



## **Wina Sentosa Bottled Water Distribution System Using Web-Based Distribution Requirement Planning and Trend Moment Algorithms**

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**Abstract.** This research focuses on the problem of PT Anugrah Wina Sentosa, which is a producer of bottled drinking water in Central Sulawesi. The company faces challenges in organizing and improving the efficiency of the distribution of bottled drinking water products. Problems include distribution management that has not been optimized and distribution arrangements at various outlets that have not been mapped. Based on this problem, researcher develop a web-based distribution system with the Distribution Requirement Planning (DRP) algorithm and Trend Moment Algorithm to see the results of sales and distribution predictions. The designed application can carry out data processing, Distribution Requirement Planning processes, Trend moment processes, MAPE calculations, and sales predictions. The application development method uses the Waterfall method. The test results show that the system can manage input, edit, and delete data and run DRP calculations as a whole or per outlet. With an error value of 1.71%, the trend moment forecasting system proved to be very accurate in forecasting sales of drinking water products. Thus, the implementation of a web-based distribution system can improve production efficiency and facilitate stock management and distribution management at PT Anugrah Wina Sentosa. This research has several limitations that need to be considered, namely limited scope, limited data, limited generalization, limited affordability, and limited time.

**Keywords:** Distribution System, Website, Distribution Requirement Planning (DRP), Trend Moment, Mean Absolute Percentage Error (MAPE)

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### **1. Introduction**

Indonesia is the fifth largest bottled water market in the world. Many bottled drinking water companies have spread in every region in Indonesia [1]. The growth of the food and beverage industry in Indonesia contributed greatly to national investment by contributing up to IDR 56.60 trillion in 2018, and the food and beverage industry grew by 7.91%, exceeding national economic growth by 5.17% [2]. People in Indonesia make bottled drinking water a daily product; the National Socio-economic Survey (SUSENAS) conducted by the Central Statistics Agency (BPS) in March 2023 showed that 40.64% of households in Indonesia chose to use bottled drinking water / refilled water daily drinking water. Along

with the increasing population in Indonesia, the need for bottled drinking water will also increase [3]. Efforts to increase product demand and a reliable distribution system are needed to meet product demand. Distribution is the process of distributing goods or services from producers to consumers [4],[5]. The distribution system is one of the important factors for companies to deliver products appropriately to customers [6]. This is what was done by PT Anugrah Wina Sentosa.

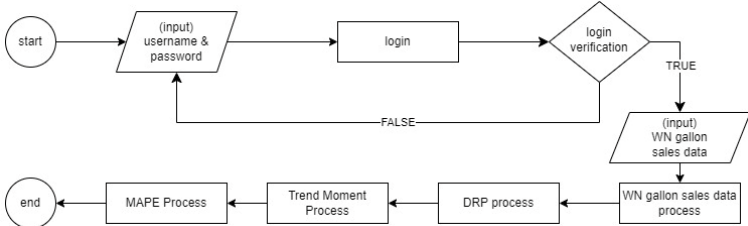
PT Anugrah Wina Sentosa is one of the bottled drinking water producers in Central Sulawesi with a product called WN. WN is a local brand of bottled drinking water with international standards. WN has several size variants, namely, 19L gallons, 330ml and 600ml bottles, and 220ml and 250ml cups. The 19L gallon WN has two product variations, namely, original WN gallons and WN gold gallons. Distribution areas include West Palu, East Palu, North Palu, South Palu, and Tatanga, with a total of more than 1,000 outlets. In the West Palu area, WN gallons are distributed to 179 different outlets. The large demand for products caused PT Anugrah Wina Sentosa to experience several obstacles in organizing and increasing the efficiency of the distribution of drinking water products in WN packaging. These problems include aspects such as distribution management that is not yet optimal, increasing the number of outlets that can be reached, and distribution arrangements in various areas of Palu City that have not yet been mapped. If this problem continues it can cause inventory shortages, increased distribution costs, and an inability to meet consumer demand.

The implementation of a web-based distribution system can provide several benefits for PT Anugrah Wina Sentosa, especially in terms of operational efficiency and responsiveness to market changes. The application design will use the Distribution Requirement Planning algorithm and the Trend Moment Algorithm. Distribution Requirement Planning (DRP) is an algorithm for managing product inventory and distribution so that it can carry out distribution design to meet consumer demand at the right time and amount [7]. The author chose the DRP algorithm because the problems faced by PT Anugrah Wina Sentosa were by the objectives of this algorithm, namely inventory management and product distribution planning to meet customer demand. Trend moment is a method for forecasting using visualization of trend lines in sales [8]. The trend moment method in forecasting has several advantages compared to other methods, especially for forecasting data that shows a significant trend or pattern of increase or decrease. This research seeks to explore the potential benefits of a web-based distribution system in increasing product production efficiency. The main objective is to assist the stock management process and optimize product distribution strategies, to meet customer demand, thereby contributing to overall system operational improvements.

