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Designing a Key Performance Indicator Application for Sales Performance Evaluation Using the Web-Based ROC Method (Case Study of PT. Valve Automation Indonesia)

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Abstract

Sales performance assessment is an important aspect in human resource management because it directly influences the achievement of company targets. At PT. Valve Automation Indonesia, KPI weighting is determined by managers based on personal assessments, this causes weight imbalances when adding or reducing assessment parameters. This study aims to design and implement a web-based Key Performance Indicator (KPI) application with the Rank Order Centroid (ROC) method to determine the weight of criteria based on the order of importance so as to produce a more objective and proportional weighting. The assessment criteria used include Absence, Sales Revenue, New Customers, Payment Collection, Visit Customers, and Follow Up Progress. This application was developed through the stages of needs analysis, design, implementation, and testing. This application shows that it is able to calculate KPI values automatically, generate sales performance rankings, and assist managers in making decisions more effectively and efficiently.

Keywords: *Key Performance Indicator, Rank Order Centroid (ROC), Sales Performance Evaluation, Web Application.*

1. Introduction

The rapid development of information technology has encouraged companies to adopt technology-based systems to support business processes, including human resource management and evaluation. The use of information technology has been proven to improve the quality of human resources and support the effectiveness and efficiency of company operations [1].
Human resources are a strategic asset because they play a direct role in achieving organizational goals and success [2]. Therefore, companies need to implement appropriate performance management strategies to produce a qualified and productive workforce [3].
In sales-oriented companies, the sales division plays a crucial role as the frontline, interacting directly with customers. Sales performance is crucial for achieving sales targets and ensuring the company's business continuity. Therefore, sales performance needs to be evaluated measurably and continuously using a clear and structured assessment system [4]. One instrument commonly used in performance measurement is the Key Performance Indicator (KPI), which serves as a tool to assess target achievement based on specific indicators [5]. The implementation of KPIs allows companies to obtain an objective picture of sales performance and serves as the basis for awarding incentives or bonuses based on predetermined performance achievements [6]. Furthermore, a good performance appraisal system is expected to increase sales motivation in optimally carrying out their duties and responsibilities [7]. However, in practice, the sales performance evaluation process is still often manual and subjective, particularly in determining the weighting of each assessment parameter. This situation occurs at PT. Valve Automation Indonesia, where sales performance evaluations are conducted by processing monthly reports using KPI calculation formulas in Microsoft Excel. Determining KPI weights relies entirely on managerial discretion, potentially leading to imbalanced weighting between criteria. Parameters that have a significant impact on sales performance success may receive lower weighting than other, less significant parameters. Furthermore, the assessment system used is unable to assess salespeople's consistency in following up with potential customers, potentially leading to lost business opportunities.
Based on these issues, this study aims to design a web-based Key Performance Indicator application for sales performance evaluation using the Rank Order Centroid (ROC) method. The developed system adds progress follow-up parameters and integrates photo- and location-based attendance features, as well as On Duty Request submission through the application, to improve the objectivity, efficiency, and accuracy of sales performance assessments.

2. Literature Review

This research is based on various references from previous studies related to the problem discussed. The review of these studies provides a theoretical foundation and important insights that support the process of writing this thesis. Therefore, several relevant literature studies served as the primary references in this research:

