

## Implementation of the SAW Method on the Employee Career Determination Website at PT. Hartono Palace of Technology

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### ABSTRAK

PT. Hartono Istana Teknologi adalah perusahaan di Indonesia bergerak di bidang elektronik dan terdapat kendala dihadapi diantaranya penilaian kinerja karyawan dan penentuan karyawan berhak memperoleh kenaikan jabatan menggunakan data berupa kertas tersimpan secara terpisah dan file Excel untuk pendataan penilaian kinerja karyawan belum terintegrasi seperti data agreement, data training dari perusahaan dan data prestasi belum tersistematis sehingga perusahaan membutuhkan sistem informasi terintegrasi proses jenjang karir karyawan. Berdasarkan permasalahan di atas dan penelitian difokuskan implementasi berbasis website untuk memberi solusi kepada perusahaan terhadap masalah jenjang karir di perusahaan dapat meningkatkan efektivitas kerja dan diotomatisasi proses kriteria kelayakan kenaikan jabatan. Dalam proses pembuatan website menggunakan salah satu fitur Decision Support System (DSS) yaitu metode Simple Additive Weighting (SAW). Telah dilakukan Blackbox testing dengan hasil rata-rata 77.5 % menunjukkan keberhasilan uji kelayakan aplikasi untuk diterapkan di PT Hartono Palace of Technology.

### ABSTRACT

*PT. Hartono Istana Teknologi is a company in Indonesia engaged in electronics and there are obstacles encountered including evaluating employee performance and determining employees entitled to promotion using data in the form of paper stored separately and Excel files for data collection on employee performance assessments that have not been integrated such as data agreements, training data from company and achievement data are not yet systematic so companies need an integrated information system for employee career path processes. Based on the problems above and the research is focused on website-based implementation to provide solutions to companies for career path problems in companies that can increase work effectiveness and automate the eligibility criteria process for promotion. In the process of making a website, one of the features of the Decision Support System (DSS) is used, namely the Simple Additive Weighting (SAW) method. Blackbox testing has been carried out with an average result of 77.5% indicating the success of the application feasibility test for implementation at PT Hartono Palace of Technology*

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## INTRODUCTION

The era of globalization of technology and networks in Indonesia is growing rapidly every year. This has an impact on the field of old products to face challenges and a new era of world competition, including in the field of electronics which will give birth to new products. This causes humans to never forget that technology is the center of life and will never die. Therefore, it is necessary to create networks and technologies that support the development of electronics and technology (Z. Arifin, et al,2020) & (H. Darmawan,2022).

There are many relevant examples in today's era where the human age is gradually being replaced by electronics and technology, such as using the internet Facebook Marketplace to sell goods and carry out promotions through advertisements that can be seen by most application users. (Meese, J et.al,2021). From previous research entitled decision support system for evaluating the performance of outstanding employees using the MBO reference and the AHP method using the Expert Choice Application by Mr. Rudi Sutomo and Mr. Johny Hizkia. The results are studied from the performance indicators of outstanding employees and can be used as a reference for this research and examined using the SAW method with web-based implementation as an application for determining employee career performance.

All of this can be achieved through the use or utilization of the internet and technology, especially in the role of its use, where information system technology can increase the effectiveness and performance of existing and required information can be utilized optimally. help support the company's various activities so that the company can increase profits and the quality of the company's products. Of the thousands of large companies established in Indonesia, PT. Hartono Istana Teknologi is confirmed to have more than 1,000 employees, so that HR experiences problems in evaluating employee performance because the data used as research material is not available quickly. To conduct an employee performance appraisal, data about each employee is needed, such as contract data, training data from the company. and employee success data. However, the required data is still managed manually, so that currently the company does not have a system that can help process employee career paths. To companies regarding career path issues in the company so as to increase work efficiency, because it is website-centric and automatic to calculate employees who meet promotion eligibility criteria ("Tentang Kami," 2021).

