IMPLEMENTATION OF THE SMART METHODS (SIMPLE MULTI-ATTRIBUTE RATING TECHNIQUE) FOR LOCATION SELECTION OF INDUSTRIAL WORK PRACTICE AND MONITORING IN VOCATIONAL SCHOOL STUDENTS

Aulia Rizky Muhammad Hendrik Noor Asegaff[)], M Dedy Rosyadi[2)], dan Budi Ramadhani[3)]

[1, 2),3))]Teknik Informatika, Fakultas Teknologi Informasi, Universtitas Islam Kalimantan Muhammad Arsyad Al Banjari Jalan Adyaksa No.2 Banjarmasin

e-mail: aulia.rizky.m.h.n.a@gmail.com[1)], dedy.rosyadi@gmail.com[2)], budiramadhani99@gmail.com[3)]

Corresponding Author: Aulia Rizky Muhammad Hendrik Noor Asegaff

ABSTRACT

Industrial Work Practices are educational, training, and learning activities for SMK (Vocational High School) students in the business world or the industrial world related to student competencies according to the fields they are involved. However, several problems arise in practice, such as difficulty updating data and distribution of random locations. It is deemed unfair for students because some get locations far from where they live. There is no forum for monitoring the development of internships by supervisors for students, both in reports from daily and final reports. So we need an information system that can provide solutions to these problems. Making internship activities more effective and efficient for Schools, Guiding Teachers, Students and Prakerin Partners. The SMART (Simple Multi-Attribute Rating Technique) method supports decision-makers in choosing between several alternatives.

Keywords: Implementasi, Method, Monitoring, Prakerin, SMART

I. INTRODUCTION

Industrial Work Practices are educational, training, and learning activities for Vocational High School (Vocational High School) students conducted in the business world or the industrial world related to student competencies according to the field they are involved. In general, schools will strive to implement the Prakerin program; this vocational school is intended to improve student's skills in their fields.

The implementation of this industrial Work Practice or prakerin program is based on the Minister of Industry Regulation Number 3 of 2017 concerning Guidelines for the Guidance and Development of Competency-Based Vocational High Schools that Link and Match with Industry which contains a clause on Industrial Work Practices which reads, "Industrial Companies and or Industrial Estate Companies facilitate Industrial Work Practices for students and Industrial Apprenticeships for teachers in Productive Studies".

Several problems occur in implementing internship activities; from the objects studied, general problems need to be solved. First, the difficulty of updating the internship participant data quickly because the data collection is still using Microsoft Excel. Second, the random distribution of internship locations is considered unfair for students because they get locations far from where they live. Third, there is no forum for monitoring the development of prakerin by the supervising teacher to students, both in daily and final reports.

From this problem, it can be researched and observed how to create an information system with the SMART method to help schools, supervisors, and students record location selection and monitor Prakerin activities in SMK. And how to use information systems to make it easier to collect data, select locations and monitor student progress in vocational prakerin activities.

II. LITERATURE REVIEW

1. Information Systems

The system is a collection of people who work together with the provisions of the rules that are systematic and structured to form a single unit that carries out a function to achieve goals. The system has several characteristics or properties: system components, system boundaries, the environment outside the system, system liaisons, system inputs, system outputs, system processing and system targets. At the same time, information is data processed to be more useful and meaningful for the recipient and reduce uncertainty regarding a situation's decision-making process. An information system is an organized combination of people,

hardware, software, communication networks and data resources that collects, transforms, and disseminates information within an organization (Anggraeni & Irviani, 2017).

2. Web

According to (Agus Hariyanto, 2015), the web can be interpreted as a collection of pages that display text data information, image data, animation data, sound, video and a combination of all of them, both static and dynamic which form a series of interrelated buildings, where each -each linked by page networks (hyperlinks).

According to Rohi Abdulloh (2015), the web is a collection of several pages containing information in the form of digital data in the form of text, images, video, audio, and other animations provided through an internet connection. Based on the description, the author concludes that the web is software that functions to display documents on a web that allows users to access the internet through software connected to the internet.

3. PHP

PHP was short for Personal Home Page (personal site). Rasmus Lerdorf first created PHP in 1995. At that time, PHP was still called FI (Form Interpreter), whose form was a set of scripts used to process form data from the web. In 1997 a company called Zend rewrote the PHP interpreter to be cleaner, better and faster. Then in June 1998, the company released a new interpreter for PHP and formalized the release as PHP 3.0. The abbreviation PHP was changed to a recurring acronym that PHP is Hypertext Preprocessing (Virdiandry & Putratama, 2018).

