The Development of a Web-Based School Expenditures Budgeting System Using The Agile Method

[1]Jessica Aurelia Sujangga, [2]Ridwan Sanjaya, [3]G. Freddy Koeswoyo
[1,2]Department of Information Systems, [3]Department of Accounting
Soegijapranata Catholic University, Semarang, Indonesia
[1]19g40001@student.unika.ac.id, [2]ridwan@unika.ac.id, [3] freddy@unika.ac.id

Abstract— Schools under the auspices of Kanisius Foundation, Surakarta Branch are still making school expenditures budgeting manually using Microsoft Excel application. Thus, all school expenditure budgeting data in each school is not well integrated and the flow of adaptation to each change in Excel format is difficult. If the situation remains like this where the data is not well integrated, then the difficulty will be that the data processing process to obtain information about the school budgeting plan and its reports will become difficult. Meanwhile, the need is for the results of data processing to be used as a basis for decision making quickly and precisely. The development of a web-based school expenditures budgeting system using the Agile method becomes the solution for schools expenditure budgeting plan's data to be well integrated and to be used as a basis for decision making. This development uses Agile method because this method is flexible to several changes that occur within the development process.

Keywords—Agile Method, Laravel, School Expenditure Budgeting, Website

I. INTRODUCTION

Kanisius Foundation is an educational foundation founded by the Archdiocese of Semarang. Kanisius Foundation Surakarta Branch is one of 4 branches founded by them. This branch manages more than 25 schools in Surakarta from the playgroup level until middle level. In every new academic year, every school under the auspices of Surakarta Branch of the Kanisius Foundation are required to prepare a School Activity and Budget Plan (they called it as RKAS) that inside it consist information about income and expenditure plans and also the summary of the plans whether it is surplus or deficit in one period of academic year. The problem is, all of the schools under the supervision of Kanisius Foundation Surakarta Branch are still making RKAS using Microsoft Excel applications. This situation causes information on RKAS and comparison reports not to be integrated which also makes it difficult to process and obtain information from the report. Besides that, the flow of adjustments to changes in the RKAS format is also difficult, because the new Excel format must be distributed every time a change occurs.

Based on the previous research done by Wahyuni, Saefudin and Hakim [1] about Designing and Development of a Desktop-Based Accounting Information System for School Cash Receipts and Disbursements an accounting information system was successfully built, designed and implemented in one of the schools in Jatisari, Karawang Regency. This research is a solution to the problems that arise as a result of recording cash disbursements manually and recording cash receipts using the Microsoft Excel application. Another research about Designing and Implementation of a Web-Based Accounting Information System to Increase Transparency and Accountability was conducted by Annisa, Azizah and Tambunan [2] also showing that with the existence of an accounting information system, income and expenditure management can be carried out in a systematic and integrated manner.

So, based on the problems experience by Kanisius Foundation Surakarta Branch and also the previous research about the development of accounting information systems, this research is done for developing an information system for school expenditure

ISSN 2442-7888 (online) DOI 10.24167/Sisforma

budgeting and its reporting for schools under the auspices of Kanisius Foundation Surakarta Branch as a basis for decision making using the Agile method. This research is important to do with the aim of being a solution to the problems experienced by schools under the Kanisius Foundation Surakarta Branch.

The information system will be created in the form of a website. Website can be explained as a collection of site pages and documents that spread in several servers across the world and connected into a single network that can be called the internet [3]. Website components consist of text, static or moving images, data, animated data, videos, and various other forms that become interesting information to visit [4]. Furthermore, in developing this system the Laravel framework will be used which has PHP as the base programming language. Framework is a basic programming tool that is often described as a set of scripts that assist programmers in addressing programming challenges. These challenges can include database connections, variable calls, file management and many more [5]. Laravel is created using the concept of MVC (Model Controller View) that separates the main component of the development. So, the MVC characteristic is dividing model (data manipulation), view and controller (algorithms) into different parts. Because of this concept, it becomes easier for developers to work on a program without worrying about the modifications in one part affecting other parts [6]. The advantages of Laravel are it is an open-source framework and has a syntax that is expressive, clear and saves time [7]. The most important thing of Laravel's advantage is that the maintenance process can be carried out easily because of the readable source code. This advantage also makes it easier for another programmer to understand the website [8]. Laravel offers an extensive set of built-in features, as if authentication, routing, caching, and many more. Moreover, it also offers a strong migration tool for databases, simplifying the process for developers to handle database schema modifications and version control [9]. As for this research, the development method used is the Agile method. The reason for using this method is because it is different from the waterfall method which is less flexible regarding changes that occur in the middle of system development, the Agile method is software development method where it has the ability to adapt to changes in the midst of system development without risking the system development process [10]. Other advantages of using Agile method are enhanced software quality, higher customer satisfaction, greater adaptability in processes and improvement on communication [11].