## RESEARCH METHODOLOGY

In this study, interviews were conducted to obtain information and resources needed to be managed in the information system. The website creation method that will be used is the Prototype method and the career determination method uses Simple Additive Weighting.

The following is a comparison of the Prototype and RAD methods (S. Aswati et.al,2021).

**Table 1. Comparison of Methods**

Method	Advantage	Disadvantage
RAD	In relatively short system development, around 60 days to 90 days	Because using speed so that product quality is not perfect and errors often occur.
	The cost required is small because this method provides a new system in it..	This system is difficult to implement elsewhere.
	It is easy to observe because it uses a prototype model, namely the user understands the system will be developed..	Projects can fail due to the agreed time not being completed
Prototyping	Save time in developing application systems	Complexity
	Suitable for simple application systems	Not suitable for large application systems
	Every improvement made requires input from clients who use it to make it more reliable	Developers will get big challenge from clients

### Prototyping Model

Based on the results of research by Ms. Aswati in 2021, it can be concluded that using the prototyping method provides more benefits in building applications. We can see it in the Prototyping stage, Figure 1. Prototyping Model.

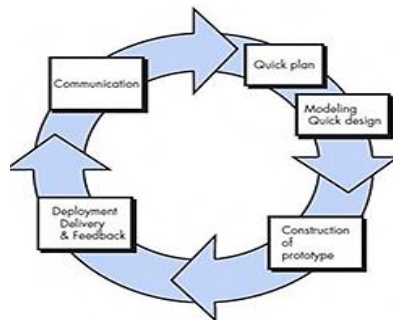


Figure 1. Prototype Model. Source : (D. S. Tiyas et.al,2019).

### Simple Additive Weighting

The SAW method is a multi-attribute decision-making method. This method is known as the weighted addition method. The basic idea of the SAW method is to use rankings to find the sum of the weights in other ways of all the attributes (Frieyadi,2017).

$$r_{ij} = \begin{cases} \frac{x_{ij}}{\max x_{ij}} \\ \frac{\min x_{ij}}{x_{ij}} \end{cases} \quad (1)$$

Where  $r_{ij}$  normalized performance rating value,  $x_{ij}$  attribute value owned by each criterion,  $\max x_{ij}$  the largest value of each criterion, and  $\min x_{ij}$  the smallest value of each criterion.

## RESULTS AND DISCUSSION

### Calculation of the SAW Method Manually

In the problem to be solved and the goal is to monitor prospective employees who will get a promotion. With this system, potential job candidates are identified according to specified criteria. The criteria are as follows:

Table 2. Assessment criteria

<b>Time Discipline</b>	35%
<b>Cooperation</b>	25%
<b>Work experience</b>	20%
<b>initiative</b>	20%

After weighting per criterion and sub-criteria, employee data is processed according to the SAW method. An example of 5 employees was taken and the calculation process was carried out using the SAW method according to the table below.

Table 4. Employee Sample

A1	Rulik Rudianto
A2	Muhammad Syahrul Ramadhon
A3	Muhammad Adam Alfaridzi
A4	Ismail Abdul Gani Alamsyah
A5	Nur Kholis Purnomo

After being taken from five employees, indicators are made according to the weighting that has been determined.

**Table 5.** Match Rating

Name	Criteria			
	Time Discipline	Cooperation	Work Experience	Initiative
A1	3	3	3	2
A2	3	4	4	4
A3	3	3	4	2
A4	3	3	2	3
A5	4	4	2	2

Then a decision matrix is made based on the given criteria (Ci) then the matrix is normalized for each alternative name.

**Table 6.** Initial Matrix

Ai / Ci	C1	C2	C3	C4
A1	3	3	3	2
A2	3	4	4	4
A3	3	3	4	2
A4	3	3	2	3
A5	4	4	2	2

After the initial matrix point is reached, the decision is normalized (Xij) by calculating the normalized performance value point (Rij) from the alternative (Ai) with the criteria (Ci).