1. A study conducted by Rio Andika (2024) entitled "Combination of Grey Relational Analysis (GRA) and Rank Order Centroid (ROC) in Determining Supervisor Promotions" addresses the issue of determining supervisor promotions. The background of this research problem is the unclear criteria for job promotions, resulting in an inconsistent promotion determination process. In this research, the ROC method was applied with the aim of determining criteria weights based on their order of importance. The criteria used were cooperation, responsibility, attendance, length of service, and loyalty. The results of this study indicate that cooperation is the most important criterion, with a weight of 0.457. The successful implementation of ROC weighting provides a clear weighting structure, thus supporting more measurable and consistent promotion decision-making. [8]
2. Research conducted by Agung Triayudi, Jumpa Dorisman Rajagukguk, & Mesran (2022) entitled "Implementation of the MAUT Method in Determining Priority of Regional Superior Products Using ROC Weighting" highlights problems in the process of prioritizing superior products in the region. To date, determining criteria weights has relied on subjective assessments, potentially resulting in inconsistent decisions. This study applied the Rank Order Centroid (ROC) method to determine criteria weights based on their order of importance before the assessment process. The criteria used were turnover, workforce, target market, raw material origin, and raw material quantity. The results showed that turnover was the most important criterion, with a weighting value of 0.456. ROC weighting produces more objective and consistent criteria weights, thus supporting a more focused decision-making process. [9]
3. Research: Research conducted by Puspa Ayu Soleha, Rima Tamara Aldisa, and Mohammad Aldinugroho Abdullah (2023) entitled "Selection of the Best Waitress at Akul Restaurant Using the WASPAS Method with ROC Weighting" highlighted the challenges in selecting the best restaurant waitresses. Restaurant management has struggled to prioritize each criterion. In their research, they used ROC weighting to determine the criteria's weight based on predetermined criteria levels. The assessment criteria were appearance, responsibility, discipline, teamwork, initiative, and multitasking skills. The results showed that the highest weighting was 0.408 for appearance. ROC weighting allows for more structured restaurant waitress recommendations [10].
4. Research conducted by Dian Nur Sholihaningtias (2023) entitled "Credit Recipient Eligibility Recommendations Using the TOPSIS Method with ROC Weighting" highlighted decision-making issues in the customer eligibility assessment process for credit applications. The background of this research is that banks, particularly credit managers, have difficulty determining the requirements for prospective customers that are stipulated by bank regulations. This risks customer default. The process of determining creditworthiness considers several criteria with varying degrees of importance, such as price, down payment, income, customer character, and home ownership status. The results show that the most important criterion is price, with a weighting of 0.457. This achievement proves that the ROC method is given based on the priority order of each criterion [11].
5. Research conducted by Jhiro Faran and Rima Tamara Aldisa (2023) entitled "Decision Support System for Recommendations of Educational Quiz Maker Applications for Learning Using the OCRA Method and ROC Weighting" highlights the problem of selecting educational quiz applications that suit learning needs. The background of this research problem is the large number of educational quiz maker applications available, but users have difficulty determining the most appropriate application due to differences in learning criteria. The criteria used are interactivity, storage and download capabilities, automatic scoring, value customization, app ratings, paid apps, internet data usage, and app size, ranked from most important to least important. The ROC method then mathematically calculates a weighted value for each criterion based on its ranking position.

3. Reasearch Methods

This study uses a quantitative approach with a decision support system method to evaluate sales performance. The research object is the sales division at PT. Valve Automation Indonesia, with the data used being sales performance data obtained from the company.

3.1. Rank Order Centroid Methodology

The Rank Order Centroid (ROC) method is used to determine the weight of each criterion based on its order of importance. Criteria are arranged from most important to least important. The weight of each criterion is calculated using the ROC formula as follows:
The initial step in the ROC method is to determine the priority order of the criteria, which is then used in the following calculation equation:$C_1 \geq C_2 \geq C_3 \geq C_4 \ldots > Cn$

Meaning:
1. C_1 = most important criterion
2. C_2 = next most important criterion
3. C_n = lowest criterion'

Once the priority order of the criteria has been determined, the next step is to determine the priority level of each weight [13].

$$W_1 \geq W_2 \geq W_3 \geq W_4 \ldots > Wn \quad (1)$$

Meaning:
1. Weights follow the order of the criteria
2. W_1 = the order of weights for criterion C_1 or the most important
3. W_n = the order of weights for criterion C_n or the lowest

After that, calculate the weight value (W) for each of the criteria that have been determined, using the following formula:

$$W_i = \frac{1}{n}\sum_{j=i}^{n}\left(\frac{1}{j}\right) \quad (2)$$

Meaning:
1. W_i = weight of the i-th criterion, where i indicates the order of the criteria based on priority, starting from the first criterion to the n-th last criterion.

2. $\Sigma_{j=i}^{n}$ = is an addition operation indicating that the weight calculation is done by adding the priority values of the i-th criterion to the n-th last criterion.
3. n = total number of criteria used in decision-making.
4. $\frac{1}{j}$ = is the inverse of the priority order of the criteria used in the weight calculation process.

Calculate the sum of the values of the total weight (W).

$$W = \sum_{i=1}^{n} W_i = 1 \quad (3)$$

If the ROC method is applied correctly, the sum of all the criteria weights should have a value of 1. [14].

