems and technologies as well as the use of the latest social media and networks such as; the use of Android, big data, Geographic Information Systems (GIS), Social networks, Data Warehouse, and Web-based. Table 1 shows that Web-based is an information system that is widely used in this context, because web-based is a system that is in great demand in addition to its rapid development Table 1 shows that Web-based is an information system that is widely used in this context, because web-based is a system that is in great demand in addition to its rapid development, programming language and its use is easy to create, although developers from several sectors must take part in the creation of this web-based system [27]. In addition, seen by country, the dominance of the Indonesian state which has developed this system a lot. This is in line with the results of a review related to information systems where Asian countries, especially Indonesia, excel in contributing to the success model of information systems [28]. Here, the author describes the information system that has been used by previous researchers in the context of tracer studies, especially.

3.1. Android-based tracer study information system

This android-based information system is contained in a research document [17], in the design and manufacture of a tracer study information system at Universitas Islam Negeri Syarif Hidayatullah, Jakarta, Indonesia. The system is designed as shown in Fig. 1.

Figure 1 shows the Use case diagram and user interface of the information system designed by Azis et al. [17]. This is an information system for career and alumni development based on Android, this system works with the cooperation between job seeking companies and the information systems department in recruiting employees. If both have an agreement, then the information system decides to agree or not. Then there are job vacancies so that alumni who previously got an account to register themselves and as an id to enter this system. Alumni can access and apply to the desired company. The decision to accept or not depends on the company, which then the system responds directly to the decision. Alumni can use other facilities in the form of applying for scholarships, applying for projects, participating in job training, and reading news and events that can develop job skills. The system also displays graphic data for tracer studies which are used to make it easier for the head of the information systems department to view statistical reports. For this reason, the web dashboard contains features that can manage the system and display data displayed on graphs that can be easily accessed and read by the Admin, Head of the Information System Department and Company Staff. The advantage of this system is that it is based on Android so that alumni, department heads and company parties can easily access using an Android-based mobile phone, besides that information can be managed properly and can be accessed easily starting from job vacancies, scholarships and recruitment.

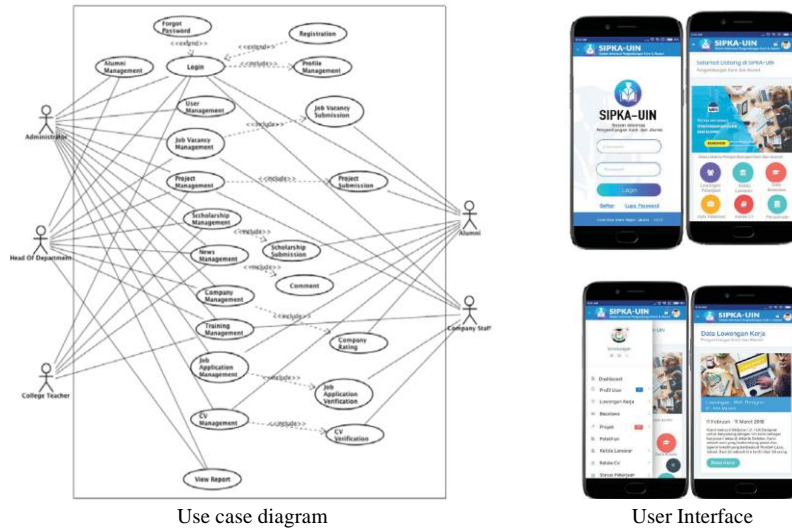


Fig. 1. Use case diagram and User interface of an Android-based information system [17].

3.2. Data Warehouse tracer study information system

The tracer study information system uses a data warehouse, in this case the author adopts the article from Asroni et al. [29]. Asroni et al. [21] built this information system for a tracer study at the University of Muhammadiyah Yogyakarta. The following system is built as shown in Fig. 2.