**Tabel 7.** Normalized Matrix

Ai / Ci	C1	C2	C3	C4
A1	3 / 4	3 / 4	3 / 4	2 / 4
A2	3 / 4	4 / 4	4 / 4	4 / 4
A3	3 / 4	3 / 4	4 / 4	3 / 4
A4	3 / 4	3 / 4	2 / 4	3 / 4
A5	4 / 4	4 / 4	2 / 4	2 / 4

The results obtained from each criterion are normalized (Ri) and the final value (Vi) is determined by adding them up and then multiplying the elements (Ri) by the weight (W), namely:

$$V1 = (0.35 * 0.75) + (0.25 * 0.75) + (0.2 * 0.75) + (0.2 * 0.5) = 0.2625 + 0.1875 + 0.15 + 0.1 = 0.7$$

$$V2 = (0.35 * 0.75) + (0.25 * 1) + (0.2 * 1) + (0.2 * 1) = 0.2625 + 0.25 + 0.2 + 0.2 = 0.9125$$

$$V3 = (0.35 * 0.75) + (0.25 * 0.75) + (0.2 * 1) + (0.2 * 0.75) = 0.2625 + 0.1875 + 0.2 + 0.15 = 0.7925$$

$$V4 = (0.35 * 0.75) + (0.25 * 0.75) + (0.2 * 0.5) + (0.2 * 0.75) = 0.2625 + 0.1875 + 0.1 + 0.1125 = 0.6625$$

$$V5 = (0.35 * 1) + (0.25 * 1) + (0.2 * 0.5) + (0.2 * 0.5) = 0.35 + 0.25 + 0.1 + 0.1 = 0.8$$

**Table 8.** Final Score

Name	Time Discipline	Cooperation	Work Experience	Initiative	Total
	0.35	0.25	0.2	0.2	
A1	0.2625	0.1875	0.15	0.1	0.7
A2	0.2625	0.25	0.2	0.2	0.91
A3	0.2625	0.1875	0.2	0.15	0.79
A4	0.2625	0.1875	0.1	0.1125	0.66
A5	0.35	0.25	0.1	0.1	0.8

The basis for assessing personnel performance and the highest criteria is work discipline (35%), then cooperation (25%), professional experience and initiative with 20%. The highest final score in the table found that the employee performance evaluation system was calculated based on work discipline, cooperation, work experience and the results of initiatives on behalf of Muhammad Syahrul Ramadhon (A2) as the employee who made the most positive contribution to educational institutions (Rudi Sutomo,2021).

## Implementation Prototyping Model

### 1. Communication

Based on the problems faced by the company PT. Hartono Istana Teknologi then offered an idea of a solution to the problem in the form of a website-based information system application that could be used by all company employees. It is divided into 2 things, namely non-functional requirements and functional requirements:

#### 1.1 Non-Functional Requirement:

- Employee performance determination system can be accessed easily
- Access login is required according to the registered position
- Systems that are connected to the database

#### 1.2 Functional Requirement:

- Added a new Rank Tier
- Enter Employee Name
- Create new Username
- Create Category assessment questions
- View Rank list
- View the list of Employees
- View a list of Usernames
- View a list of Question Categories
- Create Assessment Quiz
- See the process of Employee Appraisal Results
- View the list of Assesment Results

### 2. Quick Plan and Modelling Quick Design

#### a) Use Case Diagram

The information system behavior model is used to find out the features owned by the system and who is allowed access to use the application features (S. Mulyani, et.al,2017)&( Denaldi Prima Fadlurrahman,2021).