3.1. Key Performance Indicator (KPI)

KPIs are a crucial element in the performance management process implemented by an organization or company. Through a performance management system, an organization can direct company activities and development to align with its desired goals. Therefore, determining appropriate KPIs is essential so that work results in each department can be clearly measured [15]. Determining KPI indicator values is done using the following calculation formula:

$$KPI\ value\ percentage = \frac{Actual}{Target}\ x\ 100 \quad (4)$$

Then, calculate the KPI indicator weight, based on the assessment weight as follows:

$$Indicator\ Value\ =\ Indicator\ Value\ x\ Indicator\ Weight$$

The KPI value is then determined by adding the total KPI indicator values to obtain the final KPI value as follows [16]:

$$KPI\ Value\ =\ Total\ KPI\ Indicator\ Values$$

Below is the PT.VAI dataset; this data is the raw data before KPI calculations using the ROC method.

Activities Completed List

As of 2026-01-05 10:58:16 West Indonesia Time/WIB • Generated by Manager VAI

Filtered By
Show: All activities
Date Field: Start Date equals Last Month (01/12/2025 to 31/12/2025)
Status equals Completed
Assigned To: Full Name greater than 1

Start Date	Assigned To: Full Name	System Date	Indicator	Bobot	Realization	Target	Score KPI
01/12/2025	Aris Budi Kurniawan	31/12/2025	Sales Revenue	30%	Rp5.895.518.000,00	Rp25.000.000.000,00	7
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	25	25	20
		31/12/2025	Payment Collection	15%	10	10	15
		31/12/2025	Visit Customer	10%	20	20	10
	Overall KPI Score Count			100%			77
	Clara Brigitta	31/12/2025	Sales Revenue	30%	Rp19.851.282.023,00	Rp25.000.000.000,00	24
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	9	25	7
		31/12/2025	Payment Collection	15%	8	10	12
		31/12/2025	Visit Customer	10%	14	20	7
	Overall KPI Score Count			100%			75
	Desi Ramdhani	31/12/2025	Sales Revenue	30%	Rp25.913.928.000,00	Rp25.000.000.000,00	31
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	13	25	10
		31/12/2025	Payment Collection	15%	7	10	11
		31/12/2025	Visit Customer	10%	19	20	10
	Overall KPI Score Count			100%			87
	Eko Handoyo	31/12/2025	Sales Revenue	30%	Rp4.460.536.550,00	Rp25.000.000.000,00	5
		31/12/2025	Absence	25%	20	23	22
		31/12/2025	New Customer	20%	13	25	10
		31/12/2025	Payment Collection	15%	5	10	8
		31/12/2025	Visit Customer	10%	9	20	5
	Overall KPI Score Count			100%			50
	Femy Triastita Hutabarat	31/12/2025	Sales Revenue	30%	Rp4.904.123.000,00	Rp25.000.000.000,00	6
		31/12/2025	Absence	25%	22	23	24
		31/12/2025	New Customer	20%	10	25	8
		31/12/2025	Payment Collection	15%	5	10	8
		31/12/2025	Visit Customer	10%	6	20	3
	Overall KPI Score Count			100%			49
	Maulana Yusup	31/12/2025	Sales Revenue	30%	Rp8.943.273.591,00	Rp25.000.000.000,00	11
		31/12/2025	Absence	25%	22	23	24
		31/12/2025	New Customer	20%	15	25	12
		31/12/2025	Payment Collection	15%	3	10	5
		31/12/2025	Visit Customer	10%	12	20	6
	Overall KPI Score Count			100%			58
	M Dodi Andri	31/12/2025	Sales Revenue	30%	Rp2.762.644.000,00	Rp25.000.000.000,00	3
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	3	25	2
		31/12/2025	Payment Collection	15%	10	10	15
		31/12/2025	Visit Customer	10%	21	20	11
	Overall KPI Score Count			100%			56
	Novia Meliani	31/12/2025	Sales Revenue	30%	Rp13.702.125.980,00	Rp25.000.000.000,00	16
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	17	25	14
		31/12/2025	Payment Collection	15%	8	10	12
		31/12/2025	Visit Customer	10%	14	20	7
	Overall KPI Score Count			100%			
	Pranata Aulia Dharma	31/12/2025	Sales Revenue	30%	Rp30.793.424.557,00	Rp25.000.000.000,00	37
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	17	25	14
		31/12/2025	Payment Collection	15%	9	10	14
		31/12/2025	Visit Customer	10%	20	20	10
	Overall KPI Score Count			100%			100
	Rudi Ansyah Noor	31/12/2025	Sales Revenue	30%	Rp4.830.356.000,00	Rp25.000.000.000,00	6
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	12	25	10
		31/12/2025	Payment Collection	15%	9	10	14
		31/12/2025	Visit Customer	10%	7	20	4
	Overall KPI Score Count			100%			59
	Susanti Hoerunisa	31/12/2025	Sales Revenue	30%	Rp13.180.457.171,00	Rp25.000.000.000,00	16
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	21	25	17
		31/12/2025	Payment Collection	15%	5	10	8
		31/12/2025	Visit Customer	10%	16	20	8
	Overall KPI Score Count			100%			74
	Vicky Leo Pratama	31/12/2025	Sales Revenue	30%	Rp4.064.520.050,00	Rp25.000.000.000,00	5
		31/12/2025	Absence	25%	23	23	25
		31/12/2025	New Customer	20%	14	25	11
		31/12/2025	Payment Collection	15%	5	10	8
		31/12/2025	Visit Customer	10%	10	20	5
	Overall KPI Score Count			100%			54

