Implementation of Push Notification for Monitoring Motor Vehicle Tax Payments (Case Study: Samsat Siak)

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Article Info	ABSTRACT
	In an effort to maximize revenue from the motor vehicle tax, the local government is pursuing numerous strategies, one of which is to introduce the e-Samsat (PAD) program to increase revenue from the motor vehicle tax. However, in the current system, there is no system to monitor these payments. Therefore, many people pay their taxes late. The objectives of this research are: (1) Design and develop a web-based application to monitor tax payments using Whatsapp gateway. Data collection techniques using interviews and direct observation at the research site. The results of this application research can display a list of taxpayers and can add to the list of taxpayers. It also generates outputs in the form of data reports in various forms and types. Designing an application to process vehicle tax data makes it easier for employees to detect late tax payments. The public can learn about tax payments via WhatsApp notifications without having to visit Samsat Siak. *This is an open access article under the CC BY-SA license.*

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1. Introduction

Taxes are the main source of revenue and one of the government's efforts to realize national development. It is expected that the potential that exists in each region is properly maximized so that local governments can increase their regional revenues.It is the desire of each region to have a maximum of regional original revenues (PAD). The source of regional original revenue (PAD) that contributes much to each region is regional tax, one type of regional tax is motor vehicle tax. Motor vehicle tax is one of the regional revenue sources used in the budget of regional autonomy [1].

PKB revenue can increase local original revenue. Siak regency. In 2017, the number of motorized vehicles, both cars and motorcycles, reached 156,237 units, and in 2018, it reached 169,830 units, while in 2019, it increased by 186,131 units In view of the increasing number of motor vehicle owners, the Siak Regional Tax Authority introduced an online tax payment system, namely the e-samsat program. However, there is no system in the current system that can monitor these payments. Therefore, many people pay their taxes late.

The research was conducted by Hidayat Rohman (2017), STMIK AKAKOM Yogyakarta about the application of web-based Customer Relationship Management (CRM) and SMS Gateway at Pratama Kusuma Husada Klaten Clinic as a case study. The system provides patients with information on immunisation schedules, antenatal check-up appointments and information on child growth and development through the

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website and uses Short Message Service (SMS) to deliver personalised information to patients. In this study, the existing e-samsat system and the new system are merged as push notification via Whatsapp.

2. Literature Review

2.1 Implementation

Linguistically, implementation means execution, application. In general, implementation is the action or execution of a plan that has been carefully prepared, meticulously detailed. So implementation occurs when there is good and careful planning or a plan that has been prepared well in advance so that there is certainty and clarity of the plan. Implementation is the provision of means to carry out something that has an impact or effect on something. It is an activity that is seriously planned and carried out and relates to specific standards to achieve the objectives of the activity. Implementation can be interpreted simply as realisation or application [2]

2.2 Monitoring

According to Government Regulation No. 39 of 2006, the definition of monitoring is an activity to carefully observe a condition or state, behavior or specific activities, with the aim that any input data or information obtained from the results of these observations can serve as a basis for decisions and further necessary actions. These actions are required when the results of the observations show things or conditions that are not as desired.

2.3 Tax

Tax Pursuant to Article 1 of Act No. 28 of 2007 on General Provisions and Tax Procedures, tax is a compulsory contribution to the State owed by a natural or legal person, levied compulsorily on the basis of the law, without direct consideration, and used for State purposes for the maximum welfare of the people.

2.3 WhatsApp Gateway

WhatsApp Gateway is an application system used to send messages through third parties to user devices. WhatsApp Gateway is also able to send mass messages to contact numbers that have been stored in the database without entering contact numbers one by one (Kompasiana).

2.4 Push Notifikation

Push Notification is a technology of sending information in the form of notifications from information providers (servers) to a device (client) automatically. Notifications obtained by clients are in the form of news title notifications and news links. The working system of this technology sends notifications by directly sending notifications from the server to the client without having to be asked by the client first. Push Notification is a service that is widely used for notification purposes through short messages on smartphones. With the Push Notification service, users can be helped in terms of short notifications [3].