For this system information development, there will be 2 main modules which are school expenditure budgeting plans module (RKAS Expenditure) and the report of RKAS and Transaction Comparison module. RKAS Expenditure is the school action plan that must be made by all of the schools based on the regulations established by the Minister of Education of the Republic of Indonesia. The school action plan is to describe the goals to be achieved within a certain period of time [12]. Inside the school expenditure budgeting plans module there are source of funds module which is related to the RKAS module and also filling period module that will set the limitation period for RKAS fulfillment. Lastly, the report of RKAS and Transaction comparison module is to show the schools about how well or how bad the school's management is regarding the budgeting plans and its realization.

II. METHOD

To develop a system as a solution to the problems mentioned in the introduction, a method called the Agile method is used in this research. Below this is the picture of the stages that will be done to make an information system for school expenditure budgeting and its reporting for schools under the auspices of Kanisius Foundation, Surakarta Branch.

Figure 1 Stages in Agile Method

1. Planning

The first step needs to do is to have some discussion with the client to plan the things needed for the software development. In this step, some information will be obtained regarding the purpose of software development, the users of the software, an image of the features needed inside the system and many more.

2. Implementation

When the developer already makes some plans to develop the system, then the next step is starting to implement the plans by starting to create use cases and activity diagrams. Use case diagram is an UML diagram that defines the function of a system using graphical elements. Use case diagram consist of 3 elements, namely actors, use cases and their relations [13]. An activity diagram is a UML diagram that defines the workflow and its sequence for a business process [14]. Activity diagram shows the workflow from one activity to another using several symbols such as activities, initial activity, final activity, transition, decision, merge, fork, join, and swimlane [15]. When the use cases and activity diagrams have been created, then it's continued with compiling the program code.

3. Software Test

The system that has been combined into a system will then go through the third step which is a software test. This step will identify whether there are bugs in the system. If at this stage some bugs are found in the system, then the developer needs to immediately fix the system so that system quality can be well maintained.

4. Documentation

The fourth step of the Agile method is to make documentation of the software. This stage aims to facilitate the software maintenance process.

5. Deployment

The deployment stage is a stage where the software that has been developed by the developer can be deployed/used by the client. At this stage the developer must ensure that the software has been tested for its quality, speed and security.

6. Maintenance

The last stage of the Agile method is the maintenance of the software periodically to maintain the quality of the software. For example, maintaining the software from the appearance of bugs.

III. RESULTS AND DISCUSSION

A. Planning

The first thing done for this research is to hold a discussion with the client to gain as much information as possible. From the discussion, it's known that there will be 3 roles that are able to access this system, namely super admin, admin, and user. Super admin is the foundation administrator, admin is the school principal and users are staff at the school. Besides that, several weaknesses in the system used by the school under the auspices of the Surakarta Branch of the Kanisius Foundation were also found in the discussion. Below are the results of the weakness analysis.

Table 1 Weakness Analysis

No.	Weakness	Solution
1.	RKAS Expenditure preparation still using Microsoft Excel application	The system is designed with the RKAS module to record the RKAS Expenditure of each of the schools.
2.	Processing and obtaining information of the comparison report is difficult	The system is designed with a module called Report of RKAS and Transaction that contain the information of the comparison between RKAS and the actual transactions
3.	Poor data documentation because every school has databases.	The system is designed to make sure that every data filled by the school's staff will be kept in one database.

The last thing that was obtained from the discussion was the need for a cloud server so that the system can be used anywhere and on various devices.

B. Implementation

After identifying all system requirements, the process of compiling the system code for each module begins, including designing use cases and activity diagrams. Below are the use cases that identify the access rights of each role to system modules/functions.

