JUKIM
ADMI Jurnal Ilmiah Multidisiplin

JURNAL JUKIM Vol 4 No. 6 November 2025 | P-ISSN: 2829-0488 E-ISSN: 2829-0518, Page. 52-65

DESIGN AND CONSTRUCTION OF A WEBSITE-BASED EMPLOYEE WORK RESULTS MONITORING SYSTEM

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Article History
Received : October-2025
Revised : October-2025
Accepted : November-2025
Published : November-2025

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Cite This Article:
Triadmaja, B. (2025). Design And Construction Of A Website-Based Employee Work Results Monitoring System. Jurnal Ilmiah Multidisiplin, 4(6), 52–65.

DOI:
https://doi.org/10.56127/jukim.v4i6.2396

Abstract: *Dwi Putra Tile Craftsman (PG. Dwi Putra) is a manufacturing industry in Klaten, Central Java, which produces three types of press tiles, namely mantili tiles, ordinary tiles, and kerpus. Recording the results of employees' work today is carried out manually, which often leads to inaccuracies in the data and hinders the calculation of salaries. Solving this problem requires a website-based employee monitoring system that can record, monitor, and report work results in real-time, and speed up salary calculations. This system aims to efficiently record employee work results, monitor productivity in real-time, provide accurate and structured work reports, automate the salary calculation process, and provide integrated and easily accessible data access. This system is built by using the Laravel Framework by implementing a Waterfall approach, and MySQL as a database. System testing is carried out with a Black Box approach and System Usability Scale (SUS). The results of the application of the Black Box method indicate that all system functions operate according to the expectations set by the researcher, resulting in a validity rate of 100%. The trial with SUS resulted in a grade of 82.5, which indicates that the system is functioning very well and has met the eligibility criteria.*
Keywords: *employee, monitoring system, work record, waterfall, website.*

INTRODUCTION

Dwi Putra Roof Tile Craftsmen (PG. Dwi Putra) is a manufacturing industry that produces high-quality pressed roof tiles in Klaten, Central Java. This industry contributes to reducing unemployment and improving the welfare of the local community (Galih, 2022). Three types of roof tiles are produced: mantili, regular, and kerpus.

As a manufacturing company, PG. Dwi Putra's capabilities are highly dependent on the skills and performance of its employees, given that employees are a crucial element for the company (Wardana et al., 2020). PG. Dwi Putra currently does not use technology to record daily employee work results. Employee work results are recorded manually in individual notebooks, which are then submitted when receiving paychecks. This method has several weaknesses, including the risk of recording errors due to human error, as found by (Mardian et al., 2021a), who stated that many companies still use handwritten work reports without adequate controls. Manual recording also makes it difficult to monitor employee productivity in real time, so business owners lack accurate data on employee daily performance (Izzulhaq, 2023). Furthermore, this manual process slows down payroll calculations, as business owners must calculate work results from received reports, often resulting in inaccurate payroll calculations (Adha et al., 2021).

As a solution to these problems, a website-based employee performance monitoring system is needed. This system aims to streamline employee performance recording, monitor employee productivity in real-time, provide accurate and structured employee performance reports, automate employee payroll calculations, and provide integrated and easily accessible data access. This system is built using the PHP (Hypertext Preprocessor) programming language supported by the Laravel Framework, using the

Waterfall method in system development, and MySQL as the database. The employee management system allows business owners to track all records easily and effectively (Nanayakkara et al., 2022).

RESEARCHMETHOD

The method chosen by the researchers to design this employee monitoring system is the *Waterfall method* . This method was chosen because it is linear, allows systematic focus on each stage, and aligns with the system requirements that have been defined since the beginning of the research. This method is one of the approaches in the System Development Life Cycle (SDLC) characterized by the completion of each stage before proceeding to the next (Heriyanti & Ishak, 2020). The stages of the *Waterfall method are carried out in a structured sequence, starting from requirements analysis, system design, coding, testing, and maintenance (Mustakim et al., 2024). The Waterfall* approach process is shown in Figure 1.

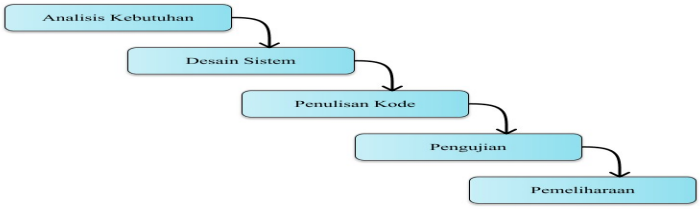


Figure 1. *Waterfall Approach*

Needs Analysis

Requirements analysis is when developers prepare and analyze the requirements for the software to be created (Utami et al., 2021). This phase focuses on collecting data and information required by the system. Data collection methods include interviews with business owners, direct observations in the factory, and reviews of previous research. System requirements analysis includes an analysis of functional and non-functional requirements. Functional requirements describe the functions the system must perform to achieve its objectives. Non-functional requirements describe other features such as characteristics, system limitations, documentation, and other aspects necessary for the system to operate successfully (Hafedmawan & Anggoro, 2021).

