




Chapter in Book

# Performance and Evaluation System with Data Visualization

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**Abstract:** Performance evaluation is a formal and productive procedure in measuring the employee's work and results according to their job responsibilities which is a response of giving feedback, promotion, or motivation to the employees. The aim of the project is to develop a web-based performance and evaluation system with data visualization. This system will be able to track the performance of the employees through task management and sales as it includes the evaluation of employees. The methodology that was used in developing this system is Waterfall Methodology with only three phases applied. In Requirements Gathering and Analysis phase, every detail about the system was acquired and analyzed. After that, the system, its interface, and database were designed in the Design phase. Lastly, the system was developed by using a PHP web framework which is Laravel with additional features of data visualization by using JavaScript language. The system can help organizations ensure the tasks of the employees and sales are properly managed and recorded with data visualization to visualize the data. Apart from that, the performance evaluation can also be done by extracting details from the task completed by employees.

**Keywords:** performance; data visualization; evaluation system.



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## 1. INTRODUCTION

In today's business, employees are important to business. Without employees, business cannot run perfectly. Somehow, the business can be successful or failing as it depends on the performance of the employee (Waheed & Hameed, 2011). Performance management is defined as a process to improve organization performance with the performance of individuals or teams to gain better result to achieve planned goals (Armstrong, 2006). Performance Evaluation System is essential in the company to track the performance of the employee. Performance Evaluation System is defined as evaluate and document the performance of the employee based on job (Muchinsky & Marchese, 2004 as cited in Murali et al, 2017). It is essential to track the performance of the employees as employees are one of the important resources for the company to make the company successful. Hence, the employees need to be guided, motivated, evaluated, and rewarded. Purpose of Performance Evaluation System is to measure the performance of the employees. As if they perform better, they should get better earnings as they deserve it. According to Lestario & Sebayang (2021), human labour is the most significant resource of the company to make the company successful. Moreover, the purpose of performance evaluation system

is to track the employees based on the performance whether they have a high or poor performance. Thus, if employees have a poor performance, the company will suffer too and vice-versa. Therefore, it is important to have performance evaluation system as the way to appreciate and evaluate the employees.

Performance appraisal is a method where the process of evaluation that is associated with job performance on the employee's development throughout working with the company. Behaviorally anchored rating scale is a modern technique of performance appraisal that has received an increasing attention in recent years. It was first introduced by Smith and Kendall during 1963. It is a combination method from critical incident method and graphical rating scale which both are traditional technique of performance appraisal (Rajitha et. al., 2019). The five-point behaviourally anchored rating scale is chosen as the performance appraisal technique as it avoids biases, and the employee may understand the criteria better compared to other types of evaluation like

Performance review is an appraisal of employee's performance by their manager it is associated with job performance on the employee's development throughout working with the company (Rajitha et. al, 2019). We identify two types of employees: administrator employees and sales employees. According to Dwimaharani (2007), the common criteria of performance review for administrator consists of nine criteria which the criteria are the followings: quantity of work, dependability, quality of work, job knowledge, teamwork, initiative, attendance, health, judgement. It is important to have criteria to develop the performance appraisal. A sales employee is an employee who commercializes a certain company's products or services. According to Kesari (2014), salespersons are evaluated in quantitative and qualitative skills which consists of the number of sales that they have made. Thus, for the quantitative, the salespersons are evaluated with sales volume that related to the job. Moreover, the qualitative skills are evaluated with communication skills, selling skills, time management skills, planning ability, customer services, appearance, co-operation, enthusiasm, initiative, and punctuality (Nisafani et. al, 2017).

In this modern era, data visualization has become an important tool in the technology (Diamond & Mattia, 2015). According to Sinatra et al (2020), the definition of data visualization is the amount of data being displayed using pictorial or graphical format. This can help the people regardless of their field to have a better understanding about data and information. Data visualization has been used for many centuries to these days as it also helps in decision making process.

## **2. METHOD & MATERIAL**

This project used three phases in waterfall methodology to develop the system. Requirement gathering and analysis phase is done to identify suitable requirement. Interview and literature review was done in this phase. Once requirements have been analysed and identified, design phase was conducted. Storyboard, system architecture and database design were produced. Lastly, the design phase output was used to develop the system. The system was developed using Laravel which is a PHP web system framework as main implementation for server-side scripting alongside JavaScript language to develop data visualization technique as an additional feature in the system.

