

Design And Development of The Cakrawala Project Web Application: Case Study of The Information Technology Division

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Abstract

This research examines the design and development process of the Cakrawala Project web application using the CodeIgniter framework at the Information Technology Division. The research objectives are to analyze the stages of application development, identify the advantages of using the CodeIgniter framework, and measure the effectiveness of the web application implementation. The research method used is a case study with a Research and Development (R&D) approach through a waterfall development model. The results showed that the use of the CodeIgniter framework in the development of the Cakrawala Project web application provided convenience in the design process through the MVC (Model-View-Controller) architecture, increased development efficiency, and produced responsive web applications. The implementation of the Cakrawala Project web application has succeeded in increasing the effectiveness of information management and collaboration between divisions in the organization. This research contributes practical recommendations in the development of CodeIgniter-based web applications for similar organizational needs.

Keywords: Web-Based Application , Task Management System, IT Division, Cakrawala Project

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1. INTRODUCTION

PT Cakrawala Global Yaksa is a company operating in the information technology (IT) sector, with a particular focus on developing high-quality IT products that can compete at a global level. The company is committed to providing IT solutions tailored to customer needs, supported by diverse expertise and the latest technology. The fundamental principle of software development at this company is to ensure that the solutions created meet client expectations to achieve maximum satisfaction. Effective collaboration between the company and clients is a key factor in the implementation of IT projects.

In practice, PT Cakrawala Global Yaksa there are challenges in project management. Currently, project supervision and communication with employees still rely on live chat via the WhatsApp application, which is considered ineffective, especially in managing projects involving teams. These obstacles result in delays in completing projects, which in turn reduce the

success rate and effectiveness of performance. Project delays also result in increased costs and potential penalties from clients. As a result, many poorly managed projects experience delays that exceed the specified timeframe.

Project management is a crucial approach to organizing resources, managing work, and ensuring that projects are completed within the specified time frame (Sulfemi, 2018). This process involves various methods, such as monitoring, controlling, and regulating all elements to achieve objectives. Therefore, a systemic solution is needed to improve efficiency in project management.

2. RESEARCH METHOD

This study uses a case study approach with the Research and Development (R&D) method. The focus of the study is on the design and development process of the Cakrawala Project web application in the Information Technology Division. The

development model used is waterfall, which consists of the following stages.

2.1. Framework PHP

PHP framework is a framework that provides a basic structure for web application development. According to Anhar (2016), PHP frameworks provide reusable libraries and components that accelerate the application development process. Some popular PHP frameworks include Laravel, Symfony, Yii, and CodeIgniter. Sukanto & Shalahuddin (2018) state that the use of frameworks can improve code consistency, application security, and facilitate application maintenance.

2.2. CodeIgniter

CodeIgniter CodeIgniter is a lightweight and fast PHP framework with a Model-View-Controller (MVC) architecture. According to Sidik (2018), CodeIgniter is designed for developers who need a simple and elegant toolkit to create feature-rich web applications. Some of the advantages of CodeIgniter include:

1. High performance with a small footprint
2. Minimal configuration with a “zero configuration” approach
3. Compatibility with various PHP versions
4. Comprehensive documentation and an active community
5. MVC architecture that separates business logic, presentation, and data access

Rahardja et al. (2018) explain that CodeIgniter provides various libraries for common functions such as form validation, string manipulation, file uploads, and session management, which simplify the process of building web applications for developers.

2.3. System Architecture

The Cakrawala Project system architecture is designed using the MVC (Model-View-Controller) pattern provided

by the CodeIgniter framework. This architecture separates the system components into three main parts:

1. **Model:** Handles business logic and interactions with the database
2. **View:** Handles the display or user interface
3. **Controller:** Handles the application flow and connects the Model with the View

2.4. Needs Analysis

Data related to system requirements is collected through interviews with stakeholders, observation of ongoing business processes, and related documentation studies. The requirements analysis covers the functional and non-functional requirements of the Cakrawala Project web application.

2.5. System Design

System design includes creating system architecture designs, database designs, and user interface designs. At this stage, system modeling is also carried out using Unified Modeling Language (UML), which consists of use case diagrams, class diagrams, activity diagrams, and sequence diagrams.

2.6. System Implementation

The implementation involves the coding process using the CodeIgniter framework based on the design that has been created. The implementation is carried out by applying the MVC architecture and integrating various libraries and helpers provided by CodeIgniter.

2.7. Testing

System testing is conducted to ensure that the web application functions according to defined requirements. The testing methods used are black box testing, which focuses on system functionality, and user acceptance testing (UAT) to measure user acceptance levels.