Functional Requirements

The system must be able to display employee work results. Admins have the ability to manage employee data, set salary amounts, review and approve each employee's work results, calculate salaries, update payroll status, and print payslips. Admins can also print reports on each employee's work results and overall reports. Employees can manage their daily work results and print reports. These results will be reviewed by the admin for approval. Admins and employees can manage their respective profiles.

Non-Functional Requirements

These requirements encompass two aspects: *the hardware* and *software* used in the operational employee performance monitoring system. The non-functional requirements for this system are shown in Table 1.

Table 1. Non-Functional Requirements

***Hardware* Requirements**	***Software* Requirements**
Laptop, *Smartphone* (Admin) *Smartphone* (Employee) Internet	*Web browser* Hosting (Admin) Domain

System Design

This stage focuses on designing the system architecture using UML (*Unified Modeling Language*) diagrams, including *Use Case Diagrams* , Activity Diagrams, and Entity Relationship Diagrams. This stage also includes designing the user interface to support user interaction.

Use Case Diagram

This diagram illustrates the interaction between users and the system, along with the features offered by the system (Mardian et al., 2021b) . The *Use Case diagram* shown in Figure 2 has two types of users: admin and employee. Admins can manage employee data, set salary amounts, review and approve work results, manage salaries, and print work reports for all employees. Employees can manage and print their daily work results reports. Admins and employees can manage their respective profiles.

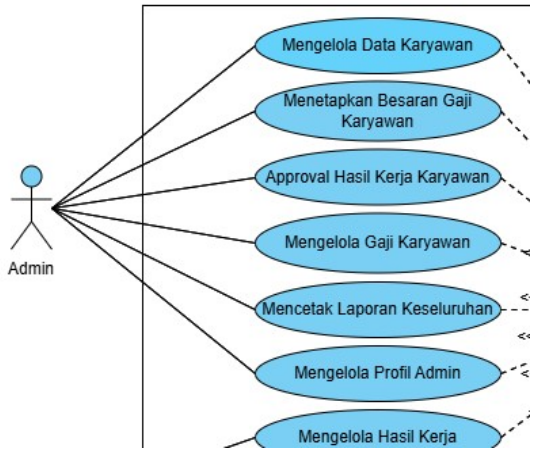


Figure 2. *Use Case Diagram*

Activity Diagram

This diagram illustrates the sequence of work or activities in a system, business process, or menu within the software (Heriyanti & Ishak, 2020) . The admin activity diagram in Figure 3 shows that the admin must first *log in using the email and password* that has been created to access the system. The system will verify the information entered. The admin will be directed to the admin dashboard page if the information entered is correct, where he/she can manage employee data, set salary amounts, review and approve all employee work results data, manage profiles, manage salaries, and print work results reports for all employees. *The database* will store employee data, salary amount data, work results data along with changes in work results status and salary payment status, and admin profile data. The admin can press the *logout button* to exit the system after completing all processes.

The employee activity diagram in Figure 4 shows that employees are required to *log in* first using the email address and *password* they created to access the system. The system will verify the information entered. If the information is correct, employees will be directed to the employee dashboard page, where they can manage their work results, print individual reports, and manage their profiles. *The database* will store each employee's work results and profile data. Employees can click the *logout button* to exit the system after completing all processes.

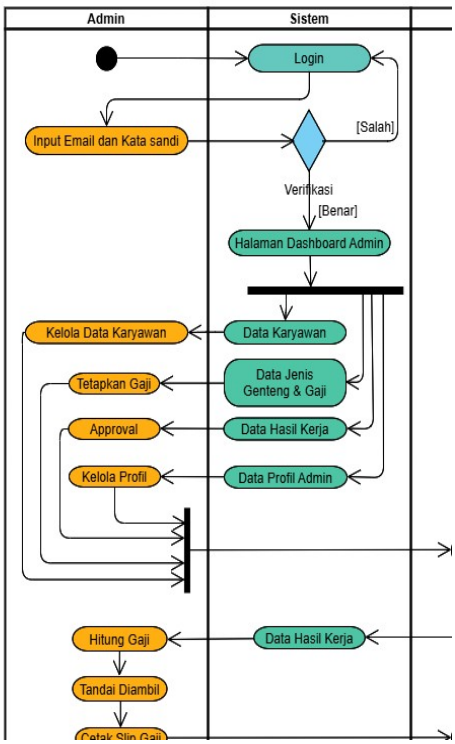


Figure 3. Activity Diagram (Admin)