Fig 1: PT. VAI Dataset

The indicators used in the KPI calculation consist of five main parameters sourced from PT. VAI data, namely sales revenue, absence, new customers, payment collection, and customer visits. In addition, this study adds the Follow Up Progress indicator as a supporting indicator that is not derived from the company's dataset, but is used to develop the performance assessment model in this study. The data used in this study is a combination of the company's dataset and simulation data used to test the ROC method calculation process in the sales performance evaluation system. For example, the researcher used two sales data sets to calculate KPIs using the ROC method.

Table 1: Desi Ramadhani Sales KPI Data

Name	Indicator	Realization	Target
Aris Budi Kurniawan	Sales Revenue	Rp25.913.928.000	Rp25.000.000.000
	Absence	23	23
	New Customer	13	25
	Payment Collection	7	10
	Visit Customer	19	20
	Follow Up Progress	13	25

After that, determine the weight of Criteria C1 Sales Revenue, Criteria C2 Absence, Criteria C3 New Customer, Criteria C4 Payment Collection, Criteria C5 Visit Customer and Criteria C6 Follow Up Progress.

$$W_1 = \frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0{,}408$$
$$W_2 = \frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0{,}241$$
$$W_3 = \frac{0+0+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0{,}158$$
$$W_4 = \frac{0+0+0+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0{,}103$$
$$W_5 = \frac{0+0+0+0+\frac{1}{5}+\frac{1}{6}}{6} = 0{,}060$$
$$W_6 = \frac{0+0+0+0+0+\frac{1}{6}}{6} = 0{,}027$$

Calculate the sum of the values of the total weights (W).
W = 0,408 + 0,241 + 0,158 + 0,103 + 0,060 + 0,027
= 1
So, the main priorities are Sales Revenue with a weight of 0.408, Absence with a weight of 0.241, New Customer with a weight of 0.158, Payment Collection with a weight of 0.103, Visit Customer with a weight of 0.060, and Follow Up Progress with a weight of 0.027.

Table 2: Calculation of Desi Ramadhani's Sales KPI Value

Indikator	Perhitungan	Nilai KPI
Sales Revenue	(25.913.928.000 / 25.000.000.000) x 100	100
Absence	(23 / 23) x 100	100
New Customer	(13 / 25) x 100	52
Payment Collection	(7 / 10) x 100	70
Visit Customer	(19 / 20) x 100	95
Follow Up Progress	(13 / 25) x 100	52

So, the total value of Desi Ramadhani's Sales KPI using the ROC method is: $(100\ x\ 0{,}408) + (100\ x\ 0{,}241) + (52\ x\ 0{,}158) + (70\ x\ 0{,}103) + (95\ x\ 0{,}060) + (52\ x\ 0{,}027) = 88$

Then below is the KPI calculation for Eko Handoyo's sales using the ROC method.