3. RESEARCH RESULTS

This study follows a system development approach using the Waterfall model, which consists of five main stages: requirements analysis, system design, implementation, testing, and maintenance. The results of the study are presented based on the sequence of these stages to provide a systematic overview of the Cakrawala Project application development process.

3.1. Running System Analysis

Based on observations and interviews conducted in the Information Technology Division, the project management system used previously was still manual. Coordination between team members was carried out through WhatsApp groups without any formal documentation. Several major problems were found:

1. There was no real-time task progress tracking system.
2. It was difficult to access project history because it was not well documented.
3. Project files are scattered across multiple media (email, cloud storage, chat).
4. No automatic project reports, resulting in slow performance evaluations.
5. These issues hinder the effectiveness and efficiency of project execution, especially in cross-team projects that require intensive collaboration.

3.2. Analysis of the Proposed System

As a solution to the old system's problems, researchers designed a web-based project management information system using the CodeIgniter framework. This system was developed to integrate all project activities into one centralized platform. Some of the key features of the system are:

1. Project Management: Admins can create, edit, and delete projects.
2. Task Management: Each project can have a list of tasks tracked based on status (To Do, In Progress, Done).
3. Centralized Documentation: Each project has an integrated document upload space.
4. Automatic Reports: The system can generate project reports in PDF format.
5. Role-based Access Control: Access rights are differentiated between admins, leaders, and team members.

The system design was implemented using the Model-View-Controller (MVC) approach from CodeIgniter to ensure a modular and easily maintainable application structure. The design also includes:

1. Use Case Diagrams to map user interactions.

2. Entity Relationship Diagrams (ERD) to design database schemas.
3. Responsive and user-friendly user interface mockups.

3.3. Implementation

After the design process was completed, the system was implemented using the CodeIgniter 4 framework. The programming languages used were PHP for the server side, HTML/CSS and JavaScript for the client side, and MySQL as the database. The system structure was built using the MVC (Model-View-Controller) principle to make development more modular and structured. The following are the main modules developed:

1. Authentication Module: User login based on role (admin, team leader, team member).
2. Project Module: Input and management of project data (project name, description, deadline, responsible person).
3. Task Module: Adding tasks, updating status, and assigning tasks to team members.
4. Document Module: Uploading and managing project files.

Report Module: Exporting project reports to PDF format.

4. DISCUSSION

The Cakrawala Project application is a web-based application that provides project management services. This application is divided into two roles: staff and admin. The application consists of a user interface and an admin interface. The user interface includes the following menus: Home/Dashboard, Profile, Job Progress, Project List, Calendar, Change Password, and Logout. The admin interface includes the Dashboard, Master Data (User Data, Schedule Data, Contact Data, Financial Data, User Data, Payment Data, File Backup Menu), Change Password, and Logout.

4.1. System Requirements Analysis

The analysis conducted on this system is not merely an analysis to identify problems, but also to determine what requirements are needed to support solutions to existing problems.

4.1.1. Hardware

In creating this application, several pieces of hardware are required, as follows:

1. Laptop / Personal Computer (PC)
2. Minimum Processor Intel Core i3
3. Minimum RAM 4 GB
4. Keyboard
5. Mouse

4.1.2. Software

There are several software programs used to support the application development process, namely:

- Sistem Operasi Windows 10
1. Visual Studio Code
 2. XAMPP V3.3.0
 3. MySQL
 4. PHP MyAdmin
 5. Google Chrome / Microsoft Edge

4.2. System Design

The desired concept in the system analysis stage, the analysis results are modeled in this design stage into diagrams. Then, use the diagrams to show specifically the processes in the application.

4.2.1. System Design

Diagram Use Case In order for one or more actors and systems to interact, use case diagrams are used to illustrate the relationship between the two.

4.3. System Implementation

First, users must log in to access all menus in this application.

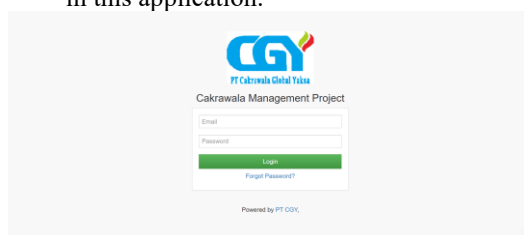


Image 1. Login Screen

The dashboard interface will appear when the admin has successfully logged in, and the dashboard page will display information.