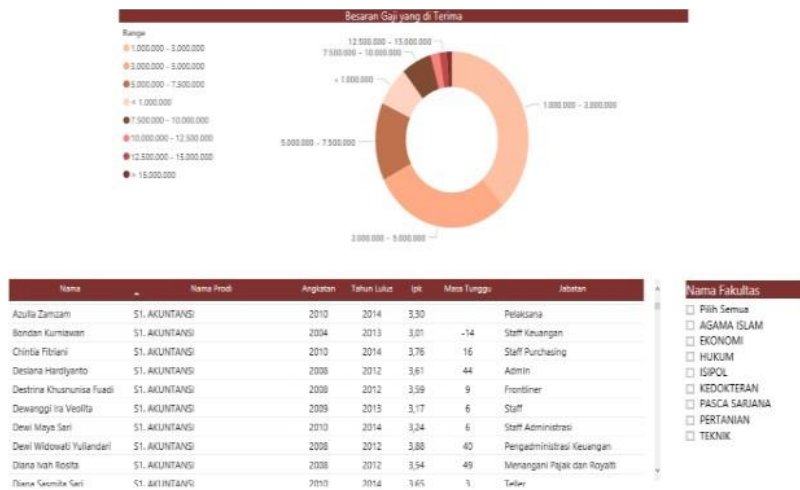


Fig. 2. The overall data display of the tracer study is based on the amount of salary.

The making of an information system based on Data Warehouse is carried out. The steps are as follows, (1) Stage, in the needs analysis there is some data that is needed and not, so at this stage it only contains the data that is needed. This stage

is used to store the first data in local storage. (2) Normalized Data Store (NDS) After the data is collected in the Stage, the next step is the ETL Process to become NDS. In this process, the data is cleaned of noise in each table. Noise can be null data, data duplication, and so on. (3) Cube Data Warehouse, in this case some data needs to be organized and stored in multidimensional form, one way to view this multidimensional data is a cube as shown in Fig. 2. (4) Analysis and Making Data warehouse Report, analysis in research This report is made to make it easier for users to understand and see the results of the data in the database. (5) Data Warehouse Testing, at the end of testing the data warehouse as shown in Fig. 2.

3.3. Geographic Information Systems (GIS) - based tracer study information system

The information system in the next tracer study that has been investigated is using Geographic Information Systems (GIS). In this section, the authors adopt the journal written by Fitriani et al. [18]. The following system is designed as shown in Fig. 3.

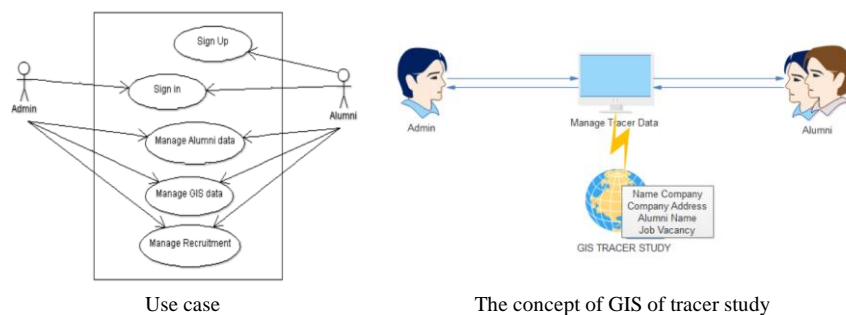


Fig. 3. Use case and concept of GIS in Tracer Study [18].

Figure 3 explains the use cases and GIS concepts in the tracer study, this study was made by a team from the Department of Informatics, Institut Teknologi Garut, Indonesia. This information system has several facilities including; Search facility to find out the location of Alumni's workplace on a map connected to Google maps, advanced search facility to find tracking data, statistics facility to identify the statistics on the distribution of tracking points per area connected to Google maps, Admin page facility for data processing and updating information, Alumni page facility to enter questionnaire tracer data, and job vacancy facility information page to be filled in by alumni if there are job vacancies available in their workplace. In this case, Alumni and Admin are actors, where alumni provide information to the system (Sign Up), Log in, fill out questionnaires and provide information on vacancies if any. Meanwhile, the admin manages input data from alumni [18].

3.4. Website-based tracer study information system

Furthermore, a web-based tracer study information system was designed by Sijabat et al. [30] at the University of Klabat. Following the design and working system in Fig. 4, this study adopts the document [30].