3. Research Methodology

3.1 Methodology of Research

Research methodology is the sequence of research implementation. This is intended to be more conceptual and focused research in accordance with the objectives to be achieved, in order to create a system that has been tested and can solve the problems studied. In this research methodology, explained in the form of a research framework that begins with pre-object identification, data collection, observation, analysis, system design, program creation, testing, and evaluation, the place of methodological research is presented as follows:

Figure 1. Research Framework

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3.2 System Design Phase

At the system design phase, researchers use the RAD (Rapid Application Development) method. The RAD (Rapid Application Development) system development phase consists of several activities which are certainly in accordance with the phase described in the system development process flow. The phase can be seen in figure 3.2 as follows:
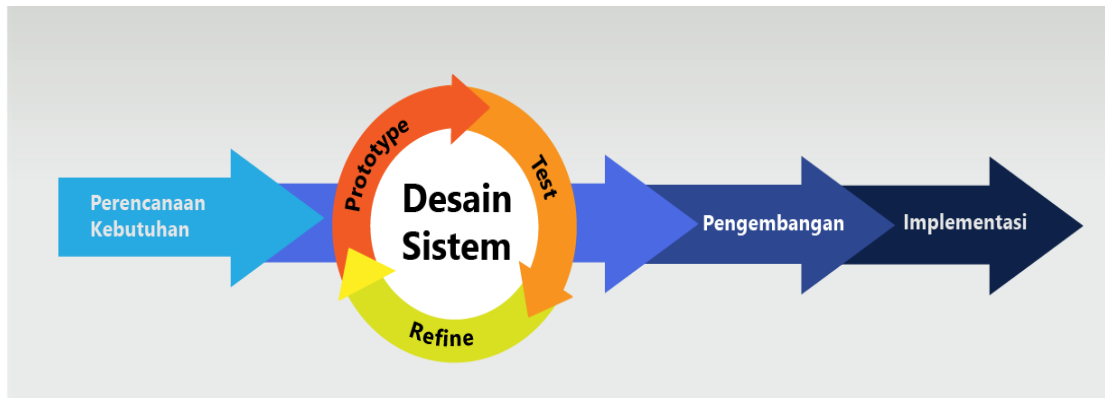

Figure 2 Phase of Rapid Application Development

The figure of the phase of Rapid Application Development above can be explained as follows:

3.2.1 Needs Planning

This phase is the initial phase of system development. In this phase, the identification of problems and collection of data obtained from users or user stakeholders is aimed at determining the ultimate purpose or intent of the system and the desired information needs. In this phase, the involvement of both parties is very important to determine the need for the development of a system.

3.2.2 System Design

In the system design phase, the activity of the users involved is very important to achieve the goals, because in this phase the design process and the design improvement process are repeated if there is still a discrepancy between the design and the needs of the users identified in the previous phase. The result of this phase is a software specification that contains the organization in the system in general, the data structures and others.

3.2.3 The process of developing and collecting feedback

In this phase, the created and agreed system design is changed in the form of a beta version of the application to the final version. Also in this phase, the programmer must constantly perform development activities and integration with other parts, while continuing to consider feedback from users or customers. If the process goes smoothly, he can proceed to the next phase, while if the developed application does not meet the requirements, the programmer returns to the system design phase.

3.2.4 Product implementation or completion

This phase is the stage where the programmer applies the design of a system that has been approved in the previous phase. Before the system is implemented, a testing process is first carried out on the program to detect errors that exist in the developed system. In this phase it is usual to respond to the system that has been created and get approval about the system.