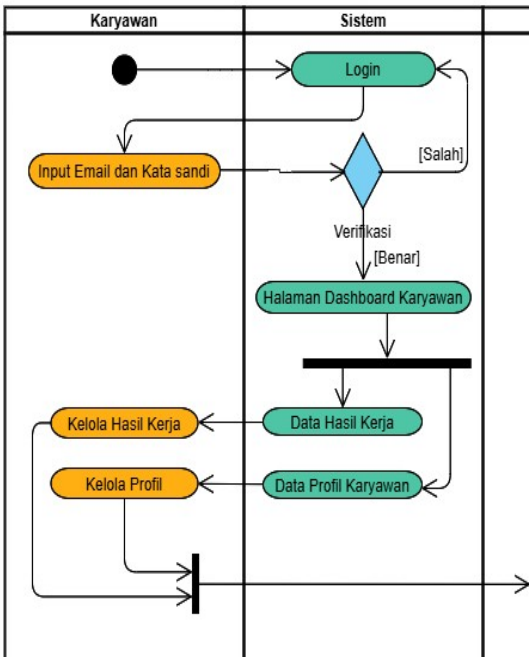


Figure 4. Activity Diagram (Employees)

Entity Relationship Diagram

Entity Relationship Diagram is a data model that utilizes various symbols to describe entities and relationships between data (Rumetna et al., 2022) . Figure 5 shows that the *Users table* has *a one-to-many relationship* with the Work Results table and *a many-to-one relationship* with the Tile Type table. One employee can have many work results, while several employees can produce one type of tile. The difference in user types is determined by the *utype column* (ADM for admins and USR for employees). The *user_id column* in the Work Results table acts as *a foreign key* that points to the *id column* in the *Users table* , while the *jenis_genteng_id column* in the *Users table* points to the *id column* in the Tile Type table. Admins have the right to manage employee data, salary amounts, and update each employee's work results data, while employees can only perform *CRUD operations* on their work results.

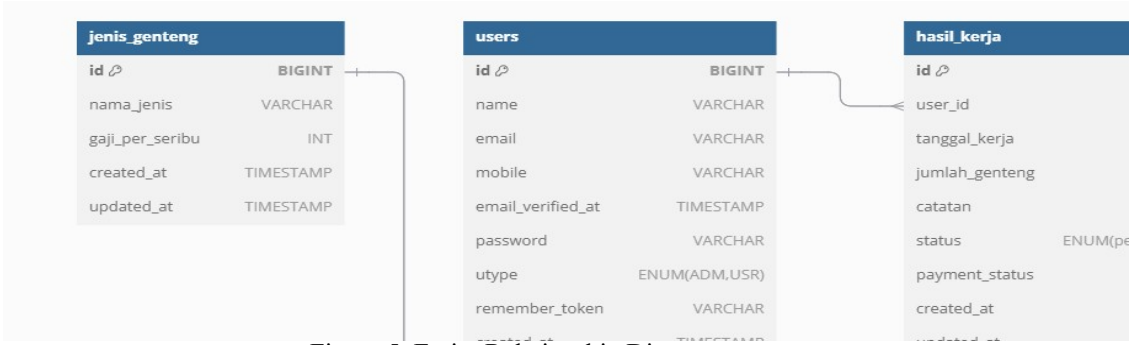


Figure 5. Entity Relationship Diagram

User Interface

User interface design transforms the needs identified during the needs analysis stage into a prototype (Fajriati & Budiman, 2021a) . The following is a user interface design for an employee performance monitoring system at PG. Dwi Putra.

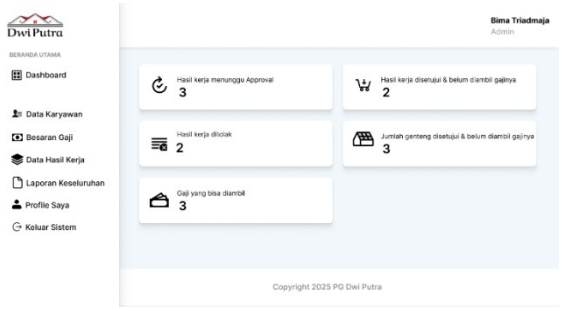


Figure 6. Dashboard page

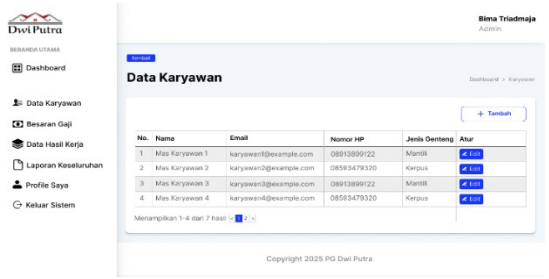


Figure 7. Data Page Employee

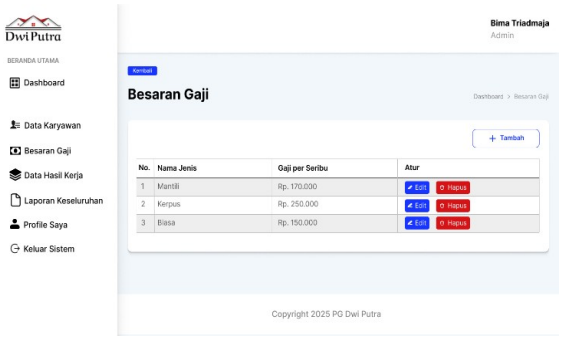
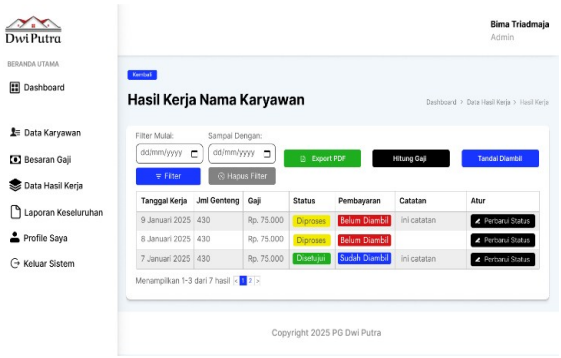


