Development of A Tracer Study System Using Agile Approach for Meeting Key Performance Indicators

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Abstract. A tracer study is very important to measure the quality of graduates of a college, besides that the results of a tracer study become material for self-evaluation of a college, for example, used for college accreditation, as material for curriculum development, and college branding. Tracer study data is one of the main performance indicators (IKU) of higher education, namely IKU 1 regarding college graduates to determine the performance and effectiveness of education delivery. Collecting alumni data with a lot of data will certainly be a challenge if done manually, so an information system is needed to manage alumni data that allows alumni to access it anytime, anywhere, effectively, and efficiently. Therefore, it is necessary to develop a tracer study information system that allows Politeknik Negeri Bali to collect, manage, and analyze its alumni data. In this research, the development of a tracer study system uses the Laravel framework with an agile approach. The Laravel framework is a framework that provides a structured technical framework, while the agile development method is a flexible development method that is oriented towards meeting user needs. The tracer study instrument developed refers to the accreditation instrument and tracer study instrument belonging to the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia which has been tested for validity and reliability.

Keywords: Agile, Alumni, Information System, Tracer Study

1 Introduction

Tracer study is a research on alumni in terms of job search, work situation, and utilization of competencies during college. Tracer study involves data collection in the form of questionnaires and data analysis (Maulana & Abdussalaam, 2023). The results of the tracer study data analysis become a reference for improving and enhancing the curriculum and educational services (Nugroho & Nugroho, 2018; Mardzotillah & Ridwan, 2020). Alumni data collection is a challenge for various universities in Indonesia, some of the reasons underlying the low response rate of alumni and the difficulty of getting alumni feedback are the lack of alumni initiative in filling out tracer

study data, cellphone numbers, or e-mails that are not active when contacted incomplete and un-updated alumni databases, alumni reluctance to answer all tracer study questions, The low emotional bond between alumni and universities, alumni feel that they do not get benefits in filling out the tracer study, the approach taken by the college by sending WhatsApp messages continuously to alumni seems forced and alumni feel that universities play a lesser role in the career life of alumni other than as a transfer of knowledge. In addition to the challenges in collecting alumni data that need a solution strategy, the challenges in managing large amounts of alumni data and confidential data need to use the use of information technology, so the development of a tracer study information system is important to automate previously manual processes, improve data accuracy and provide relevant and fast results. Some previous studies that have been conducted related to the development of tracer study systems are as follows. Research in 2022 with the title Design and Implementation of Tracer Study Website at Maitreyawira High School using the Scrum Framework designed a tracer study website to know alumni activities after graduating from school, transition from school to college, employment conditions and career paths (Charley & Aklani, 2022). The design of the Web-Based Alumni Management Information System at Politeknik Piksi Ganesha in 2023 uses the PHP programming language, the Laravel Framework, and MySQL database. The results of the system design are to facilitate the process of collecting alumni information and facilitate the preparation of questionnaire filling reports (Maulana & Abdussalaam, 2023). Deni Murdiani's research entitled Implementation of Agile Method in the Development of Electronic Journals at Non-Governmental Research Institutions (NGO) results in system development with the agile scrum framework enabling more flexible system development and being able to adapt to changes based on collaboration with users (Murdiani et al., 2020). Based on the challenges related to tracer studies and research that has been done before, it is necessary to develop a tracer study system using an Agile Approach to Meet the Main Performance Indicators of Politeknik Negeri Bali (PNB) to facilitate the collection management and analysis of alumni data. Through the tracer study system, PNB can collect alumni data in a more structured and systematic manner, improve interaction with alumni, gain deeper insights into the impact of higher education on the careers of alumni of PNB, and strengthen the relationship between the institution and alumni.

2   Methodology

2.1   Research Flow

The object of this research is a tracer study information system that will be developed and implemented for monitoring alumni of Politeknik Negeri Bali.
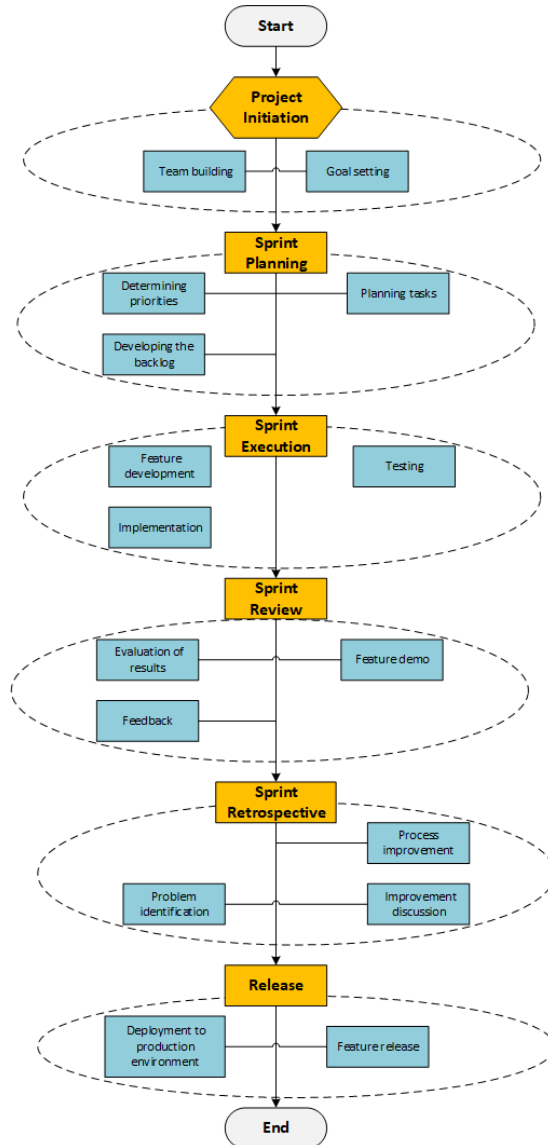
Figure 1. Research flow