3.3 BlackBox Testing

Blackbox testing is a test that allows software engineers to obtain a set of input conditions that fully utilize all functional requirements for a program. Blackbox testing attempts to find errors in the following categories:
1. Incorrect and missing functions
2. Interface errors
3. Data structures or external database access errors
4. Performance errors
5. Initialization and termination errors

3.4 Use Case Diagram

A use case diagram is one of many types of UML (Unified Modelling Language) diagrams that illustrate the interaction relationships between systems and actors. Use Case diagram can describe the type of interaction between system users and their systems. In figure 3.4 below is the use case design of the tax payment monitoring system built
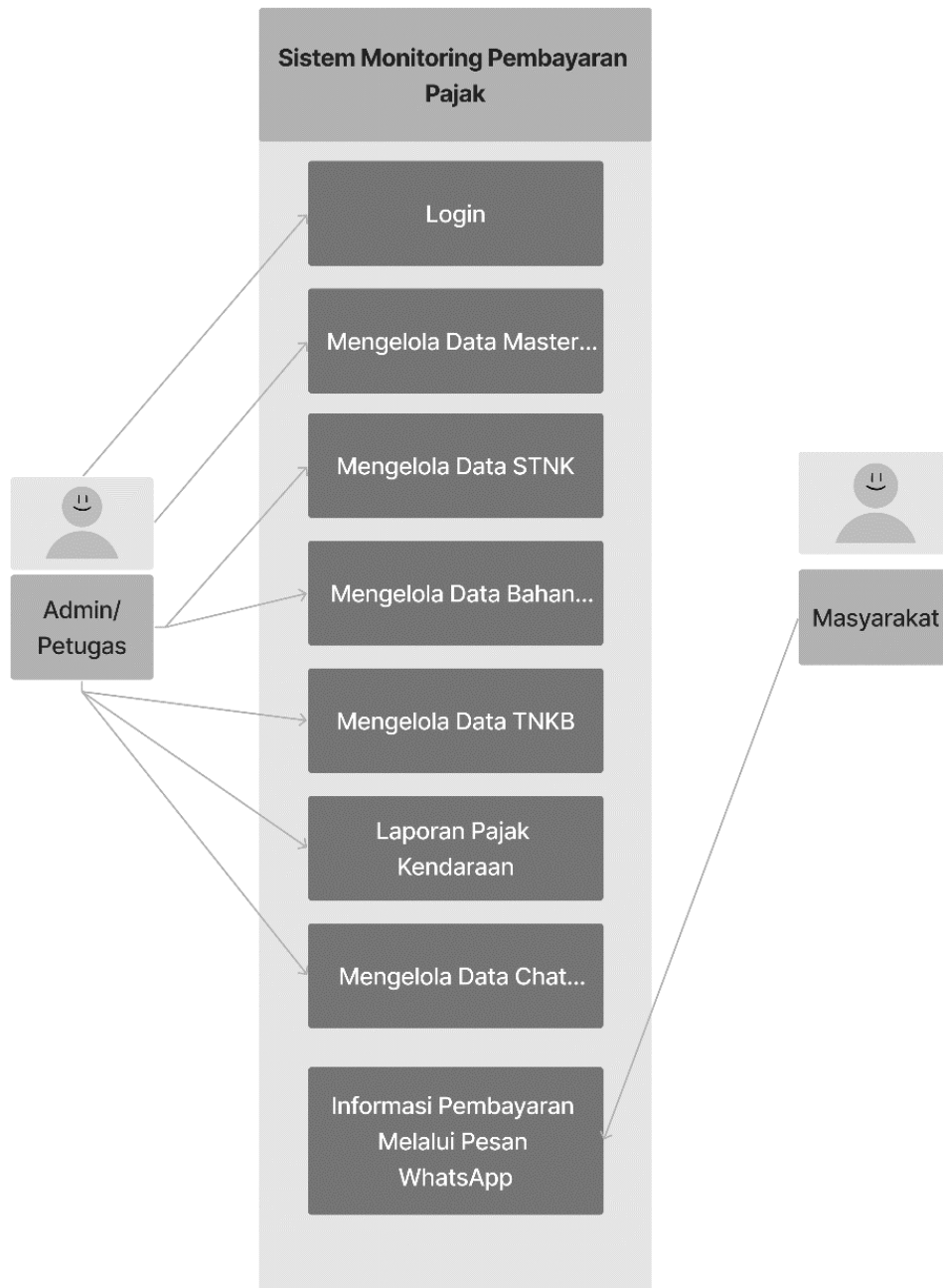