*Hypertext Preprocess*or, more familiarly called PHP, is a server-side script programming language designed for web development. PHP is also called a server-side programming language because it is processed on a server computer. PHP differs from programming languages such as javascript, which are processed in a web browser. PHP can be used for free and is open source. PHP is released under the PHP License, which is slightly different from the GNU General Public License, commonly used for Open Source projects (Jannah, Sarwadi, & Creative, 2019).

4. SMART Method

According to Lita Asyriati Latif, Mohamad Jamil, and Said HI Abbas (2018:13), "SMART (Simple Multi-Attribute Rating Technique) is a multi-attribute decision-making method developed by Edward in 1977. This multi-attribute decision-making technique supports decision-makers' decisions in choosing between several alternatives. Each decision-maker must choose an alternative that is by the objectives that have been formulated. Each alternative consists of a set of attributes, and each attribute has values. This value is averaged on a certain scale".

The definition of the SMART method, according to Dicky Nofriansyah and Sarjon Defit (2017:27), is a multi-attribute decision-making technique used to support decision-makers in choosing between several alternatives. Each attribute has a weight that describes how important it is compared to other attributes. This weighting and ranking are used to assess each alternative to obtain the best alternative. The models used in SMART which is as follows:

$$U(a_i) = \sum_{J=1}^{m} Wj\ Ui\ (ai) \tag{1}$$

Description:
W_j = Criteria Weighting Values to j and K Criteria
$U(a_i)$ = Value of Utility Criterion I for Criterion i
Where I = 1,2 …….m

The algorithm for solving the SMART (Simple Multi-Attribute Rating Technique) method is as follows:
1. Step 1: Determine the number of criteria for the decision to be taken
2. Step 2: The system, by default, assigns a value of 0-100 based on priority by normalizing (Wj/∑Wj)
3. Step 3: Give the criteria value for each alternative
4. Step 4: Calculate the Utility value for each criterion, respectively

$$U_i(a_i) = 100 \frac{(Cmax - Cout\ i)}{(Cmax - Cmin)}\ \%. \tag{2}$$

Description:
Ui(ai) = 1st utility value for the i-th criterion
Cmax = maximum criterion value
Cmin = minimum criterion value
Cout I = i-th criterion value

5. Step 5: Calculate the final score and do the ranking
   Based on the above theory, the authors conclude that the SMART method is a multi-attribute decision support system that describes an attribute that is more important than other attributes.

III.   RESEARCH METHODS

There are several methods used in this research. First, in the process of data collection used, the following methods:

1. Interview Method
   Interviews were conducted by giving questions directly to the school, the principal, the head of the department and the students participating in the prakerin, which aims to obtain complete information and data needed in making applications.
2. Observation Method
   Observation is direct observation and review of the object of research. Understand the problems that occur so they can get solutions to problems appropriately and accurately.
3. Literature Review
   Literature study is data collection in the form of studying reference books, articles and internet sites related to the research topic.

Second, the data analysis technique used in this study uses the Waterfall model. According to (Sukamto & Shalahuddin, 2018: 28), "The waterfall model is often also called a linear sequential model or classical life cycle". The waterfall model provides a sequential or sequential software life flow approach starting from the analysis, design, coding, testing, and support stages. The following are the stages that will be carried out in the research process:
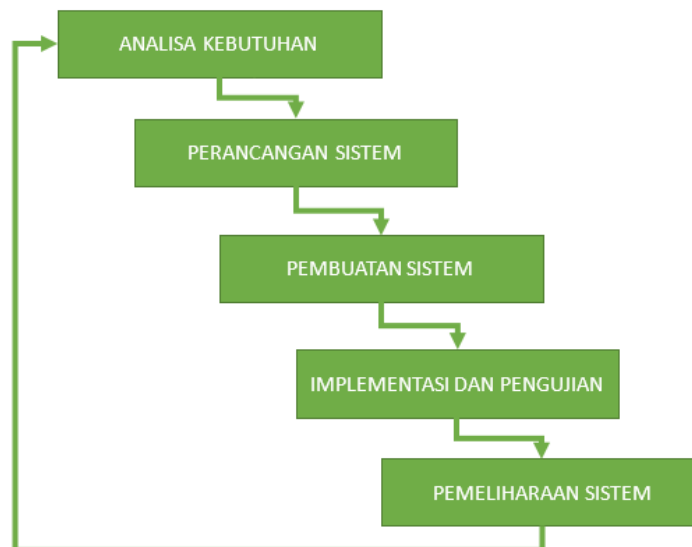