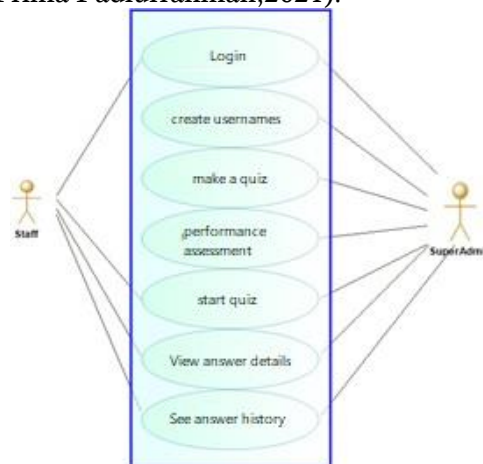


Figure 2. Use Case Diagram User Role

Figure 2 shows the use case diagram of the proposed application system described as Super Admin (system) having roles such as creating usernames, creating quizzes, determining performance appraisal requirements, viewing employee answer details, and viewing answer history. While the role of staff is to log in, take quizzes, and view detailed answers.

#### b) Activity Chart

Activity Diagram illustrates the entire work process of all stages in the system (A. Dennis, et al, 2018). Figure 3 explains the quiz menu created by the admin to be done by employees participating in the performance appraisal process. Admin creates several questions based on each category, then inputs the start date of the quiz. After that the admin determines criteria such as the range of points per answer and others.

In the employee assessment in Figure 4, the Super Admin conducts a trial run to ensure that later the performance appraisal will run smoothly by inputting data and the

reasons for participating in the employee performance appraisal. Then Artemis will bring up several questions and answer options to choose from.