Table 3: Eko Handoyo's Sales KPI Data

Name	Indicator	Realization	Target
Clara Brigitta	Sales Revenue	Rp4.460.536.550	Rp25.000.000.000
	Absence	20	23
	New Customer	13	25
	Payment Collection	5	10
	Visit Customer	9	20
	Follow Up Progress	10	25

After that, determine the weight of Criteria C1 Sales Revenue, Criteria C2 Absence, Criteria C3 New Customer, Criteria C4 Payment Collection, Criteria C5 Visit Customer and Criteria C6 Follow Up Progress.

$$W_1 = \frac{1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0{,}408$$
$$W_2 = \frac{0+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}+\frac{1}{6}}{6} = 0{,}241$$

$$W_3 = \frac{0 + 0 + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}}{6} = 0{,}158$$

$$W_4 = \frac{0 + 0 + 0 + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}}{6} = 0{,}103$$

$$W_5 = \frac{0 + 0 + 0 + 0 + \frac{1}{5} + \frac{1}{6}}{6} = 0{,}060$$

$$W_6 = \frac{0 + 0 + 0 + 0 + 0 + \frac{1}{6}}{6} = 0{,}027$$

Calculate the sum of the values of the total weights (W).
W = 0,408 + 0,241 + 0,158 + 0,103 + 0,060 + 0,027
= 1

So, the main priorities are Sales Revenue with a weight of 0.408, Absence with a weight of 0.241, New Customer with a weight of 0.158, Payment Collection with a weight of 0.103, Visit Customer with a weight of 0.060, and Follow Up Progress with a weight of 0.027.

Table 4: Calculation of Eko Handoyo's Sales KPI Value

Indicator	Calculation	KPI Value
Sales Revenue	(4.460.536.550 / 25.000.000.000) x 100	18
Absence	(20 / 23) x 100	87
New Customer	(13 / 25) x 100	52
Payment Collection	(5 / 10) x 100	50
Visit Customer	(9 / 20) x 100	45
Follow Up Progress	(10 / 25) x 100	40

So, the total value of Eko Handoyo's Sales KPI using the ROC method is: $(18\ x\ 0{,}408) + (87\ x\ 0{,}241) + (52\ x\ 0{,}158) + (50\ x\ 0{,}103) + (45\ x\ 0{,}060) + (40\ x\ 0{,}027) = 46$

4. Result and Discussion

This sales performance evaluation system was successfully implemented as a web-based application using the PHP programming language and a MySQL database. The system interface is designed to make it easier for managers and salespeople to calculate their individual KPIs using the ROC method.

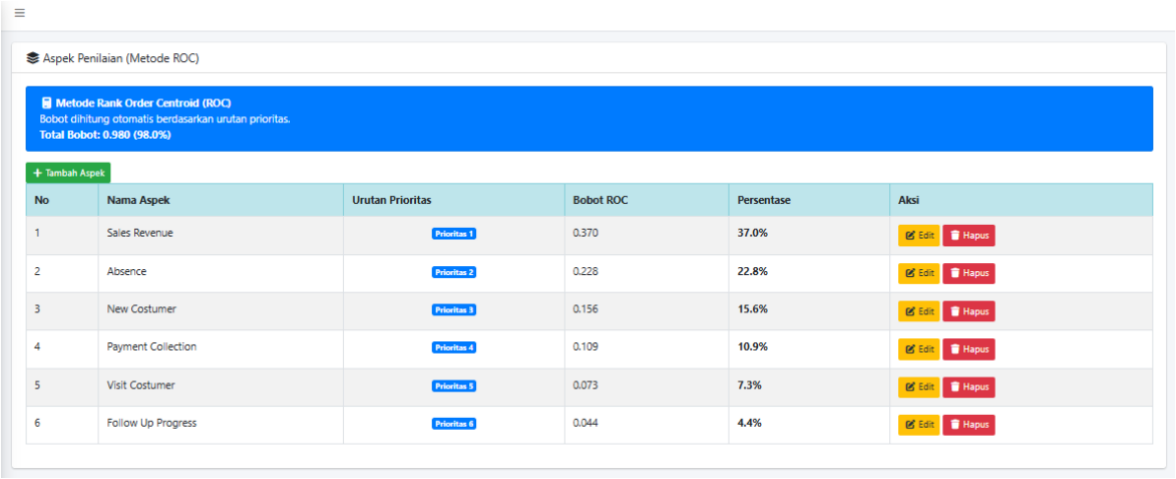

Fig 2: Change Assessment Aspects

Figure 2 shows the Change Assessment Aspects menu. This menu is used by managers to automatically assign weights to each assessment parameter using the ROC method.