## **3. FINDINGS**

The findings of the project are presented in this section.

### 3.1 Requirement Gathering and Analysis

The very first phase of waterfall methodology is requirements gathering analysis, which the information are gathered from the stakeholder for the development of the system. Hence, the first step of this phase is to collect the information by conducting an interview with the stakeholder as a primary data collection for the system. In this phase, the information that was gathered will be analysed to identify the problems that the company face and the objective of the system.

For this system, it is important to have the evaluation of the employees using performance measurement. The rubric for that purpose were identified here and will be implemented in the system. The aim of performance measurement is to give feedback if needed and need to be regularly follow up and reporting by using the suitable metrics. Quality of work has been one of the significant measurements in business as it is a fixed criteria in business firm as it has been used to identify the poor or good performance of employee on basis of performance measurement. It is a criterion to measure the performance of employee (Mbore & Cheruiyot, 2017). Quality of work is the quality of work that is achieved based on the condition or terms on suitability and the readiness of employee (Yanti & Sintaasih, 2022). Quantity of work is also one of performance measurements in business or in education where it used to measure the performance of work. Quantity of work is the total number of works that had been completed or done by the employees within a given time. Hence, there are multiple ways to measure the quantity of work as it can be the number of sales, number of tasks that has been made and number of units produced from the employees.

Another way to evaluate the employees is through performance appraisal. Performance appraisal is a method where the process of evaluation that is associated with job performance on the employee’s development throughout working with the company (Rajitha et. al, 2019). According to Dwimaharani (2007), the common criteria of performance review for administrator consists of nine criteria which the criteria are the followings: quantity of work, dependability, quality of work, job knowledge, teamwork, initiative, attendance, health, judgement. Hence, with the BARS (Behaviourally Anchored Rating Scales), can be extracted into the rubrics which it can be referred in evaluating the administrators and employees (Kustiadi & Ikatrinasari, 2018). This project identifies the BARS rubric and customized it suitable with the stakeholder’s nature of business which is sales.

Indicator	Weight (%)	Rating	Description
Attendance	15	5	Be on time consistently with 0% tardiness
		4	Attendance rate ≥ 95%
		3	Attend but sometimes like to come late with the condition of getting permission
		2	Absenteeism rate > 10% and coming late
		1	Often comes late and the attendance record is not clear
Quality of work	15	5	Always carry out assigned tasks, and complete tasks on time and results in accordance with instructions leader
		4	Always doing the assigned task and completing the task on time sometimes makes mistakes
		3	Performs assigned tasks even if late and less accurate with what is instructed
		2	Work on tasks but are often late and many mistakes occur
		1	Often does not do assigned tasks
Teamwork	5	5	Able to communicate and coordinate with various parties, as well as appreciate the opinions and opinions of others consistently
		4	Knows the duties of others related to his duties as well as is willing to learn from others
		3	Knows the outline of the task of others in relation to his task and occasionally must be convinced first to adjust his income.
		2	Refuses to accept a joint decision if it is contrary to his opinion and does not know for sure the task others who are in touch with him
		1	Absolutely unable to coordinate and communicate with various parties and unable to

Indicator	Weight (%)	Rating	Description
Quantity of work	50	5	Total tasks are more than 100
		4	Total tasks are more than 85
		3	Total tasks are more than 50
		2	Total tasks are more than 30
		1	Total tasks are more than 10
Initiative	5	5	In urgent circumstances, without waiting for instructions or orders from superiors on decisions or take the necessary actions in the implementation duty, but not against public policy company.
		4	During a precarious situation, consider first the decision to be taken or action what will be done in carrying out the task.
		3	Waiting for instructions or orders from superiors in take a decision or action to be taken during urgency.
		2	Panic when the incident to make a decision or take the necessary actions in the implementation task during an urgent situation.
		1	Apathetic.
Dependability	10	5	Consistently exhibits drive and willingness to get the job done. Organizes work and sets priorities without direct supervision in the performance of established job duties.
		4	Requires minimal direct supervision in the performance and of job duties and exhibits self-direction.
		3	Understands and performs job duties with occasional need for minor corrective supervisory intervention.
		2	Frequently requires supervision and direction in the performance of job duties.
		1	Requires extensive supervision and direction in the performance of job duties.