2.2   Tracer Study Instrument

The instrument in this research is the tracer study questions that refer to the tracer study questions belonging to the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia on the page https://tracerstudy.kemdikbud.go.id/ and

according to the rules and procedures in accreditation. The tracer study instrument is shown in Table 1.

Table 1. Tracer study instrument

No	Variables	Questions in the instrument
1	Graduate Coverage	Please describe your current status?
2	Waiting period	Have you found a job <= 6 months / including work before graduation?
3	Waiting period	In how many months did you get a job?
4	Income	What is your average income per month (take home pay)?
5	Employment criteria	Where is the location where you work?
6	Employment criteria	What type of company/agency/institution do you work for now?
7	Employment criteria	What is the name of the company/office where you work now?
8	Entrepreneurship criteria	If you are self-employed, what is your current position/title? (if question 1 answers 3 self-employed)
9	Employment criteria	What is the level of your workplace?
10	Continuing study criteria	Continuing study question (if question 1 answers 4 continuing education) - Cost source - College - Level of further study - Date of entry - Study program
11	Source of funding for tuition	Mention the source of funding in financing tuition (not when further study)?
12	Suitability of work with field of study	How closely related is your field of study to your work?
13	Competencies and skills	What level of education is most appropriate for your current job?
14	Competencies and skills	At the time of graduation, at what level did you master the following competencies? (A). At the present time, at which level are the following competencies required in the job? (B)
15	Level of satisfaction with the education program	How much emphasis do you think is placed on the following learning methods in your study program? - Lecture - Demonstrations - Participation in research projects - Internship - Practicum

		- Fieldwork
		- Discussion
16	Job search	When did you start looking for a job? Please do not include part-time jobs
17	Job search	How did you search for the job? Answers can be more than one
18	Job search	How many companies/agencies/institutions did you apply to (by mail or e-mail) before you got your first job?
19	Job search	How many companies/agencies/institutions responded to your application?
20	Job search	How many companies/agencies/institutions invited you for an interview?
21	Job search	Have you actively looked for a job in the last 4 weeks? Choose one answer
22	Job suitability with field of study	If you think your current job does not match your education, why did you take it? Answers can be more than one
23	Waiting period	Your waiting time (PNB graduates) in getting your first job in months? (Accreditation Instrument)
24	Suitability of work with the field of study	The level of suitability of your field of work (PNB graduates) with the field during college? (Accreditation Instrument)
25	Feedback	Feedback and suggestions for the progress of PNB

2.3 Agile Approach

Agile development method is an iterative approach to software development that emphasizes team collaboration, responsiveness to change, and rapid release of updated systems (Srivastava et al., 2017; Upadrista, 2015).

2.4 Laravel Framework

Laravel is one of the most popular web frameworks for PHP-based application development. Laravel's features such as clear routing, powerful Blade templating, and intuitive Query Builder help in developing code quickly and efficiently (Subecz, 2021). Laravel adopts a well-structured Model-View-Controller (MVC) architecture (Versase & Hendriyanto, 2022). Laravel comes with various built-in features that are useful for web application development, such as authentication, authorization, session management, caching, and more (Kansha et al., 2023). Product backlog detail is shown in Table 2, while the sprint details in the tracer study system development is shown in Table 3.