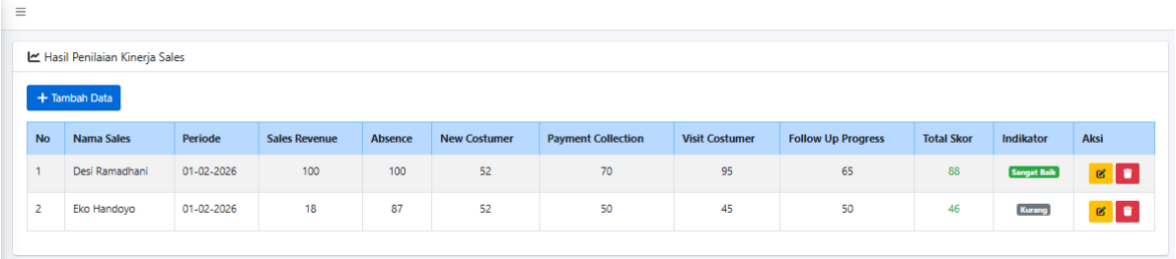

Fig 3: Sales Realization and Target

Figure 3 shows the actual sales and targets. This sales revenue report is a real-time report of sales revenue per monthly period.

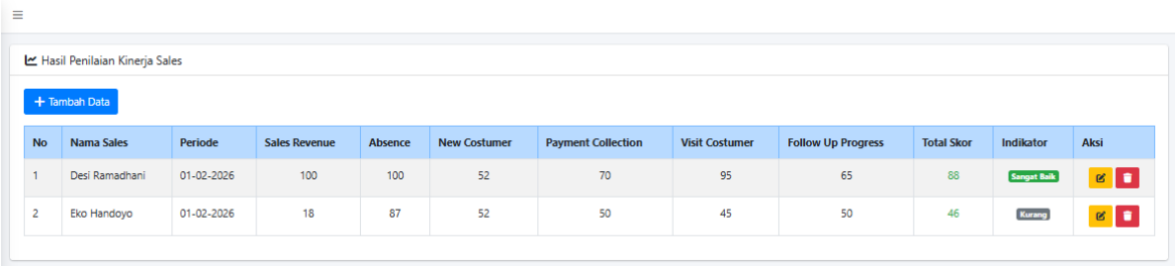

Fig 4: Assessment Results

Figure 4 shows the assessment results. These assessment results are the KPI calculations for each salesperson, calculated by the manager. The results will then be displayed for each salesperson.

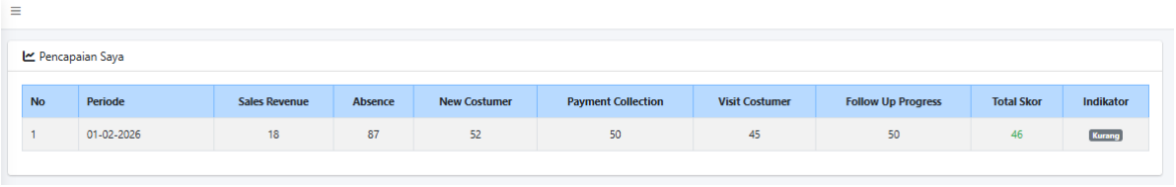

Fig 5: Eko Handoyo's Sales Achievements

Figure 5 shows the achievements of each salesperson. This is an example of Eko Handoyo's sales achievements..