Figure 8. Salary Amount Page Figure



9. Employee Work Results (Admin)

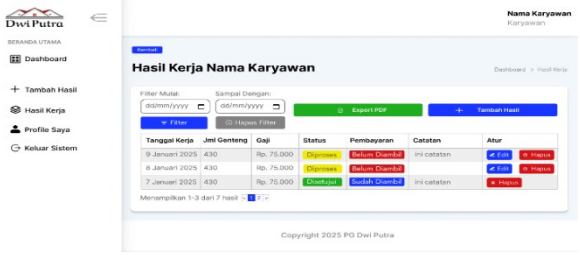


Figure 10. Employee Work Results (Employee)

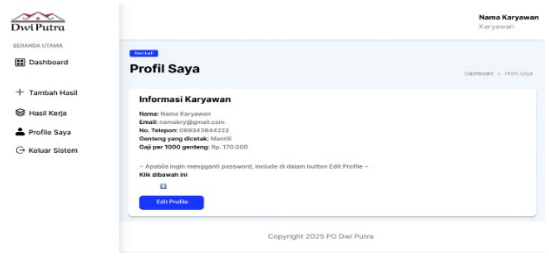


Figure 11. Profile Page

Writing Code

The coding stage, also known as encoding, is the process by which human language is translated into machine language (Nur Azizah & Nurgiyatna, 2021). This stage involves system programming, which is carried out according to predetermined design specifications (Fajriati & Budiman, 2021b). This research utilizes the PHP programming language with the assistance of *the PHP framework. Laravel* 11. *Framework* advantages *Laravel* lies in its elegant syntax and extensive ecosystem, which provides a strong foundation for building scalable, secure, and maintainable systems (Patience et al., 2024). *Laravel* helps developers maximize the use of the PHP programming language, especially in creating web-based applications (Herdiansah et al., 2021). Data storage uses *a MySQL database*. *MySQL* is a *database management system. SQL* is *open-source*, widely used, and developed and supported by Oracle Corporation (Utami et al., 2021).

Testing

This testing phase is conducted to ensure that the system output is in accordance with the established design (Inastiana et al., 2020) . The *Black Box Testing method* and *System Usability Scale (SUS)* were applied to evaluate the feasibility of the employee work results monitoring system at PG. Dwi Putra. *Black Box Testing* focuses on testing the functional requirements of the system to ensure that each

function operates optimally (Fajriati & Budiman, 2021a). Carrying out in-depth *Black Box* testing allows developers to ensure that the program functions as intended, meets requirements, and runs smoothly without unexpected problems (Asrin & Utami, 2023). *SUS* is a simple scale consisting of 10 items that provides an overview of the subjective assessment of the level of usability. (Brooke, 2020). *SUS* has several advantages, such as a simple and easy-to-understand evaluation process, the ability to produce significant results even with a small sample size, and the ability to distinguish between applications that are functioning well and those that are not (Fatmawati, 2021).

Maintenance

The next stage after the system has been successfully built is the implementation and maintenance of the information system (Puspaningrum & Sudarmilah, 2020). Maintenance ensures *the website's continued* effectiveness and usability, and allows for necessary updates or enhancements to meet evolving needs and requirements (Asrin & Utami, 2023). The system will be hosted to ensure widespread accessibility and usability. The maintenance phase is carried out after receiving user *feedback, including improvements to both the server side and the user interface.*

RESULTS AND DISCUSSION

The findings of this study reveal a system with superior features compared to systems in previous studies. Key advantages include the addition of an approval feature to improve the validity of employee work records, as well as an automatic payroll calculation feature based on work results, which will increase efficiency and prevent calculation errors.

Registration and Login Page

The registration page shown in Figure 12 is used by employees who do not yet have an account. Employees must enter their full name, email address, phone number, and password, and can optionally select a roof tile type to register. At the bottom of the registration and login page, there is a link to the system's user guide. The login page, shown in Figure 13, allows admins and employees to access the system with their registered email address and password, and then is directed to the dashboard appropriate to their role.