Figure 3. Use Case Diagram Push Notification

From the use case diagram above, it appears that there are two actors, administrators and the community. The access rights that can be granted to admins/officials include managing STNK data, managing TNKB data, managing Whatsapp broadcast data, managing car tax data and reports, while the access rights granted to the public include only receiving messages via WhatsApp.
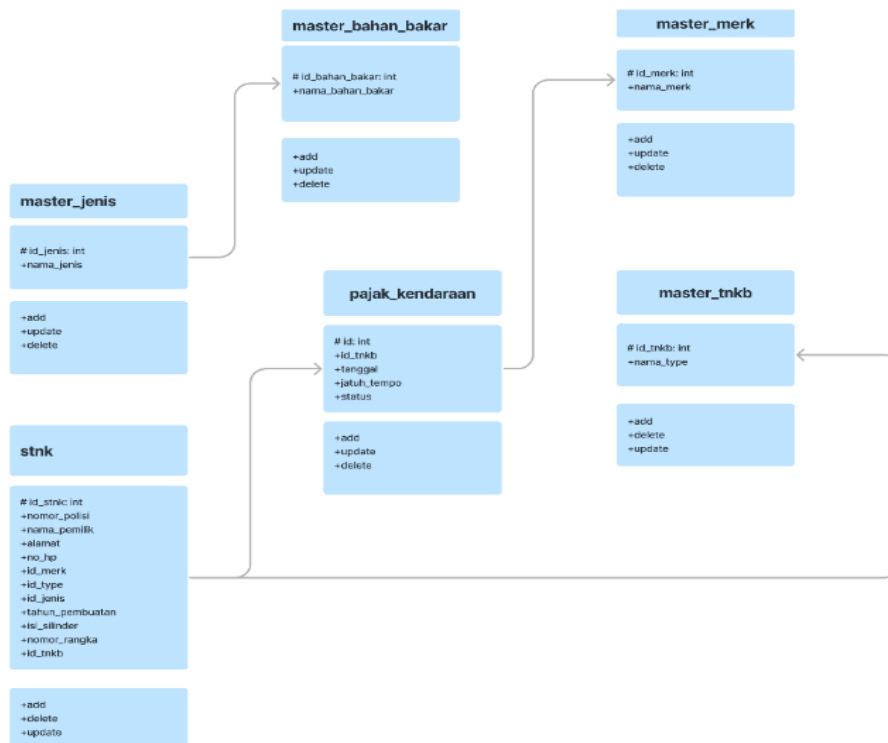
3.5 Class Diagram

Figure 4. Class diagram Vehicle Tax Monitoring

The class above can be explained that to build a tax payment monitoring system, tables are used to store data. From the figure above, there are six class diagrams, namely master type, STNK, TNKB, vehicle tax, brand master, and fuel master. Each of these diagram classes can perform add, delete and modify operations.

4.   Result and Discussion
4.1 User Login Page
Login form is a form used to login before entering the system, as for the fields used to log in by entering a username and password. In figure 5.