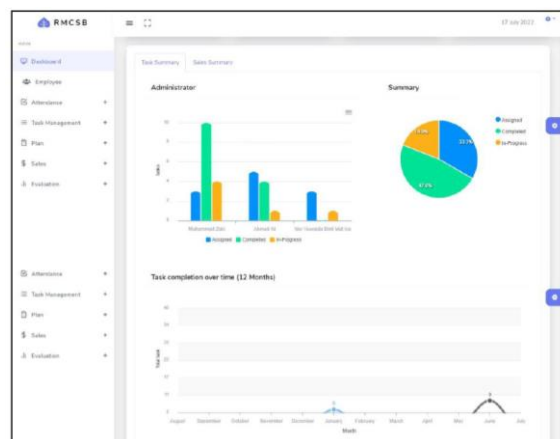
Figure 1: BARS rubric for Performance and Evaluation System

### 3.2 Design

The activity that had been done in the system design phase is design the user interface of the system by using the storyboard. The importance of using storyboard is to visualize on how the actual system may appear to the user with the front-end scripting.

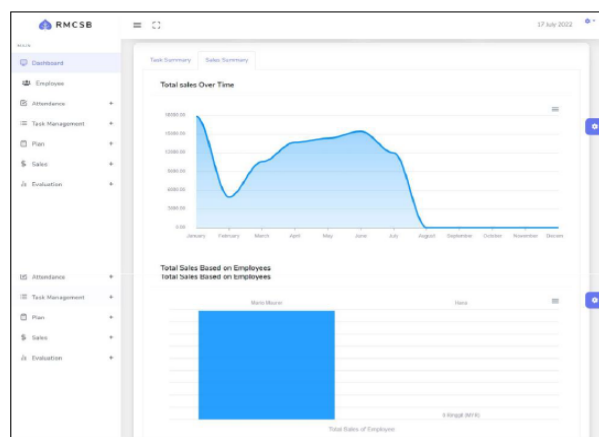
### 3.3 Implementation

The last phase of this project is implementation. In this phase, every requirement identified and designed were developed into a system. In order to show the progress of each employee, data visualization is applied. Figure 2 below shows the visualization of progress that can be tracked by the actors specifically director. The dashboard will display the visualization for administrator employees as it is easier to see the progress of each task assigned. In this figure, it shows the bar chart which is used to visualizes the total task that is divided into completed, assigned, and progress of the tasks from the first task that was assigned to each administrator. Pie chart shows the total task that has been assigned to all administration employees and it shows the total task. Meanwhile, the line chart visualizes the total completed and assigned task in each month.



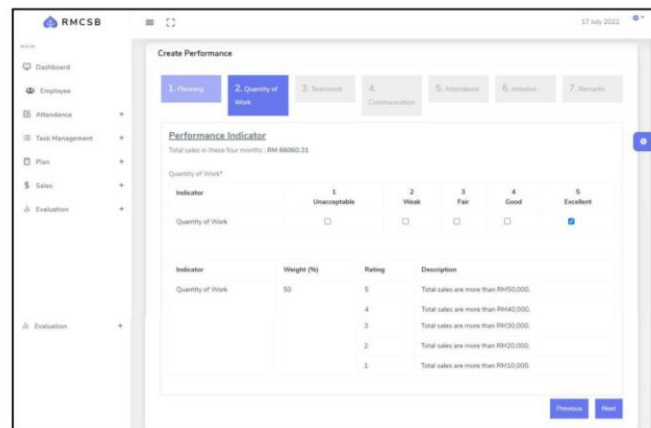
**Figure 2:** Dashboard for administrator progress.

Figure 3 below shows the dashboard page for director as this is for the sales summary which it visualizes the total sales completed by the sales employees in each month to be able to see the company’s commission. Meanwhile, bar chart shows the total sales made by each sales employee.