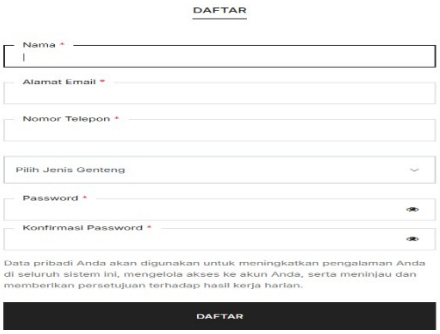


Figure 12. Registration Page

Figure 13. Login Page

Dashboard Page

This page is the initial display accessible after a successful login. Figure 14 shows the employee dashboard, which allows employees to view data on work awaiting approval, unpaid work, rejected work, the number of approved but unpaid work, and the amount of work available for withdrawal.

Figure 15 shows the admin dashboard page, which allows the admin to view similar information to that found on the employee dashboard, but with the ability to view data from all employees.

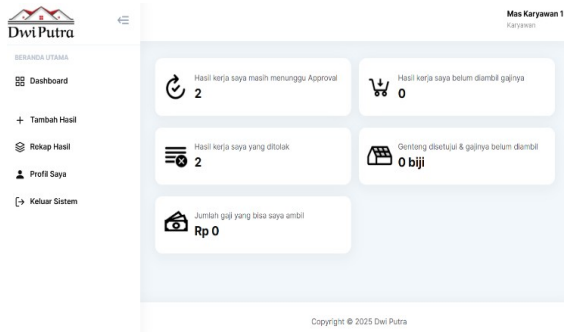


Figure 14. Dashboard Page (Employee)

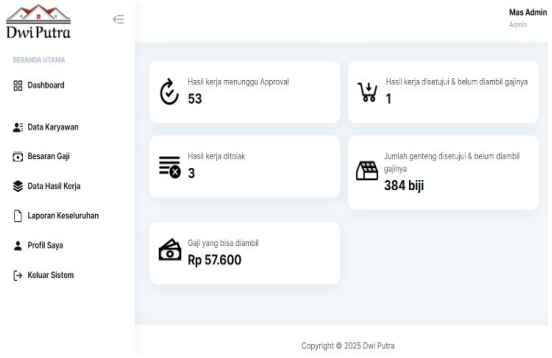


Figure 15. Dashboard Page (Admin)

Pages for Managing Employee Data (Admin)

This page displays all employee data, as shown in Figure 16. Admins can add new users with the default employee role. Admins have full access to edit or update employee data, including changing passwords without having to enter the old password. Admins also have the right to delete employee data.

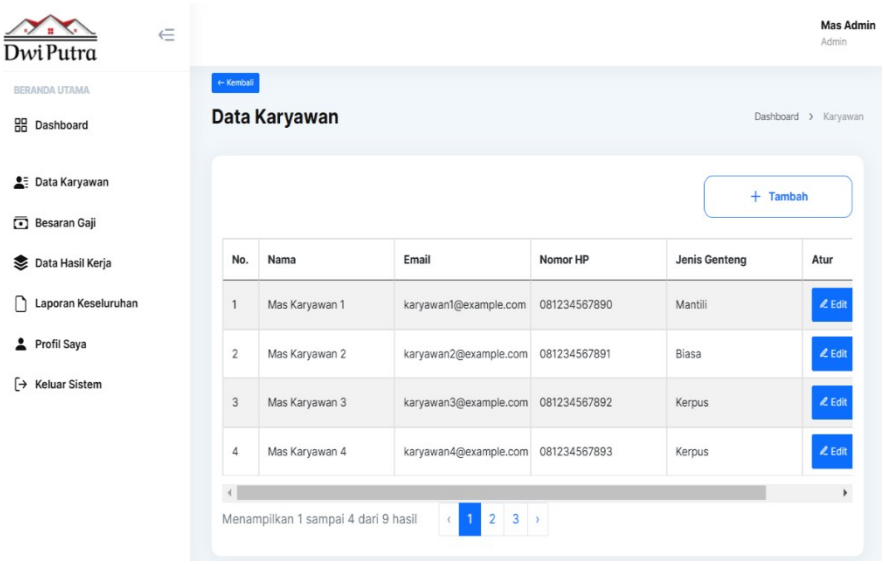


Figure 16. Employee Data Page

Page for Determining Employee Salary Amount (Admin)

This page displays a table containing data on roof tile types and their salaries that can be updated or deleted by the admin, as shown in Figure 17. Employee salaries are calculated based on the number of roof tiles produced, with a predetermined salary per thousand types of roof tiles. For example, if the salary per thousand of a type of roof tile is Rp 170,000, and an employee produces 2000 roof tiles, then the salary received can be calculated using a quick formula: 2000 x 170 = Rp 340,000.