Figure 1. Waterfall Model

Third, the flow of research stages can be seen from the following framework:
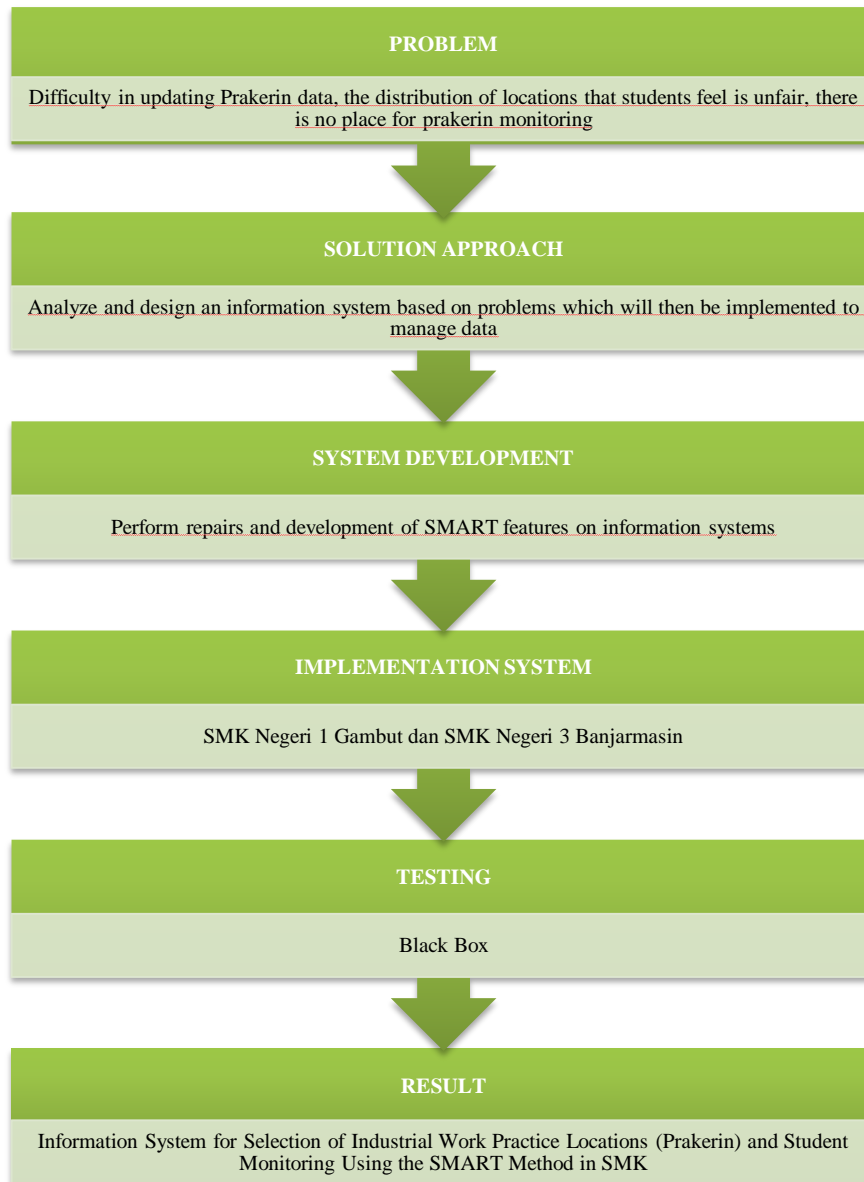
Figure 2. Framework system

IV. RESULT AND DISCUSSION

1. Functional Requirements
   a. Manage the authority of system users, namely usernames and passwords used by admins, students and supervisors.
   b. Manage student data, supervisors, majors, partners, placements, agendas and student prakerin scores.
   c. Manage student internship registration using the SMART method to categorize internship location placements according to student grades.
   d. Manage internship registration reports, student monitoring, mentoring assessments, student agendas, and final grades.