**2. Methods**

*2.1. System Flowchart*

A system flowchart is a flowchart that shows the sequence chart of a system's operating process [9]. The system to be created is a WN gallon water distribution system using the Distribution Requirement Planning algorithm and the web-based Trend Moment Algorithm. The system starts from logging in as an admin on the website page. When the login is successful, the admin can input sales data. After inputting the data, several data processing processes will be carried out. Namely, the DRP process, the Trend Moment process, and finally, the MAPE test from the Trend Moment process results so that it can produce forecasting for the next month's sales and see the error accuracy level of MAPE testing. The system flow can be seen in Figure 1.



**Figure 1.** System flowchart

## 2.2. Dataset

Datasets are collections of objects and properties or characteristics of an object itself [10]. The dataset used in this study is WN gallon water sales data from April 2023 to October 16, 2023, in the West Palu region, Central Sulawesi, with a total of 179 outlets and total sales of 4267. The dataset used can be added or changed to adjust to the latest sales situation of PT Anugrah Wina Sentosa so that the application can be used continuously. The author has been permitted to use the sales data in this research.

1	TANGGAL TRAK	NO. NOTA	TOP	NAMA CUSTOMER	ALAMAT	REA	BARANG YANG DIPELAN	QTY	HARGA SATUAN	TOTAL
2	01 April 2023	CASH	0	AARSAR/		BARAT	WN Galon Gold	3	Rp. 14.000	Rp. 42.000
3	01 April 2023	CASH	0	ALFI		BARAT	WN Galon Gold	3	Rp. 14.000	Rp. 42.000
4	01 April 2023	CASH	0	ALFI		BARAT	WN Galon Original	8	Rp. 11.000	Rp. 88.000
5	01 April 2023	CASH	0	ANCHKA/		BARAT	WN Galon Gold	11	Rp. 14.000	Rp. 154.000
6	01 April 2023	CASH	0	ANDHAKA/		BARAT	WN Galon Original	7	Rp. 11.000	Rp. 77.000
7	01 April 2023	CASH	0	DEPOT ANISA		BARAT	WN Galon Gold	8	Rp. 14.000	Rp. 112.000
8	01 April 2023	CASH	0	DELTA		BARAT	WN Galon Gold	12	Rp. 14.000	Rp. 168.000
9	01 April 2023	CASH	0	FAMILY 2		BARAT	WN Galon Gold	25	Rp. 14.000	Rp. 350.000
10	01 April 2023	CASH	0	HASNA/		BARAT	WN Galon Gold	9	Rp. 14.000	Rp. 126.000
11	01 April 2023	CASH	0	IDA		BARAT	WN Galon Gold	7	Rp. 14.000	Rp. 98.000
12	01 April 2023	CASH	0	INDRI KIOS		BARAT	WN Galon Gold	14	Rp. 14.000	Rp. 196.000
13	01 April 2023	CASH	0	INDRI KIOS		BARAT	WN Galon Original	5	Rp. 11.000	Rp. 55.000
14	01 April 2023	CASH	0	KIKI II		BARAT	WN Galon Gold	11	Rp. 14.000	Rp. 154.000
15	01 April 2023	CASH	0	MARHAM		BARAT	WN Galon Gold	20	Rp. 14.000	Rp. 280.000
16	01 April 2023	CASH	0	NIA		BARAT	WN Galon Gold	7	Rp. 14.000	Rp. 98.000
17	01 April 2023	CASH	0	PRIMA		BARAT	WN Galon Gold	4	Rp. 14.000	Rp. 56.000
18	01 April 2023	CASH	0	PRIMA PEMBAHASAN		BARAT	WN Galon Gold	11	Rp. 14.000	Rp. 154.000
19	01 April 2023	CASH	0	RAHMAT		BARAT	WN Galon Gold	7	Rp. 14.000	Rp. 98.000
20	01 April 2023	CASH	0	REZA		BARAT	WN Galon Gold	4	Rp. 14.000	Rp. 56.000
4262	16 October 2023	CASH	0	SAL TOKO		BARAT	WN Galon Gold	24	Rp. 14.000	Rp. 336.000
4264	16 October 2023	CASH	0	SAL TOKO		BARAT	WN Galon Original	9	Rp. 11.000	Rp. 99.000
4265	16 October 2023	CASH	0	SAMIRAW		BARAT	WN Galon Gold	13	Rp. 14.000	Rp. 182.000
4266	16 October 2023	CASH	0	SAMIRAW KIOS		BARAT	WN Galon Gold	19	Rp. 14.000	Rp. 266.000
4267	16 October 2023	CASH	0	UDIN/		BARAT	WN Galon Gold	9	Rp. 14.000	Rp. 126.000
4268	16 October 2023	CASH	0	UMRUD /		BARAT	WN Galon Gold	4	Rp. 14.000	Rp. 56.000