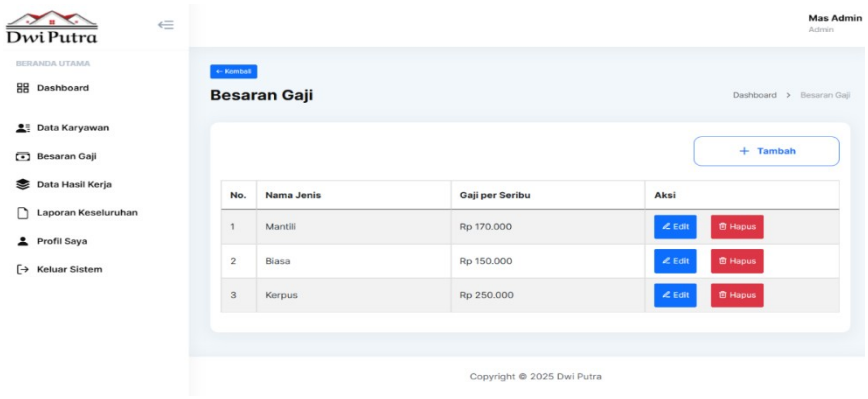


Figure 17. Salary Amount Page

Approval of Work Results (Admin)

The process begins by opening the "Work Result Data" sidebar. The "View Details" button on that page directs to each employee's work result page, as seen in Figure 18. This page allows admins to update or approve each employee's daily work result data. Admins can also filter the work result data, print it in PDF format, and manage payroll.

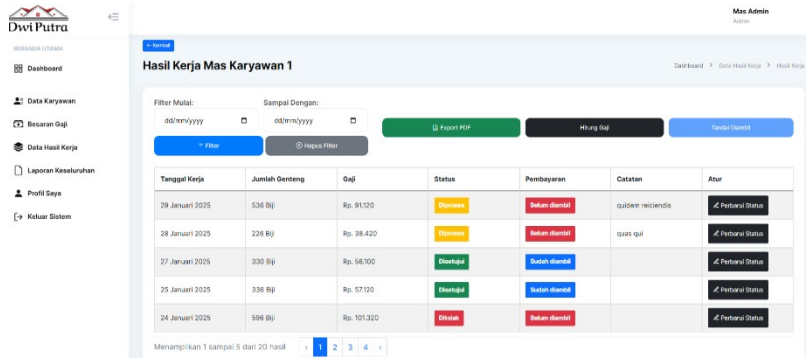


Figure 18. Work Results Page for Each Employee

Managing Salaries (Admin)

This process is carried out on each employee's work results page, as seen in Figure 18. The administrator calculates the salary based on the approved and uncollected data. The administrator then presses the "Mark as Collected" button and prints the payslip, as seen in Figure 19.

Figure 19. Pay Slip

Pages for Printing the Overall Report (Admin)

This page displays the overall report data along with details for each employee. Admins can first filter the data to display it, as shown in Figure 20, and then export it to PDF format, as shown in Figure 21.

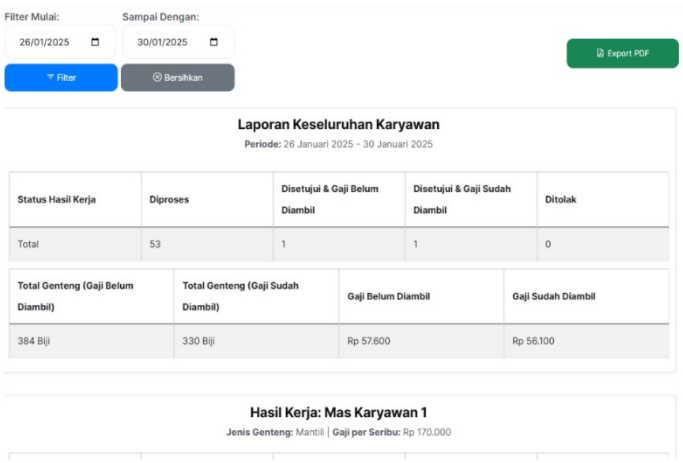


Figure 20. Overall Report Filter

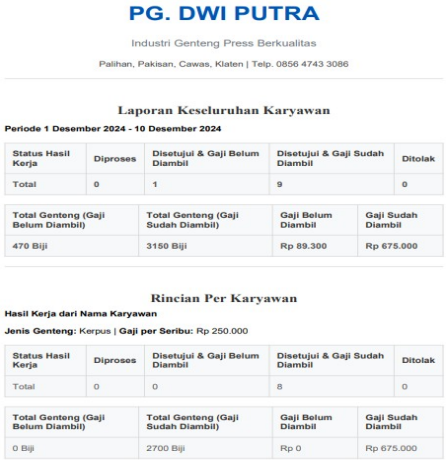


Figure 21. Overall Report

Pages for Managing Profiles

This page displays user profiles with different information depending on their role . The admin profile includes name, email, and phone number. The employee profile includes similar information, with the addition of the type of roof tile produced and their salary. The employee profile view can be seen in Figure 22. The profile edit pages for admins and employees have a similar structure. The form on this page allows users to update their name, email, phone number, and password.