2. System Plan Design
   The design used in this research is a UML diagram. These include use case diagrams, activity diagrams and sequence diagrams.
   a. *Usecase Diagram*
      (Sukamto & Salahuddin, 2018:155) States that "use cases or use case diagrams are modelling for the behaviour (behaviour) of the information system to be made".
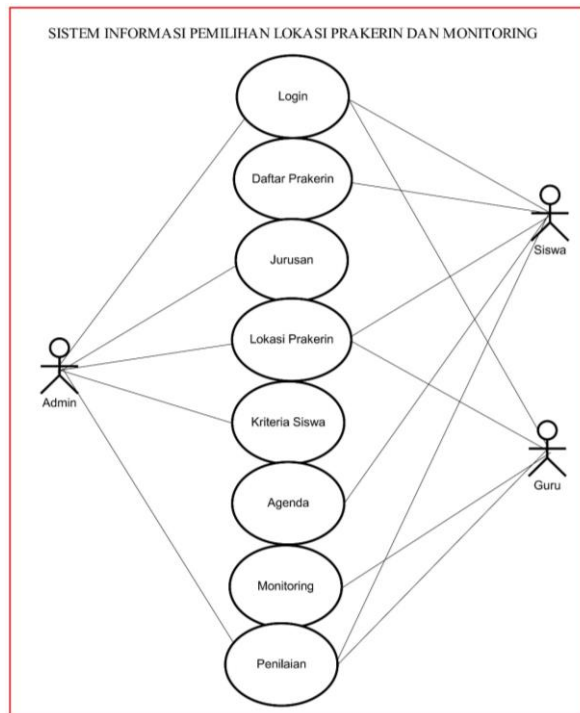
Figure 3 *Usecase Diagram*

b. *Activity Diagram*

Research (Sukamto & Salahuddin, 2018:161) explains, "The activity diagram or activity diagram describes the workflow (workflow) or activities of a system or business process or menu that is in the software".
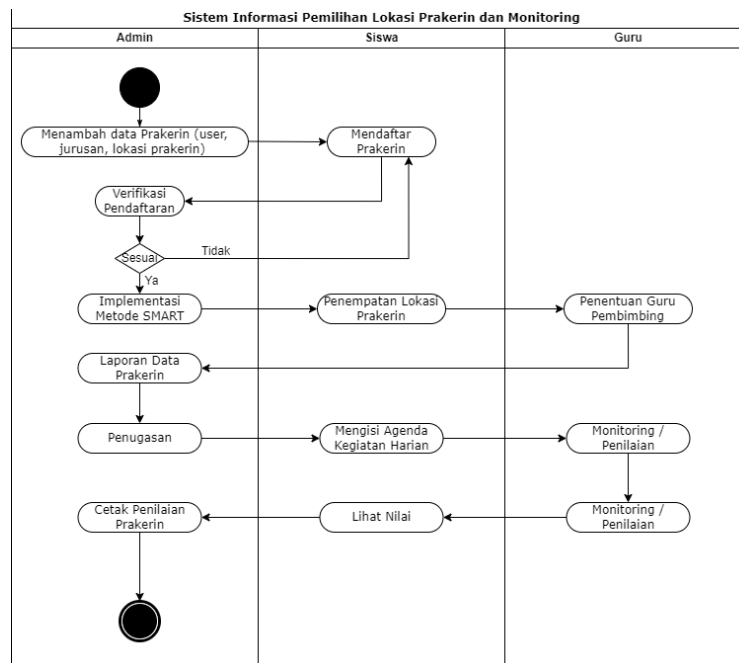