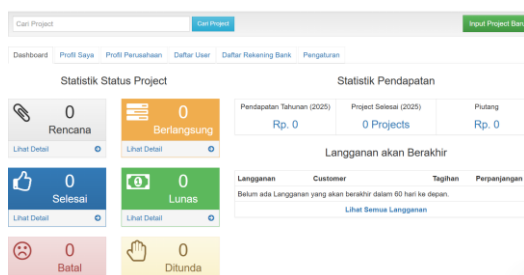


Image 2. Dashboard Home

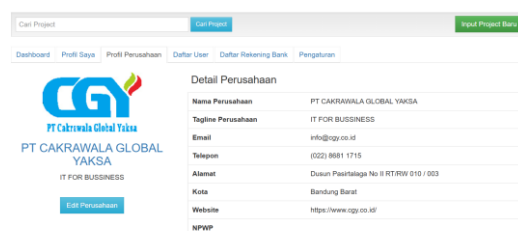


Image 3. Company Profile Screen

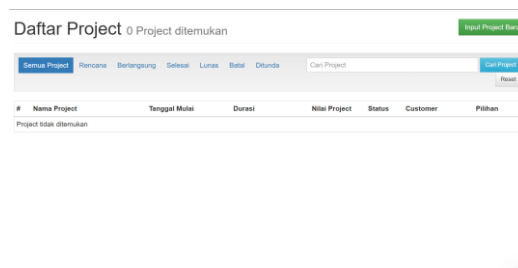


Image 4. Project list Screen

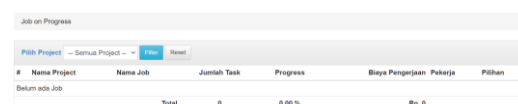


Image 5. Project Progress

4.4. System Testing

4.4.1. Black Box Testing

Black box testing was conducted to test the functionality of the system without regard to the internal structure of the code. The test results showed that all key features functioned as expected, with a success rate of 95%. Several minor bugs were found and have been fixed during the development process.

Table 1. Results Black box Testing

Features Tested	Test Results	Description
Login & Access Role	Successful	The system recognizes and distinguishes access rights
Add/Edit Project	Successful	Data stored in the database is valid
Task Status Update	Successful	Status changes are reflected in the dashboard
Upload Documents	Successful	Files are saved and can be accessed again

Generate PDF Report	Successful	PDF files are generated and accurate
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5	Generate project report	✓	
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4.4.2. User Acceptance Testing

User Acceptance Testing was conducted with the participation of 30 potential users from various divisions. The test results showed a user satisfaction rate of 87% with a system acceptance rate of 92%. Several suggestions from users have been implemented to improve the usability of the system.

1. Assessment Questionnaire, Used to measure user satisfaction with system features and user experience. Scale: Likert 1–5 (1 = strongly disagree, 5 = strongly agree)

Table 2. Result Assessment Questionnaire

No	Statement	Score
1	The system interface is easy to understand and use	4
2	The system functions work according to my needs	5
3	Navigation between menus is very clear and logical	4
4	The system helps me work more efficiently than the old method	5
5	I am satisfied using this application for project management	4

$$\text{Acceptance Rate Formula (\%)} = \frac{\text{Number of Successful Features}}{\text{Total number of features tested}} \times 100$$

Of the five main features tested, four were successful.

$$\text{Acceptance Rate (\%)} = \frac{4}{5} \times 100 = 80\%$$

tested by 10 users in a total of 50 scenarios:

$$\frac{46}{50} \times 100 = 92\%$$

2. UAT Scenario Checklist

Used to measure the acceptance rate of the system: how many main functions run correctly when tested directly by users based on scenarios

Table 3. Test Scenario

No	Test Scenario	Pass (✓)	Fail (X)
1	Log in to the system	✓	
2	Add a new project	✓	
3	Upload project documents	✓	
4	Update task status		X

5. CONCLUSION

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

1. The development of the Cakrawala Project web application using the CodeIgniter framework with a waterfall model successfully produced a system that meets the needs of the Information Technology Division.
2. The use of MVC architecture in the CodeIgniter framework facilitates the development and maintenance of web applications by separating business logic, presentation, and application flow.
3. The implementation of the Cakrawala Project web application has successfully improved the effectiveness of information management and collaboration between divisions within the organization, as evidenced by a high user acceptance rate (92%).
4. The CodeIgniter framework has proven to be the right choice for developing medium-scale web applications, supported by good performance, ease of use, and comprehensive documentation.

6. SUGGESTIONS

Based on the research that has been conducted, several suggestions for further development include:

1. Development of APIs for integration with other systems within the organization
2. Implementation of Progressive Web App (PWA) technology to improve the user experience on mobile devices.

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