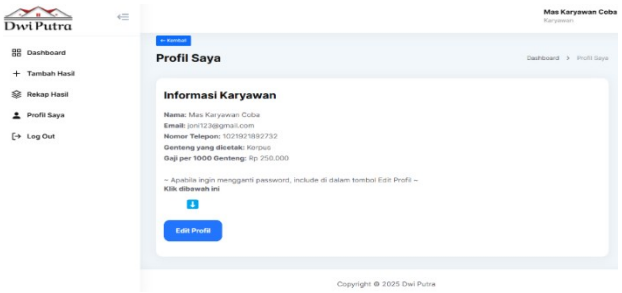


Figure 22. Employee Profile Page

Pages for Managing Work Results and Printing Individual (Employee) Reports

The work results page displays each employee's work results, as shown in Figure 23. The primary function of this page is to manage work results, such as adding, editing, and deleting data. Employees can manage data such as work dates, daily work results, and notes (optional). Employees can also filter work results data on this page and export it to PDF format as an individual report.

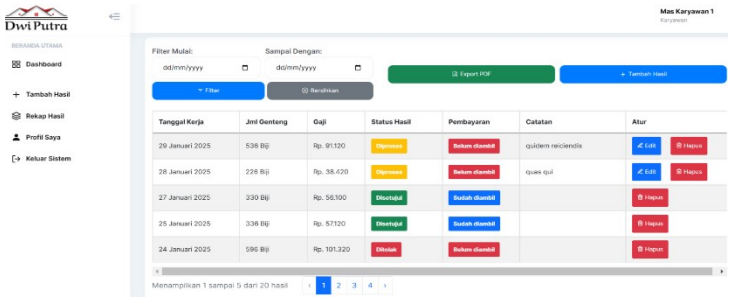


Figure 23. Employee Work Results Page

Black Box Testing

Testing of the employee performance monitoring system at PG. Dwi Putra was conducted using a *Black Box approach.* This approach focuses on validating system functionality to ensure that all features operate according to expected specifications. The testing included two user roles: admin (as shown in Table 2) and employee (as shown in Table 3).

Table 2. *Black Box Test Results* (Admin)

No.	Functions tested	Test Cases	Expected Results	Status
1.	Login	Email and password are correct	To the admin dashboard page	*Valid*
		Incorrect email and password	Return to login page	*Valid*
2.	Dashboard information	Click on the information of each employee	To the detailed page of each employee's work results	*Valid*
3.	Employee data menu	Click the “employee data” button	To the employee data page	*Valid*
		Add, edit, delete employee data	Employee data has been successfully added, edited and deleted.	*Valid*
4.	Salary amount menu	Click the “salary amount” button	To the salary amount page	*Valid*
		Add, edit, delete data	Salary data successfully added, edited and deleted	*Valid*
5.	Work results data menu	Click the “work results data” button	Go to the work results data page	*Valid*
		Click the “view details” button	If there is work result data, it will go to the work result details page, if there is not, *an error alert will appear.*	*Valid*
6.	Results detail page employee work	Click the “update status” button	Go to approval & payment status page	*Valid*
		Click the “update” button	Successfully updated approval data & payment status	*Valid*
7.	Work result detail page employees to calculate wages	Click the “calculate salary” button	The type of roof tile & salary per thousand, time span, total roof tiles, and salary received appear.	*Valid*
		Click the “mark as taken” button	The status of all approved work data is "taken"	*Valid*
		Filter work result data	Successfully filtered data	*Valid*
		Click the “export PDF” button	Successfully print report according to data filter	*Valid*
		Click the “clean” button	Clear filters and calculate payroll	*Valid*
8.	Overall report menu	Filtering work result data	Successfully displays the overall report along with details for each employee.	*Valid*
		Click the “export PDF” button	Successfully print the report according to the data filter.	*Valid*

		Click the "clean" button	Clearing data filters	*Valid*
9.	Profile menu	Click the "my profile" button	To admin profile page	*Valid*
		Click the "edit profile" button	Admin profile successfully edited	*Valid*
10.	Logout	Click the "logout" button	Successfully logged out of account, return to login page	*Valid*

Table 3. *Black Box Test Results* (Employees)

No.	Functions tested	Test Cases	Expected Results	Status
1.	Registration	Complete data input	To the employee dashboard page	*Valid*
		One of the data is blank	*Alert* for data must be filled in completely	*Valid*
2.	Login	Email and password are correct	To the employee dashboard page	*Valid*
		Incorrect email and password	Return to login page	*Valid*
3.	Dashboard information	Click on the information of the logged in employee	To the work results details page of logged in employees	*Valid*
4.	Work results page	Add, edit, delete work result data	Work result data was successfully added, edited, and deleted	*Valid*
		Filter work result data	Successfully filtered data	*Valid*
		Click the "export PDF" button	Successfully print the report according to the data filter.	*Valid*
		Click the "clean" button	Clearing data filters	*Valid*
5.	Menu profile	Click the "my profile" button	To the employee profile page	*Valid*
		Click the "edit profile" button	Employee profile successfully edited	*Valid*
6.	Logout	Click the "logout" button	Successfully logged out of account, return to login page	*Valid*

System Usability Scale (SUS) Testing

The SUS is a 10-item Likert scale used to assess subjective perceptions of a system's usability. The *SUS score* is calculated by summing the contributions of each item. Odd-numbered items are subtracted from their chosen score by 1, while even-numbered items are subtracted from 5. The sum is then multiplied by 2.5 to obtain a final score ranging from 0 to 100. This method provides a standardized usability assessment, facilitating comparisons between systems (Brooke, 2020) . Table 4 lists the ten *SUS statements* .