Figure 4. *Activity Diagram*

c. *Sequence Diagram*

Research (Sukamto & Salahuddin, 2018:165) explains that "sequence diagrams describe the behaviour of objects in use cases by approaching the lifetime of objects and messages sent and received between objects".
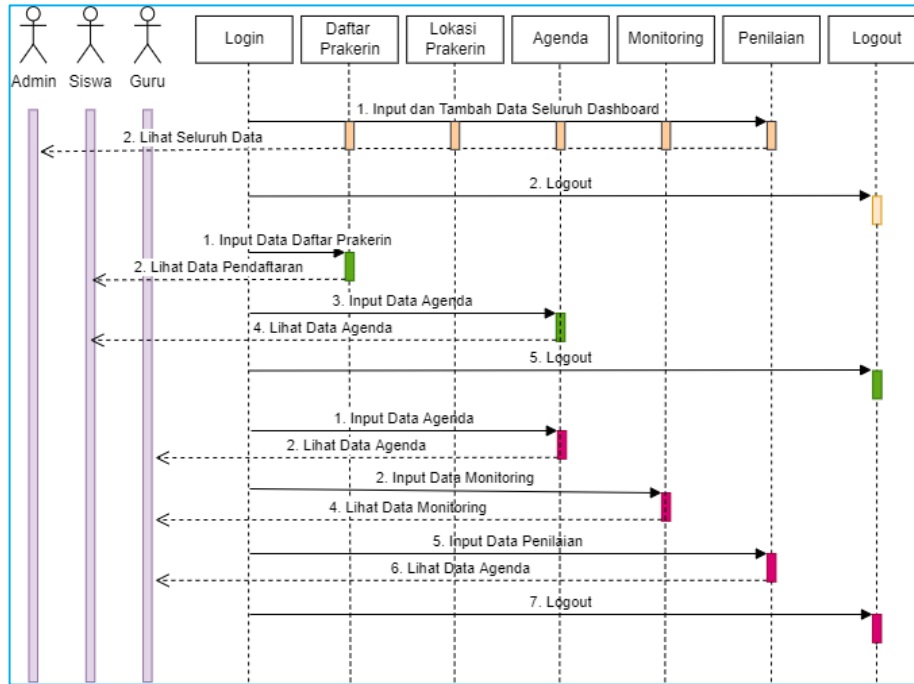
Figure 5. *Sequence Diagram*

3. System Input Interface

    The system input interface must be considered in the creation and development of an application because users involved in the application will deal directly with the pages accessed in the application. Therefore, the interface in an application is made according to the design to make it easier to use the application. In this application, several forms are used to manage and process data. The forms used in this application are:

    a. *Login Form*

        On this page, the user is asked to enter a username and password to access the menus in the application. This application has three user roles: admin, student and supervisor.
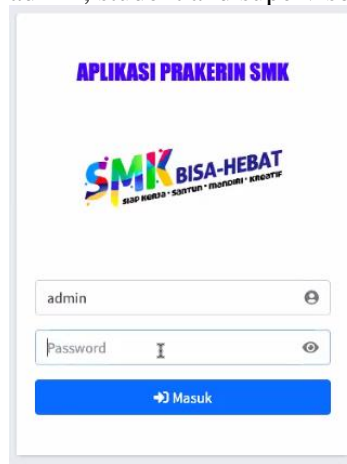
        Figure 6. *Login Form*

    b. *Admin Dashboard*

        After the admin user has successfully logged into the application, the admin dashboard will appear. This page has several master data menus, such as department, internship, and account verification: the internship menu, as well as processing the internship application system and monitoring.
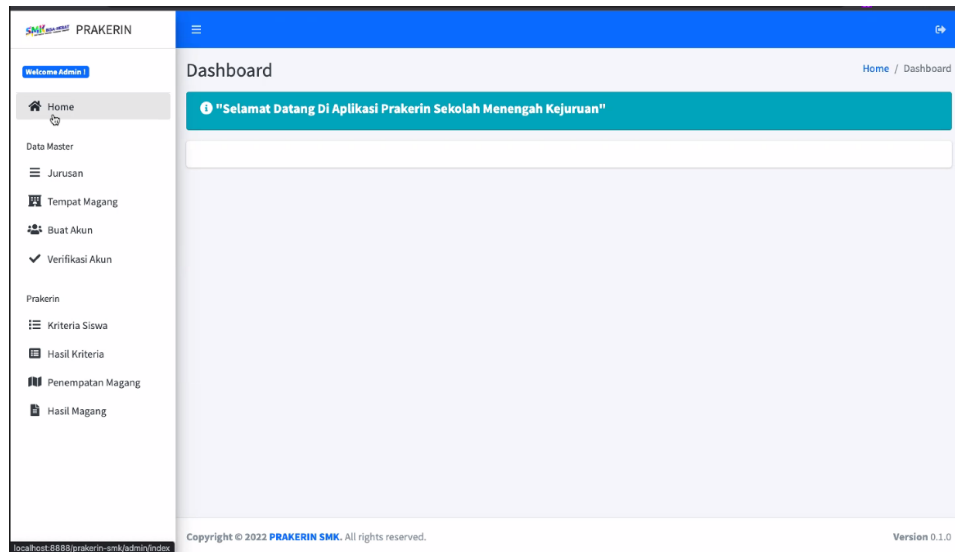
Figure 7. *Dashboard Admin*

c. *Student Criteria Assessment Data Form*

The admin provides assessment criteria to students on this page. By using the SMART method, the criteria are given based on student skills, student attitudes, student discipline, student academic scores and student communication.