**Figure 3:** Dashboard for sales employees’ progress

For the purpose of evaluation, the system was developed such that all employees were able to create their evaluation and approved by the director. Employees also able to give rating towards each other for teamwork indicator. The BARS rubric was implemented for the evaluation purpose and employees can refer to the rubric which can also be found in the system. Figure 4 shows the evaluation page for employees.



**Figure 4:** Creating employee evaluation

#### 4. DISCUSSION

Performance and Evaluation System with Data Visualization was developed to help employees rate and evaluate themselves. By using the BARS rating, employees can identify indicators for their evaluation.

Other than that, data visualization was implemented into the system to help employees see their task and plan progress. The usage of bar chart, pie chart and line chart can simplify the current situation and helps the employees and director to summarize the current progress.

#### 5. CONCLUSION

A performance and evaluation system has few advantages that can be defined as strengths that have been identified throughout the implementation of the system. The system helps organization to ensure the tasks and sales are properly managed and recorded with data visualization to visualize the data. The system also provides an additional feature that could track the performance of the employees. The most important part of the system is that it offers the ability to evaluate the employees of the organization.

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#### References

- Armstrong M. (2000). *Performance management: key strategies and practical guidelines* (2nd ed.). Kogan Page.
- Diamond, M., & Mattia, A. (2015). *Data Visualization: An Exploratory Study into the Software Tools Used by Businesses*. *Journal of Instructional Pedagogies*, 17.
- Dwimaharani, A. (2007). *Perancangan Metode Penilaian Kinerja Sesuai Dengan Gaya Kepemimpinan di Pt. Kujang*. Fakultas Teknik Universitas Islam Bandung.
- Hameed, Abdul, A. W. (2011). *Employee Development and Its Affect on Employee Performance a Conceptual Framework*. *International Journal of Business and Social Sciences*, 2(13), 224–229.
- Kesari, B. (2014). *Salesperson Performance Evaluation: A Systematic Approach to Refining The Sales Force*.
- Kustiadi, O., & Ikatrinasari, Z. F. (2018). *Perancangan Penilaian Kinerja Dengan Metode Behaviorally Anchor Rating Scale Di Pt. Zeno Alumi Indonesia*. *Jurnal Inkofar*, 1(1).

- M.Rajitha, P. B. P. R. (2019). Issn No: 1301-2746 Performance Appraisal: Traditional and Modern Approach. 8(11), 71–81.
- Mbore, C., & Cheruiyot, T. (2017). Employee Performance Measurement and Management in the African Public Sector. *International Journal of Science: Basic and Applied Research (IJSBAR)*, 36(1), 187–201.
- Nisafani, A. S., Wibisono, A., Imandani, S. K., & Wibowo, R. P. (2017). Developing Salesperson Performance Indicators on Instant Messaging Platform. *Procedia Computer Science*, 124, 239–246. <https://doi.org/https://doi.org/10.1016/j.procs.2017.12.152>
- Muchinsky, P. M., & Marchese, M. C. (2004). *Psychology applied to work: An introduction to industrial and organizational psychology* (8th Ed.). Belmont, CA, United States: Wadsworth Publishing Co.
- Nisafani, Amna & Wibisono, Arif & Imandani, Safrina & Wibowo, Radityo. (2017). Developing Salesperson Performance Indicators on Instant Messaging Platform. *Procedia Computer Science*. 124. 239-246. [10.1016/j.procs.2017.12.152](https://doi.org/10.1016/j.procs.2017.12.152).
- Rajitha, M., Balachandar, P., & Ranjithkumar, P. (2017) Performance Appraisal: Traditional and Modern Approach.
- Sebayang, S., & Lestario, F. (2022). EPRA International Journal of Economics, Business and Management Studies (EBMS) An Investigation of Employee Performance in State-Owned Enterprises.
- Sinatra, A. M., Graesser, A. C., Hu, X., Goldberg, B., & Hampton, A. J. (2020). Introduction to data Visualization & Gift. *Design Recommendations for Intelligent Tutoring Systems*, 5.
- Yanti, N.W.S.H., & Sintaasih, DK. (2022). Moderate Effect of Motivation on The Effect of Servant Leadership on Performance Of Agricultural Services In Tabanan District. Faculty of Economics and Business, Udayana University, Bali, Indonesia