Table 4. List of 10 Statements in *SUS*

No.	Statement
1.	I think I will use this system again.
2.	I find this system complicated to use.
3.	I found this system easy to use.
4.	I need help from another person or technician in using this system.
5.	I feel like the features of this system are working as they should.
6.	I feel there are many things that are inconsistent (inconsistent) in this system.
7.	I feel like other people will understand how to use this system quickly.
8.	I find this system confusing.
9.	I felt no barriers in using this system.
10.	I need to get used to it first before using this system.

SUS test was conducted with 30 respondents. The results of the *SUS test* can be seen in Table 5.

Table 5. *SUS Test Results*

Respondents	Score After Calculation										Total	Value (Total*2.5)
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
R1	4	3	4	1	4	3	4	3	4	0	30	75
R2	3	2	3	2	4	4	2	3	2	1	26	65
R3	4	4	4	4	4	4	4	4	4	4	40	100
R4	2	3	3	3	3	3	2	2	2	1	24	60
R5	3	4	4	2	3	2	4	4	4	4	34	85
R6	3	4	4	3	4	4	4	4	0	4	34	85
R7	3	3	3	2	3	3	3	3	3	4	30	75
R8	3	4	4	4	4	4	3	4	3	0	33	82.5
R9	3	3	2	3	3	3	2	2	3	3	27	67.5
R10	4	4	3	3	4	4	4	3	4	3	36	90
R11	4	4	4	4	4	4	4	4	4	4	40	100
R12	2	3	4	4	4	4	3	3	4	4	35	87.5
R13	4	4	4	4	4	4	4	4	4	4	40	100
R14	4	4	4	3	4	4	4	4	3	4	38	95
R15	4	4	3	4	4	4	4	4	4	4	39	97.5
R16	3	4	4	4	4	3	3	4	4	3	36	90
R17	4	4	4	4	4	4	3	4	4	4	39	97.5
R18	3	3	4	4	4	4	4	4	4	4	38	95
R19	3	1	3	1	3	1	3	1	3	1	20	50
R20	3	3	3	2	4	2	3	3	3	2	28	70
R21	2	3	3	3	2	2	3	3	1	3	25	62.5
R22	3	4	3	3	4	4	3	3	3	4	34	85
R23	1	3	3	4	4	1	2	2	3	2	25	62.5
R24	4	4	3	3	4	4	4	3	3	4	36	90
R25	4	4	3	3	4	4	3	4	4	4	37	92.5
R26	4	3	4	3	4	4	3	4	3	3	35	87.5
R27	4	4	3	3	4	4	2	3	3	4	34	85
R28	4	4	4	3	4	4	2	4	4	2	35	87.5
R29	3	4	4	4	3	4	3	3	3	3	34	85
R30	3	2	3	3	3	2	4	2	3	3	28	70
Average Value (Final Result)												82.5

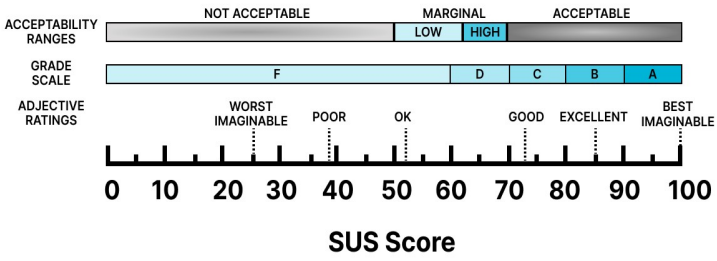


Figure 24. *SUS assessment*

Table 5 shows that the final system score after user testing was 82.5. This score falls into the " *Acceptable* " category with a "B" grade scale and a qualitative rating of " *Excellent* ," as shown in Figure 24. Based on *the acceptability ranges* , this score falls into the *"Acceptable" category* , meaning the system is acceptable and suitable for use by users. In *the grade scale* , a score of 82.5 is categorized as "B," indicating that the system has good quality and meets eligibility standards. Meanwhile, based on *the adjective ratings* , this score is rated *"Excellent,"* indicating that the system functions very well and provides an optimal user experience. These results indicate that the system has met the eligibility criteria and is able to carry out its function very well in monitoring employee work results at PG. Dwi Putra.

CONCLUSION

The employee performance monitoring system at PG. Dwi Putra has been successfully built and developed. All features, from employee data management, salary determination, work result approval,

salary management, and printing overall reports for admins, to managing work results and printing individual reports for employees, as well as managing each profile (both admin and employee) have been running well and in accordance with expectations. *Black Box* and *SUS testing* were conducted to ensure the success of the system. The *Black Box test results* indicated that all features functioned well as expected without any functional errors, while the *SUS test results* showed an average score of 82.5, which indicates that the system is suitable for use. Suggestions for further research include the addition of a notification feature to notify users of the latest activity in the system.

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