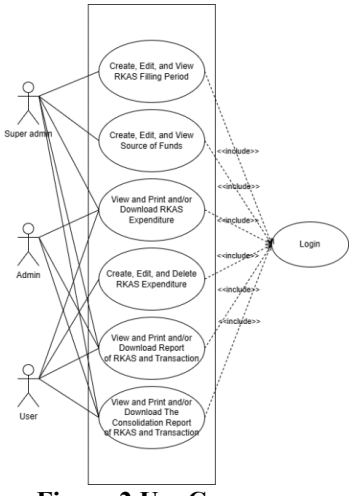

Figure 2 Use Case

As seen in Figure 2 there are 3 roles that will have the access to the system. Super admin can only access RKAS Filling Period module, Source of Funds module, and is only able to view and print and/or download the RKAS Expenditure, Report of RKAS and Transaction and also the Consolidation Report of RKAS and Transaction.

The activity diagram will be divided into several parts according to the modules in this system. Activity diagram in figure 3 is for the RKAS Expenditure module. It's showing the flow to add a new RKAS Expenditure. As shown above, it begins with accessing the RKAS Expenditure tab that will show the list of RKAS Expenditure that has already been submitted. Creating new RKAS Expenditure can only be done if the current date and time are between the RKAS Filling Period and there's no data for the active academic year in the database. This module can be accessed by all of the roles but each role has limitations as shown in Figure 2.

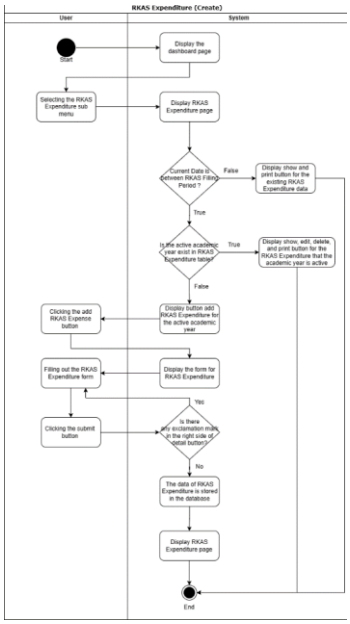

Figure 3 RKAS Expenditure Activity Diagram

The activity diagram for the Report of RKAS and Transaction Activity module can be seen in Figure 4. Same as the RKAS Expenditure module, this module also can be accessed by all of the roles which each have their own limitations. In Figure 4 it's shown that the super admin is able to access the Report for all the schools (institution). Meanwhile, the admin and user are only able to access its own report. The activity diagram begins with accessing the RKAS-Transaction Comparison Report tab. After that it is required to select the desired year and/or the desired institution so that the data

can be processed by the system. If the data has shown in the page, a print button will show up which allows the printing/downloading action.

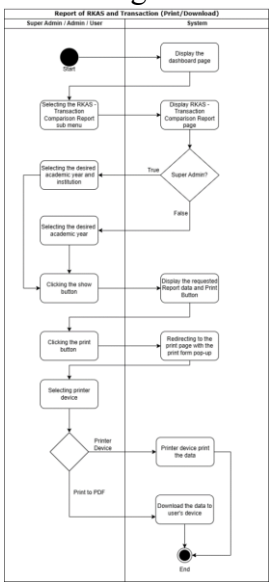

Figure 4 Report of RKAS and Transaction Activity Diagram

Figure 5 is showing the appearance of the page when the user that has role User accesses the RKAS Expense tab. Meanwhile, Figure 6 is showing the appearance of the page when the user that has role Super Admin or Admin accesses the RKAS Expense tab