Table 2. Product backlog detail

ID	Feature	Description	Priority	Sprint
1	Login Page	Users can log in to the system by using email and password.	High	Sprint 1
2	Alumni Questionnaire	Alumni can fill out questionnaires related to their work after graduation	High	Sprint 2
3	Dashboard Visualization	Statistics and alumni data are displayed in the form of graphical visualizations	Low	Sprint 3
4	Export Data Feature	Admin can export alumni data in Excel format.	Low	Sprint 4
5	Two-factor Authentication (2FA)	Add an additional layer of security with two-factor authentication	Low	Sprint 4

Table 3. Sprint details in tracer study system development

Sprint	Duration	Main Objective	Worked Backlog	Output
Sprint 1	2 Weeks	Basic Feature Development	1. Login Page 2. Admin Dashboard	1. Login System Functioning 2. Admin Dashboard - Login System Functioning
Sprint 2	3 Weeks	Alumni Questionnaire Feature Development	1. Alumni Questionnaire 2. Questionnaire Data Validation	1. Questionnaire Feature Functioning 2. Data Validation Ready
Sprint 3	2 Weeks	Reporting Feature Development	Dashboard Visualization	Visualization Dashboard Ready
Sprint 4	2 Weeks	Additional Feature Development and Enhancement	1. Questionnaire Filling Notification 2. Data Export 3. Two Factor Authentication (2FA)	1. Notification Feature Ready 2. Export Ready 3. 2FA Implemented

3   Result and Discussion

3.1   Result

The system has been implemented at the Center for Quality of Politeknik Negeri Bali Assurance and Learning Development. User training was conducted to ensure users understand how to use the system effectively. The interface view is shown in Figure 2.
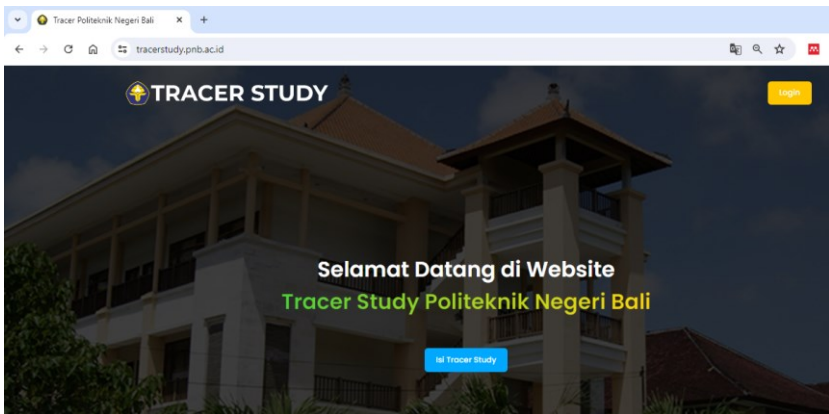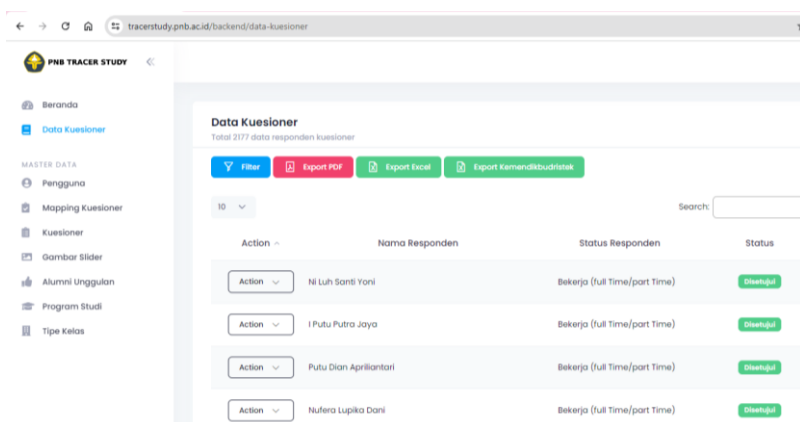

Figure 2. Interface view (in Indonesia language)
Photograph by Dewa Ayu Indah Cahya Dewi, permission by Politeknik Negeri Bali

The web-accessible tracer study system allows alumni to fill in data independently and access related information easily. The intuitive user interface makes it easy for alumni to fill in and update their personal data, employment information, and contributions in the world of work. The admin page view is shown in Figure 3.

Figure 3. Admin page view (in Indonesia language)
Photograph by Dewa Ayu Indah Cahya Dewi, permission by Politeknik Negeri Bali

3.2   Discussion

System development with an agile approach can meet user needs flexibly and collaboratively. The development of a tracer study system using Laravel does not take a long time because of the features that facilitate system development. One of the main challenges faced was ensuring a high level of participation from alumni. To overcome this, strategies such as regular follow-ups and incentives to complete the tracer study were implemented. In addition, the maintenance of up-to-date contact information and improved communication strategies helped overcome barriers related to data collection.

4   Conclusion

The development of a tracer study information system using the Laravel framework with an agile approach allows the collection, management, and analysis of alumni data of the Politeknik Negeri Bali (PNB) to be more effective and efficient. The tracer study system makes an important contribution to the university evaluation process, accreditation, curriculum development, and branding of the PNB. The development of the tracer study system uses the Laravel framework with a structured architecture with a model view controller (MVC) and an agile approach in developing the system iteratively with the gradual addition of features that are released quickly so that users provide feedback on the system. The tracer study system developed allows the collection of accurate and relevant data for various purposes of the PNB referring to the instruments set out in the accreditation procedures and the Ministry of Education, Culture, Research and Technology of the Republic of Indonesia which have been tested for validity and reliability.

Acknowledgment

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