Figure 5. Form Login

4.2 Home Page
The home page of the motor vehicle tax system is the page that is displayed when an administrator successfully logs on to the system. On the main page there are several menus that an administrator can access, namely Mater Brand for motor vehicle brands, then there are Species, Fuel, tnkb Colours, STNK, Vehicle Tax, then Reports and Settings menus. In figure 6.
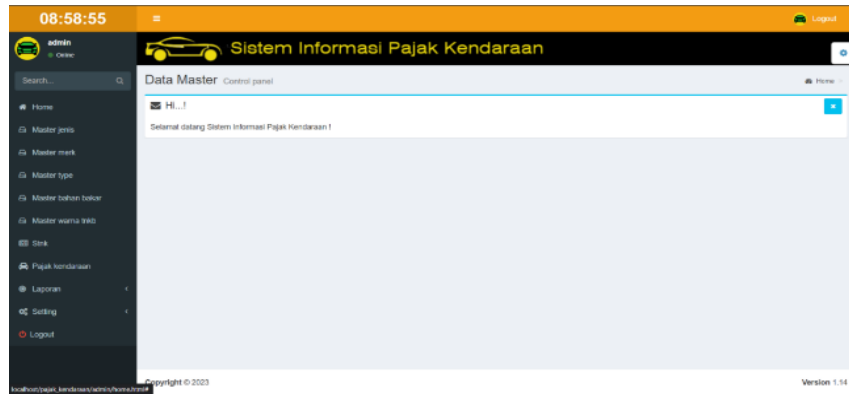
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Figure 6. Home Page

4.3 STNK Master Data Page

The STNK of motor vehicle master data program display consists of the subsequent sequence number, police number, motor vehicle owner's name, address, mobile phone number, vehicle brand name, type, year of manufacture, cylinder content, frame number, engine number, colour, fuel, TNKB colour, registration year, BPKB number and tax payment due. With the STNK master data programme you can add data by clicking on the Add button and edit data by clicking on the Edit button. If the data is incorrect, you can delete it by clicking the Delete button. In figure 7.
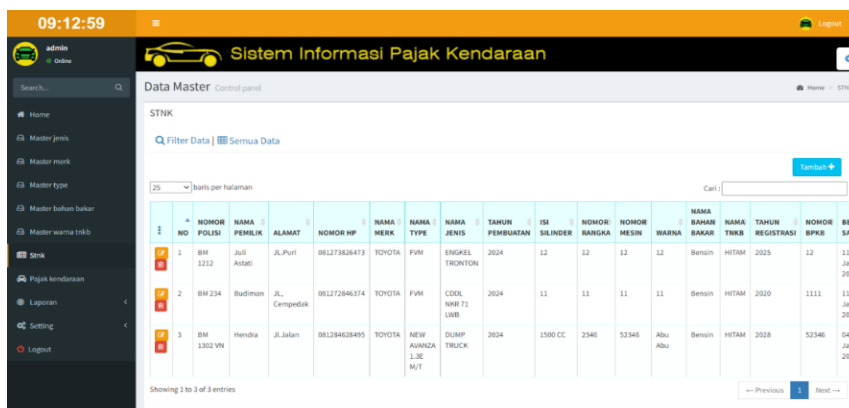

Figure 7. STNK Master Data.

4.4 Motor Vehicle Tax Data Page

The program display for motor vehicle tax data is a detailed indication of when the tax object must make tax payments after the due date. The motor vehicle tax program can add data by clicking the Add button, and it can also edit data by clicking the Edit button. If the data is incorrect, it can be deleted by clicking the Delete button. In Figure 8.
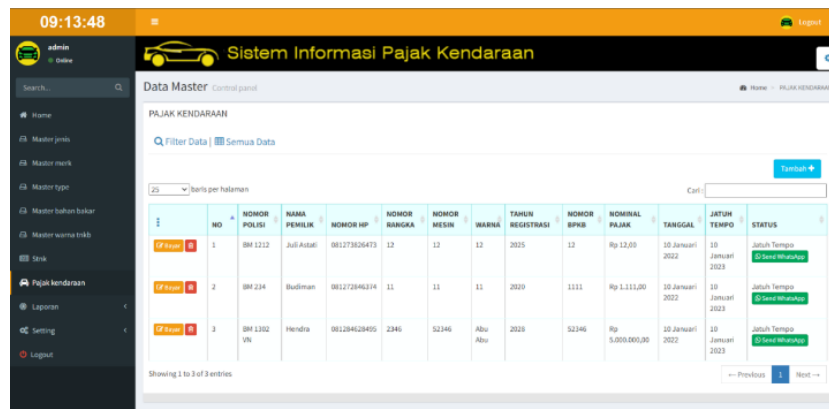

Figure 8. Motor Vehicle Tax Data

4.5 Motor Vehicle Report

The Motor Vehicle Reports program display is a detailed state of all motor vehicles that are taxable. Reports can be generated based on police number, type, kind, cylinder content, frame number, engine number, color, fuel and other details. This facilitates the search for the address of the vehicle owner. In figure 9.