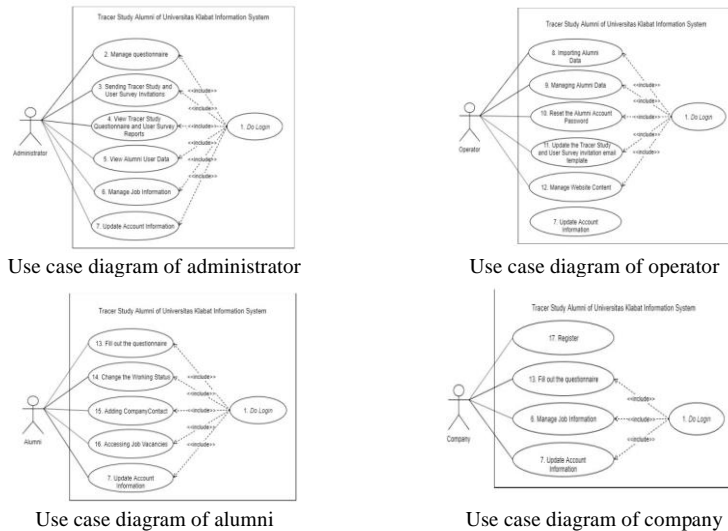


Figure 4. Use case diagram of 4 elements.

Figures 4 and 5, show use case diagrams and Application conceptual framework and manage alumni data and Questionnaire interfaces in a web-based information system at Universitas Klabat. In this case, all elements can be connected to the tracer study by using a device that is connected to the internet. To access the system, each user must first login before being able to access the system. The system responds to requests sent via a web browser. The web browser displays the results of the responses received from the system to the user. This information system uses Laravel, a web-based PHP. Some of the features in this information system, such as managing alumni data in Fig. 4, which can import data by operators through the available forms. Then the alumni can fill out the questionnaire and it is managed by the administrator, then the results can be displayed in graphical form.

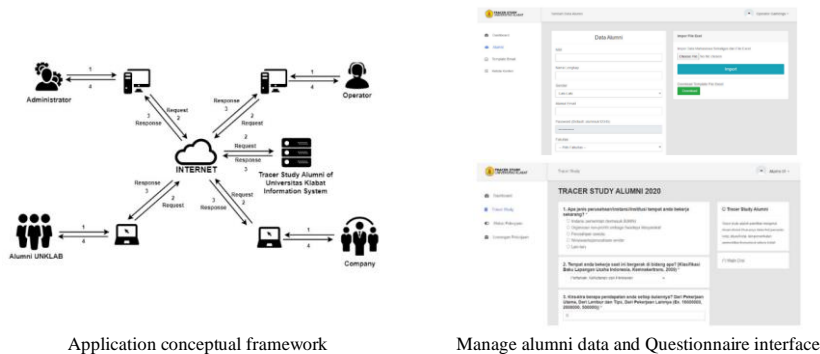


Figure 5. Application conceptual framework, manage alumni data and Questionnaire interface.

3.5. Social Network-based tracer study information system

Furthermore, the last section describes tracer study information systems based on social networks such as LinkedIn [31], Facebook [20] and Twitter [32]. LinkedIn

is a professional network as the world's largest and most valuable repository of information. Many alumni have joined LinkedIn groups from various universities, departments or programs taken, this is a proper way for educational units to maintain relationships with students and can collect alumni data so that their data can be collected using this network. As in the article [31] using LinkedIn to gather Information Technology alumni. So that in his research, 88.14% of graduates were collected and 19.40% of students worked in the IT field, then 8.80% of the graduates were IT managers.

4. Conclusion

This study explores the description of the use of information systems in the tracer study, after filtering the data obtained as many as 14 articles from 2010 to 2021 which specifically discuss information systems in the tracer study. The countries that discussed this study the most were from Asia, especially Indonesia. The following are the types of information systems used by several previous researchers, such as the use of Android, big data, Geographic Information Systems (GIS), social networks, data warehouses, and web-based. However, it is strongly recommended that future study select more databases for wider outreach.

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