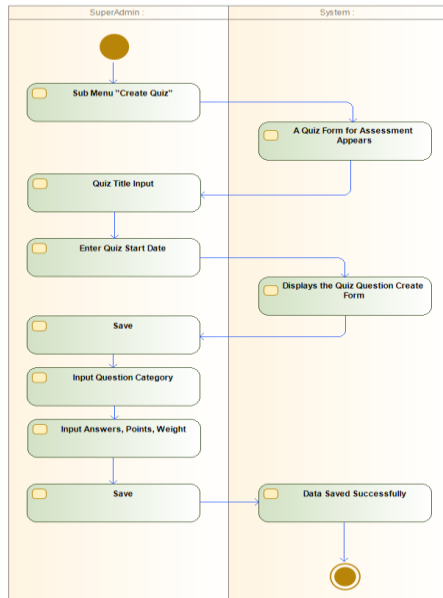


Figure 3. Activity Diagram Proposed Quiz

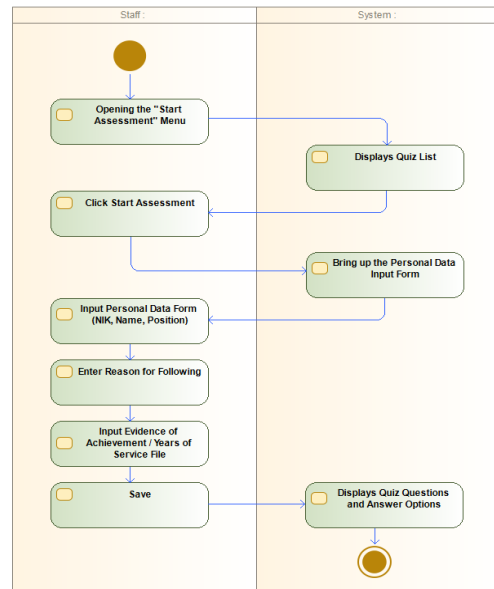


Figure 4. Activity Diagram Proposed Employee Assessment

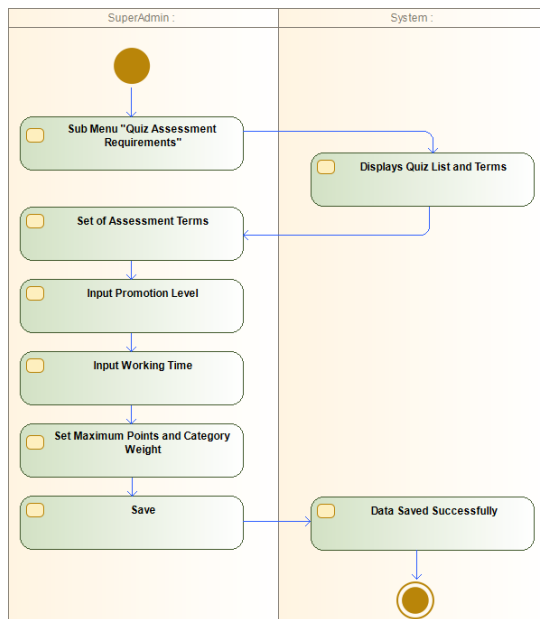


Figure 5. Activity Diagram Proposed Assessment Requirements

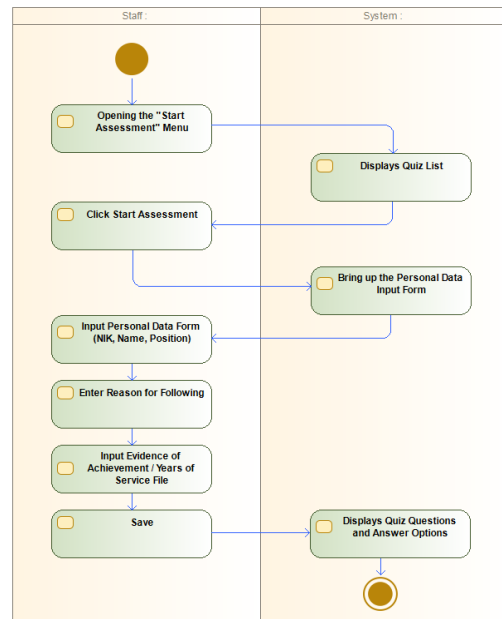


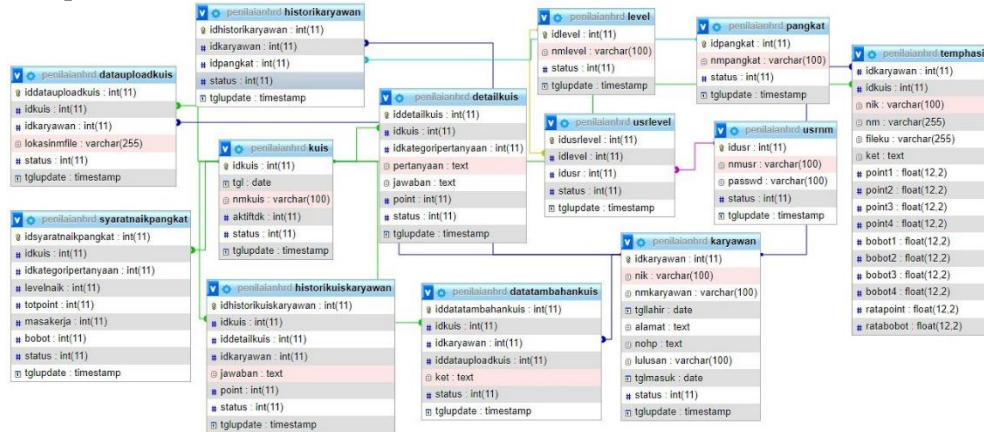
Figure 6. Activity Diagram Proposed Assessment

After the quiz is created, the Super Admin sets the level increase requirements such as how many levels he will rise, years of service at the company and maximum points for each category of questions. Then the data is stored in the system (Artemis) as an assessment requirement.

Figure 6, Staff conducts an assessment by filling in the form of personal data, reasons and evidence of years of service or achievement, then after submission a number of questions will appear based on which each category has its own points. The results of the points will be totaled and calculated using a formula and finally get the average for each employee and sorted by rank. The top rankers have the opportunity to receive promotions.