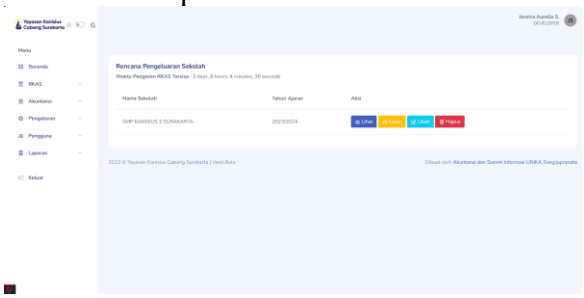

Figure 5 RKAS Expense Page for User

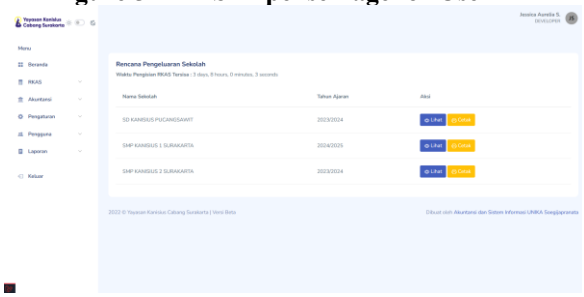

Figure 6 RKAS Expense Page for Super Admin and Admin

C. Software Test

1. Black Box Testing for RKAS Expenditure

Table 2 RKAS Expenditure Black Box Testing

No	Testing Activity	The Expected Outcome	Result
1.	The amount in RKAS and its source of funds are not balanced	A warning will show up to notify the user that the amount of RKAS and its source of funds must be balanced.	Valid
2.	There is/are exclamations mark/s in the form	A warning will show up to notify the user that the exclamation mark is preventing them from saving the data.	Valid
3.	Saving data	The system will save the data and return to the index page	Valid
4.	Editing data	The system will update the data and return to the index page	Valid
5.	Deleting data	The system will delete the data selected by the user	Valid
6.	Viewing data	The system will show the data selected by the user	Valid
7.	Printing data	The system will show the print pop-up for the data selected by the user	Valid
8.	Current time is not between the RKAS Filling Period	The system will not show the add, edit and delete button	Valid
9.	Current time is between the RKAS Filling period but there's data with the active academic year in database	The system will not show the add button but the edit and delete button will be shown only on data which has an active academic year.	Valid
10.	Current time is between the RKAS Filling period but there's no data with the active academic year in database	The system will show the add button.	Valid
11.	Super admin and admin	The system will only allow them to	Valid

No	Testing Activity	The Expected Outcome	Result
	access this module	view and print and/or download the RKAS Expenditure data	

2. Black Box Testing for Report of RKAS and Transaction

Table 3 Report of RKAS and Transaction Black Box Testing

No	Testing Activity	The Expected Outcome	Result
1.	Academic year field is empty	A warning will show up to notify the user that the field needs to be filled.	Valid
2.	Institution field is empty	A warning will show up to notify the user that the field needs to be filled.	Valid
3.	Super admin accesses this module	The system will allow the user to select the institution field that they want to display	Valid
4	Admin and user access this module	The system will not allow the users to select the institution field that they want to display (including consolidation report)	Valid
5.	Viewing data	The system will show the data desired by the user	Valid
6.	Printing data	The system will redirect to another page that shows the print pop-up for the data selected by the user	Valid

D. Documentation and Deployment

The fourth step of the Agile method is to make documentation of the software. This stage aims to facilitate the software maintenance process. Then it's continued with the deployment stage where the software that has been developed by the developer can be deployed/used by the client. At this stage the developer must ensure that the software has been tested for its quality, speed and security.

E. Maintenance

After the system implementation process is complete, it will continue with training for users who will actively use this system. Apart from that, maintenance of the software must be carried out periodically to maintain the quality of the software.

IV. CONCLUSION

Based on the results this research, the development of a Web-Based School Expenditures Budgeting and Its Reporting Information System using the Agile method has overcome the problems experienced by the schools under the auspices of Surakarta Branch of the Kanisius Foundation and also Kanisius Foundation, Surakarta Branch itself.

From the implementation of this research, the schools under the auspices of the Surakarta Branch of the Kanisius Foundation are all able to record RKAS Expenditure with the same format and kept in the same database. All of the RKAS Expenditure data are well integrated, making it easier to process the data to obtain some information. The users are all able to get the comparison report between the RKAS data and the actual transaction from this Information System.