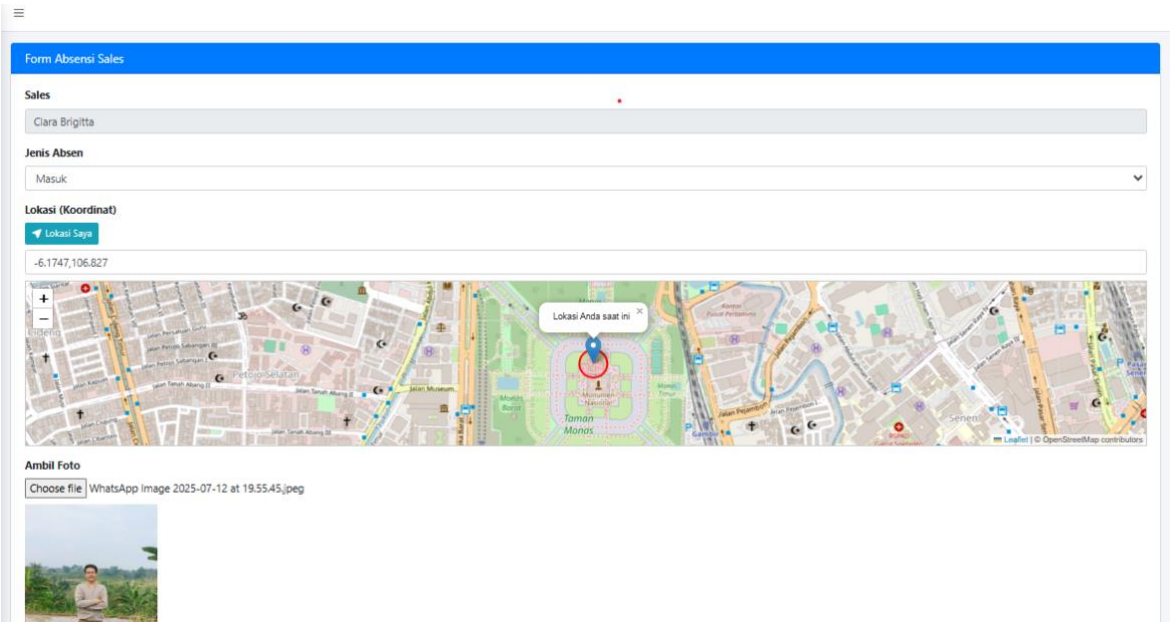

Fig 6: Sales Attendance

Figure 6 shows the sales attendance display. Salespeople can check in and out. Location access is also available to track salespeople's whereabouts.

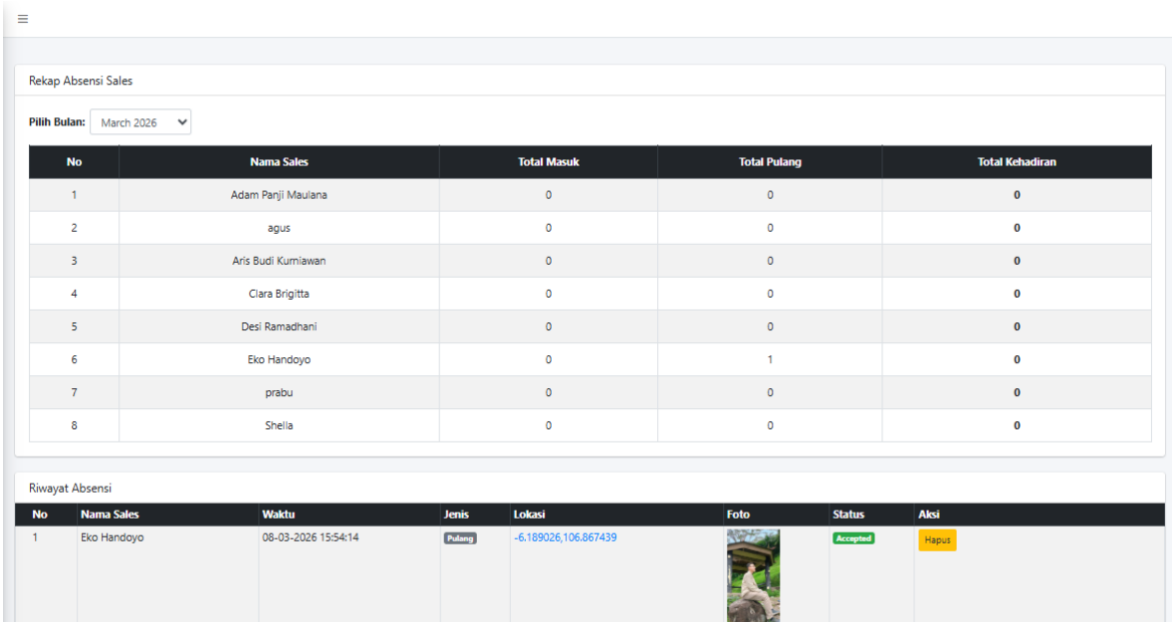

Fig 7: Sales Attendance History

Figure 7 shows the sales attendance history. This menu is available under the manager, where managers can approve, reject, and delete sales. Salespeople must clock in and out to achieve an attendance score of 1.