**c) Relationship Table**

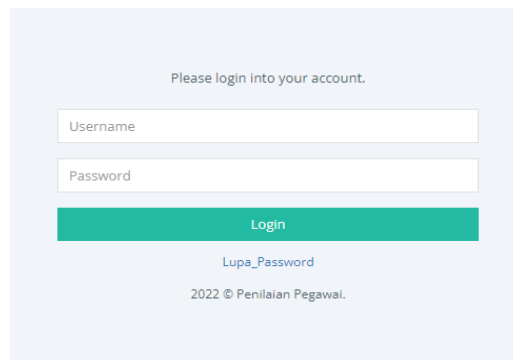
The relation table in the career path system is used to store information about the objects represented in the database.



**Figure 7. Relationship Table**

**3. Construction of Prototype**

**a) Interface Design**



**Figure 8. Login Page**

Figure 8 The login page is used by admins and staff to enter the employee performance determination website.

The screenshot displays a web form titled "Form Input Pegawai". On the left, there is a sidebar menu with options like "Form Master", "Buat Kuis", "Penilaian Pegawai", and "Hasil Penilaian Pegawai". The main form area contains the following fields:
 

- NIK Pegawai**: A text field with a note "Format NIK Pegawai TahunMasuk+No ex: 2022150".
- Nama Pegawai**: A text field.
- Tgl Lahir**: A date picker field with the format "mm / dd / yyyy".
- Tgl Masuk Pegawai**: A date picker field with the format "mm / dd / yyyy".
- Jabatan**: A dropdown menu labeled "Pilih Jabatan".
- Alamat**: A large text area for address input.
- No HP**: A text field.
- Lulusan**: A dropdown menu.

 A "SIMPAN" button is located at the bottom right of the form.

**Figure 9. Employee Input Form**

Displays a menu for admins to add new employee data with NIK, name, date of birth and date of entry into work and others.

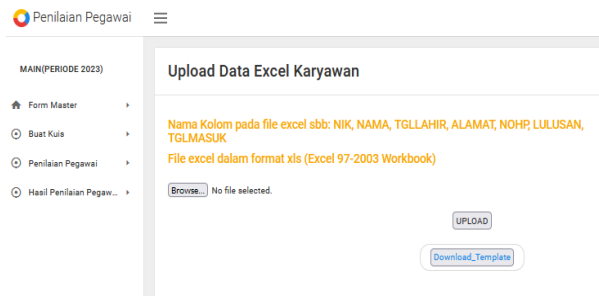


Figure 10. Upload Data From Excel

Displays a menu for the admin to upload data from excel or an existing database and the employee data in excel form that you want to update.

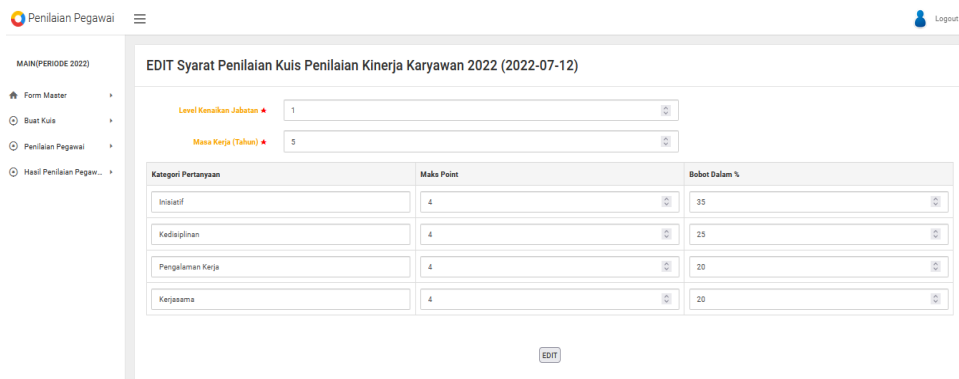


Figure 11. Set / Edit Rating Terms page

Displays the admin menu to edit terms and determine conditions in the form of weights and maximum points for each question category so that calculations can be carried out.