Figure 9. Vehicle Report

4.6 WhatsApp Broadcast Notification

This system also provides a feature to convey information related to the tax payment schedule by the public. In figure 10.
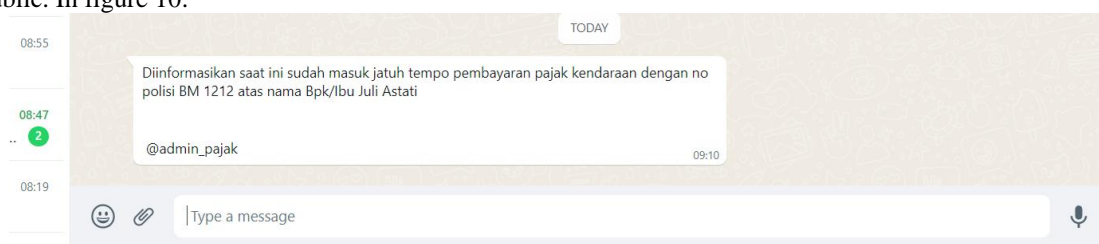

Figure 10. WhatsApp Broadcast Notification

4.7 Testing System

Black box testing, or often known as functional testing, is a software testing method used to test software without knowing the internal structure of the code or program. In this test, the tester knows what the program has to do, but does not know how to do it. The following are the results of tests conducted using the black box testing method..

Table 4.1 Blackbox Testing

No	Scenario Testing	Expected Results	Result
1	Login by entering username "admin" and password "admin"	The system successfully logged into the system and displayed the main menu page	Valid
2	Login by entering username not "admin" and password "admin"	The system did not log in successfully and displayed an error message in the form of an incorrect username and password	Valid
3	Login by entering username not "admin" and password "admin"	The system successfully logged into the system and displayed the main page	Valid
4	Add tax data (The data entered is incomplete), then	The system will not save when the column is not filled all, it will	Valid

	click Save	display "Data is incomplete"	
5	Add vehicle data, save it correctly (none is empty) and then click Save	The system successfully inputs healthy menu data, and it will display "Data saved successfully"	Valid
6	Add STNK data (The data entered is incomplete), then click Save	The system will not save when the fields are not filled all, it will display "Data is incomplete"	Valid
7	Add TNKB color data, save it correctly (none is empty) and then click Save	The system successfully inputs decision data, and it will display "Data saved successfully"	Valid
8	Add vehicle type data (The data input is incomplete), then click Save	The system will not save when the column is not filled all, it will display "Data is incomplete"	Valid
9	Add fuel, save it correctly (none is empty) and then click Save	The system successfully inputs healthy menu data, and it will display "Data saved successfully"	Valid
10	The system can update vehicle data, tax data and vehicle type, TNKB color by selecting the data then the system will display a form for updating data and click Save	The system successfully updates the data and it will display "Data successfully updated"	Valid
11	The system can delete vehicle data, tax data and vehicle type, TNKB color by pressing while holding on the criteria data then the system will display a form to delete data and click Save	The system successfully updates the data and displays "Data successfully deleted"	Valid

5. Conclusion

Based on the results of previous discussions, it can be concluded that:

1. In this application can view the list of taxpayers and add a list of taxpayers. In addition, it generates output in various forms and types data report.
2. The design of vehicle tax data processing application makes the employee can detect delays in tax payments easily.
3. The public can find out tax information without having to visit Samsat Siak.
4. The drawback of this application is the data in manual input from the existing e-samsat system to the new system.
5. Researchers can develop e-samsat data synchronization models and push notification systems.

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