Figure 8. Student Criteria

4. System Output Interface

The results of system input and data processing of this information system produce a report data that can be stored and viewed as a decision support system from the start of internship activities until students complete internship activities. The data that the system outputs include:

a. Prakerin Registration Report
b. Student Monitoring Report
c. Supervisor Assessment Report
d. Student Agenda Report
e. Student Final Report

Here are some of the system output interfaces:

Figure 9. Prakerin Registration Report

Figure 10. Student Final Report

5. System Testing

Testing this system using the Blackbox Testing method. The stages of testing on the information system that is built include the input/output process, which is the process to try the program by using the data into the form in it. The following table contains the parts to be tested:

TABLE 1 System Testing Design

Test Items	Test Details	Jenis Pengujian
Login	User Login Verification	*Blackbox*
	Admin	*Blackbox*
	Major	*Blackbox*
	Apprenticeship place	*Blackbox*
	Account	*Blackbox*
	Student Criteria	*Blackbox*
	Criteria Results	*Blackbox*
Data Input	Internship Placement	*Blackbox*
	Student Profile	*Blackbox*
	Prakerin Registration	*Blackbox*
	Student Agenda	*Blackbox*
	Supervisor Profile	*Blackbox*
	Monitoring	*Blackbox*
	Evaluation	*Blackbox*

Print Data Results	Print Prakerin Registration Report	*Blackbox*
	Print Student Monitoring Report	*Blackbox*
	Print Advisor's Assessment	*Blackbox*
	Print Student Agenda	*Blackbox*
	Print Student Final Score	*Blackbox*

V. CONCLUSION

The conclusions that can be drawn from this research include the following:

1. Creating an Information System for selecting Industrial Work Practice Locations (Prakerin) and Monitoring of Vocational High School Students has been successful. It can be used by Admin users (TU staff), teachers, and student users. So that archiving becomes more effective and efficient.
2. The resulting application simplifies the process of prakerin registration activities, monitoring activities and reporting the results of prakerin activities.
3. Using the SMART method, students can choose a place/location for internships that follow their competency values.
4. By using this application, the teacher is more in monitoring student prakerin activities every day.

REFERENCES

[1] Abdullah, Rohi. 2015. *Web Programming Easy*. Jakarta. Elek Media Komputindo.

[2] Anggraeni, E. Y., & Irviani, R. (2017). *Pengantar Sistem Informasi.* Penerbit Andi.

[3] Baiduri, M & Sulistiawati, E. (2019, Oktober). Perancangan Sistem Informasi Praktek Kerja Industri di SMK Bakti Nusantara 666 Cileunyi. *JAMIKA (Jurnal Manajemen Informatika)*

[4] Dicky, N., & Sarjon, D. (2017). Multi Criteria Decision Making (MCDM) pada Sistem Pendukung Keputusan. Yogyakarta: Deepublish- Dicky Nofriansyah dan Sarjon Defit - Google Buku. Retrieved from https://books.google.co.id/books

[5] Febriansyah, Z & Wartika. *Sistem Informasi Praktek Kerja Lapangan Di SMKN 1 MAJALAYA.*

[6] Hayiyanto, Agus, 2015. *Membuat Aplikasi Coumputer Based Test dengan PHP MySQL dan Bootstrap*. Penerbit Andi. Yogyakarta

[7] Jannah, M., Sarwadi, & Creative, C. (2019). *Mahir Bahasa Pemrograman PHP*. PT Elex Media Komputindo.

[8] Latif, Lita Asyiriati, Mohamad Jamil, dan Said HI Abbas. 2018. *Sistem Pendukung Keputusan Teori dan Implementasi*. Yogyakarta. DEEPUBLISH

[9] Saxena and P. Upadhyay, "Waterfall vs. Prototype: Comparative Study of SDLC. Imperial Journal of Interdisciplinary Research," IJIR, Vol. 2, No. 6, pp. 1012-1015, 2016.

[10] Sukamto, R. A., & Shalahuddin, M. (2018). *Rekayasa Perangkat Lunak Terstruktur dan Berorientasi Objek (Edisi Revisi)*. Bandung: Informatika

[11] Virdiandry, & Putratama, S. (2018). *Pemrograman Web Dengan Menggunakan PHP dan Framework Codeigniter*. Deepublish.