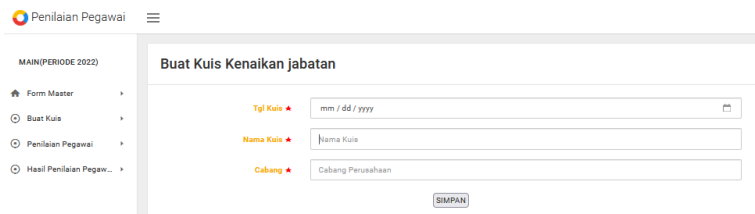


Figure 12. Take a career advancement quiz Page

Displays the admin and staff menus in conducting performance appraisals by answering several questions with the available options to get predetermined points.

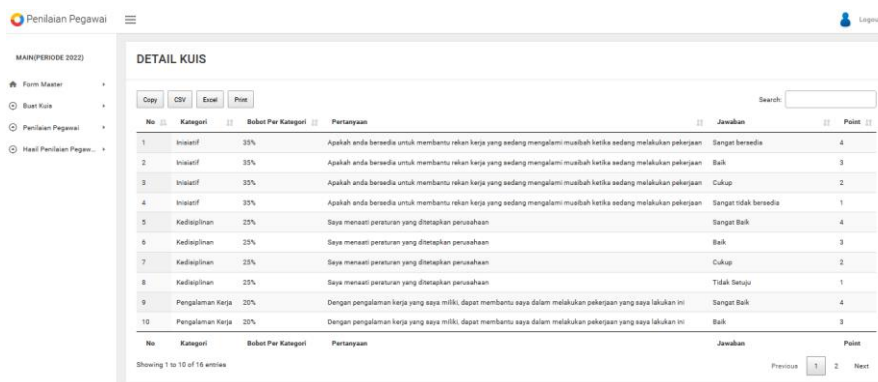


Figure 13. Assessment Result Detail Page



Displays the admin menu to view overall data on employees who have taken part in the assessment. As for the staff, they can only see their own name, not in its entirety.

#### 4. Deployment Delivery and Feedback

The system has been created, the user or users are asked to do some testing of the features on the website, this is useful so that the system can be used properly without any problems. Therefore it is necessary to do some system testing according to the UAT standard with the blackbox method (Y. D. Wijaya et.al,2019) & (B.A.P.N.T.S.AD.B. et.al,2020).

**Table 9. Test Scenario**

Test Scenario	Test Case	Expected Result	Percentage	Status
Login Admin	The admin logs in using the superadmin user and password and the staff logs in using the registered user and password	The username and password are entered correctly so you can access the admin / staff page.	85	OK
Admin uploads employee data via excel/database	Admin uploads existing employee data from database or excel	The username and password are entered incorrectly, an alert appears and the user and password are entered again correctly.	80	OK
Rating Page	Admin is doing a trial for the assessment page	Displays an alert when confirming the upload of employee data to the new database	75	OK
	Staff conduct performance appraisals	Displays available question and answer pages so that the assessment process can run smoothly	70	OK
		On clicking start the assessment is directed to filling in data as confirmation. If you do not meet the minimum requirements, an alert notification will appear	80 75	OK OK

## CONCLUSION AND RECOMMENDATION

### Conclusion

The results of the research using the prototyping method and the results of research analysis on the application of determining employee performance are summarized as follows:

1. Research on the implementation of an employee performance determination system using the SAW method has proven useful after testing because the SAW method has been successfully used as the basis for weighted calculations to determine employee performance and potential. The results of the study are in the form of an application system that makes it easier for HR managers to evaluate employee performance so there is no need to use the Excel application for manual entry calculations.
2. Implementation of an information system for determining employee performance for web-based career promotion has been successfully implemented using the prototyping development method with black testing results with an average of 77.5% and this indicator shows the success of the feasibility trial can be accepted for implementation at PT Hartono Palace of Technology.

### Recommendation

With the completion of making a website for evaluating employee performance, it is hoped that this application can be used by companies to assist in solving problems related to leadership decision making regarding employee performance, besides that this application is still in the development stage, so it is wide open for changes in features and functions.

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