REFERENCES

[1] A. T. Wahyuni *et al.*, "Design and Development of a Desktop-Based Accounting Information System for School Cash Receipts and Disbursements (Rancang Bangun Sistem Informasi Akuntansi Berbasis Desktop Penerimaan dan Pengeluaran Kas Sekolah)," 2021. [Online]. Available: http://jurnal.bsi.ac.id/index.php/profitabilitas

[2] Syerlie Annisa, Juwita Azizah, and Leonard Tambunan, "The Designing and Implementation of a Web-Based Accounting Information System in an Effort to Increase Transparency and Accountability (Perancangan dan Implementasi Sistem Informasi Akuntansi Berbasis Web Dalam Upaya Meningkatkan Transparansi dan Akuntabilitas)," *SATIN - Sains dan Teknologi Informasi*, vol. 7, no. 2, pp. 44–52, Dec. 2021, doi: 10.33372/stn.v7i2.756.

[3] H. H. Batubara, "Web-based learning with Moodle version 3.4

(Pembelajaran berbasis Web dengan Moodle versi 3.4)," 2018, doi: 10.13140/RG.2.2.20230.88643.

[4] A. Zahir, "The Development Of Website Based Live Streaming Learning Media For Computer Knowledge (Pengembangan Media Pembelajaran Live Streaming Pengetahuan Komputer Berbasis Website)," 2019.

[5] O. Widodo Purbo, "Enrichment: Journal of Management is Licensed under a Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0) Enrichment: Journal of Management A Systematic Analysis: Website Development using Codeigniter and Laravel Framework," 2021.

[6] B. D. D. Arianti, H. Kuswanto, H. A. Januari, and J. Jamaluddin, "The design of a letter archiving application using the Model View Controller (MVC) concept," in *Journal of Physics: Conference Series*, IOP Publishing Ltd, Apr. 2021. doi: 10.1088/1742-6596/1869/1/012083.

[7] A. T. Ramadhani, "Implementation Of A Web-Based Service Letter Application Using Laravel Framework At PT Pupuk Sriwidjaja Palembang (Implementasi Aplikasi Surat Dinas Berbasis Web Menggunakan Framework Laravel Di PT Pupuk Sriwidjaja Palembang)," 2020.

[8] A. R. Mahfud, "Design and Development Of a Website For Promoting UMKM, Tourism, and Cultural Arts In The Jatirejo Sub-District Using The Laravel Framework (Rancang Bangun Website Promosi UMKM, Wisata dan Seni Budaya Di Kecamatan Jatirejo Menggunakan Framework Laravel)," vol. 12, no. 1, 2021.

[9] E. Himanen, "Developing a feature to a CRM system with Laravel."

[10] S. Al-Saqqa, S. Sawalha, and H. Abdelnabi, "Agile software development: Methodologies and trends," *International Journal of Interactive Mobile Technologies*, vol. 14, no. 11, pp. 246–270, 2020, doi: 10.3991/ijim.v14i11.13269.

[11] A. S. Abdelghany, N. R. Darwish, and H. A. Hefni, "An agile methodology for ontology development," *International Journal of Intelligent Engineering and Systems*, vol. 12, no. 2, pp. 170–181, 2019, doi: 10.22266/IJIES2019.0430.17.

[12] "Regulation Of The Minister Of National Education Of The Republic Of Indonesia Number 19 Year 2007 (Peraturan Menteri Pendidikan Nasional Republik Indonesia Nomor 19 Tahun 2007)".

[13] M. N. Arifin and D. Siahaan, "Structural and Semantic Similarity Measurement of UML Use Case Diagram," *Lontar Komputer : Jurnal Ilmiah Teknologi Informasi*, vol. 11, no. 2, p. 88, Jul. 2020, doi: 10.24843/lkjiti.2020.v11.i02.p03.

[14] M. Tabrani and I. R. Aghniya, "Implementation Of The Waterfall Method In The Subur Jaya Mandirisubang Cooperative Savings And Loan Program (Implementasi Metode Waterfall Pada Program Simpan Pinjam Koperasi Subur Jaya Mandirisubang)," *Jurnal Interkom: Jurnal Publikasi Ilmiah Bidang Teknologi Informasi dan Komunikasi*, vol. 14, no. 1, pp. 44–53, Apr. 2019, doi: 10.35969/interkom.v14i1.46.

[15] W. Sornkliang and T. Phetkaew, "Performance analysis of test path generation techniques based on complex activity diagrams," *Informatica (Slovenia)*, vol. 45, no. 2, pp. 231–242, Jun. 2021, doi: 10.31449/inf.v45i2.3049.