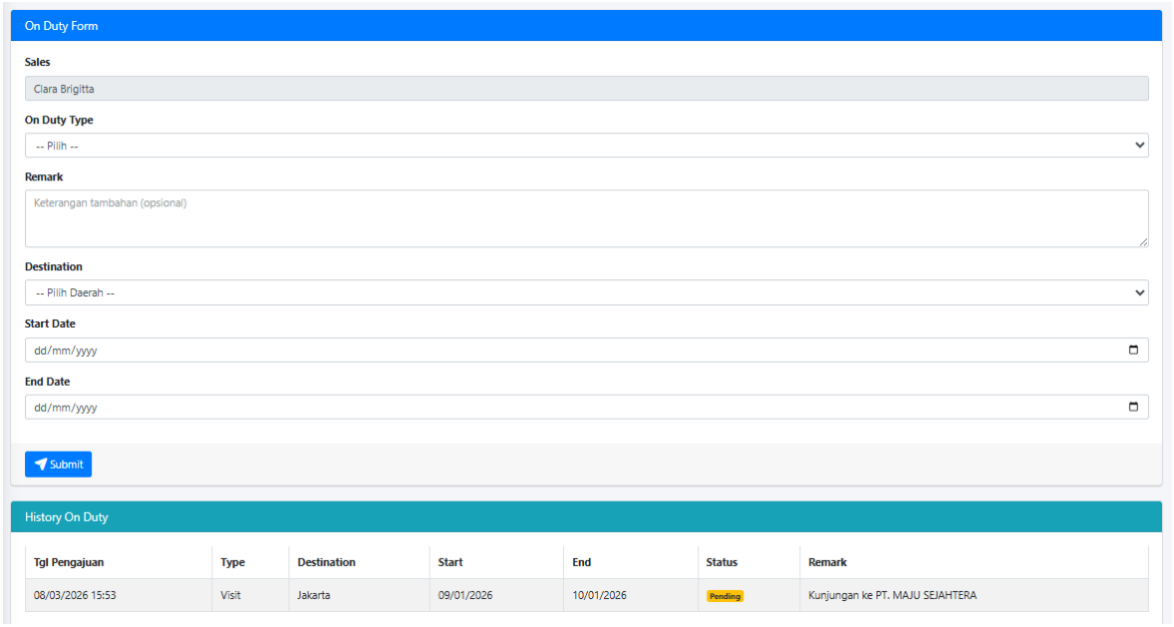

Fig 8: On Duty

Figure 8 shows on-duty, where salespeople must make an on-duty request before making a visit.

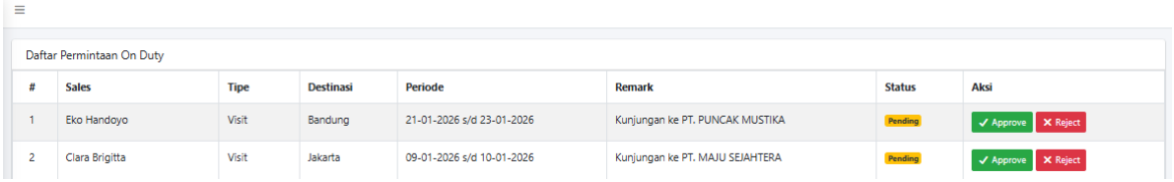

Fig 9: Approval On Duty

Figure 9 shows the approval on duty menu available to managers. Managers can approve or reject tasks, and pending tasks if no action has been taken.

5. Conclusion

Based on the research results and discussion regarding the application of key performance indicators for sales performance evaluation at PT. Valve Automation Indonesia, the following conclusions can be drawn:

1. This research has successfully produced a Key Performance Indicator (KPI) weighting system based on the Rank Order Centroid (ROC) method. This system has proven capable of calculating the weight of each criterion objectively and consistently based on a predetermined priority order. Through a structured and systematic weighting process, the ROC method transforms the weighting mechanism that previously relied on the manager's personal judgment into an automatic calculation that is fair, measurable, and unaffected by subjectivity, thus maintaining consistent weighting even when the number and composition of assessment parameters change.
2. This research has successfully produced a web-based attendance system designed to support sales work mobility across multiple locations. This system has proven capable of facilitating online attendance recording, allowing it to be accessed anytime and anywhere without having to return to the office. Through a digitally integrated attendance mechanism, this system transforms the attendance process, which previously required physical presence in the office, into a more practical, flexible, and efficient process, thereby overcoming the challenges of changing sales work locations and increasing the effectiveness of attendance recording.
3. This research has successfully produced a web-based On Duty Request submission feature designed to simplify the process of submitting official duties for sales. This feature has proven to be able to support fast and easy submissions and provide real-time monitoring of approval status. Through a digitally integrated submission and validation mechanism, this system transforms the previously manual and time-consuming submission process into a more practical, responsive, and monitored process, thereby accelerating approvals and assisting sales in handling sudden customer visit requests on the same day.

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