Figure 2. Sales dataset from April 01, 2023-October 16, 2023

## 2.3. Distribution Requirement Planning

The Distribution Requirement Planning (DRP) algorithm is an algorithm for handling product inventory stocks in a company to carry out the distribution [7]. The DRP algorithm can manage product availability and determine distribution planning so as to improve the company's sales performance in meeting consumer demand at the right time with the right amount [5]. The terms used in this algorithm are Safety Stock (SS), Period, Lot Size (LS), Lead Time (LT), Past Due (PD), Gross Requirement (GR), Projected on Hand (POH), Net Requirement (NR), Planned Order Receipts and Planned Order Release. The following equation calculates the value of Projected on Hand:

$$POH = POH_{(t-1)} - GR + POR \quad (1)$$

Description:

POH = projected on hand

$POH_{(t-1)}$  = previous period's projected on hand

GR = gross requirement

The following equation calculates the net requirement value.

$$NR = GR + SS - POH_{(t-1)} \quad (2)$$

Description:

NR = net requirement

GR = gross requirement

SS = safety stock

$POH_{(t-1)}$  = previous period's projected on hand

## 2.4. Trend Moment

The Trend Moment method is used to find the trend line using statistical and mathematical calculations to see the intersection between the company's historical data [11]-[13]. The trend moment algorithm is chosen due to its excellence in capturing trends and fluctuations in data, which are essential characteristics in forecasting within distribution systems. Within distribution systems, the trend moment algorithm contributes to improvement by providing more accurate forecasts of future demand. To do forecasting, this method uses the equation:

$$Y = a + bX$$

Description:

Y = trend value

a = constant number

b = slope or trend line coefficient

X = time index (0,1,2,...,n)

To find the values of a and b, the following elimination function is used:

$$\sum y = (n \times a) + (b \times \sum x) \quad (3)$$

$$\sum xy = (a \times \sum x) + (b \times \sum x^2) \quad (4)$$

Description:

$\sum y$  = number of sales data

$\sum x$  = number of time periods

$\sum xy$  = number of sales data times the time period

$n$  = amount of data

### 2.5. Mean Absolute Percentage Error

Mean Absolute Percentage Error (MAPE) is a matrix that aims to calculate the error value or accuracy of forecasting performed by the Trend Moment method by comparing the specified test data and training data. The results of these calculations can illustrate the accuracy of the prediction results of the trend moment method using training data. [14]. The MAPE calculation formula is:

$$\text{MAPE} = \frac{1}{n} \sum \left| \frac{y_t - y'_t}{y_t} \right| \times 100 \quad (5)$$

Description:

$n$  = sample size

$y_t$  = actual value at time t

$y'_t$  = predicted or forecasting value at time t

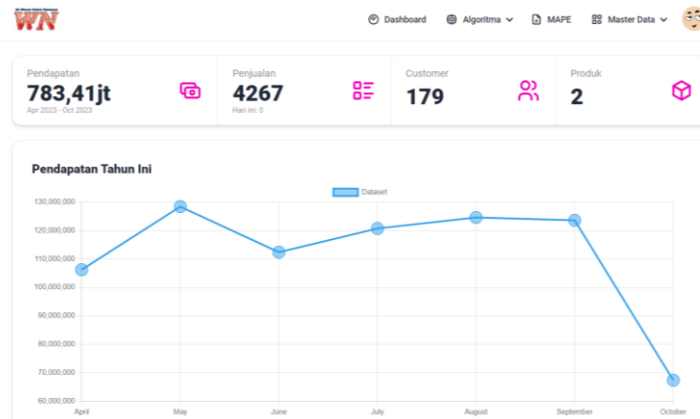
From the MAPE calculation formula, the actual value is reduced by the predicted value and then divided by the actual value, which is made into an absolute value and multiplied by 100. The grouping of MAPE value categories can be seen in Table 1.

<b>MAPE Value</b>	<b>Category</b>
<10%	Very accurate
10-20%	Good
20-50%	Reasonable
>50%	Inaccurate

## 3. Results and Discussion

### 3.1. System Testing Result

After testing, the following are the results of processing WN gallon water sales data from April 01 to October 16, 2023. The designed system provides good results; the existing features can function properly. On the dashboard page, it can be seen that there is total revenue, total sales of 4267, 179 outlets, two types of products, namely WN gold and original gallons, and a graph of revenue every month for a period of 1 year. The revenue graph in October looks very low because the dataset used is only until October 16. The dashboard display can be seen in Figure 3.



**Figure 3.** Dashboard

On the DRP algorithm page, the system automatically calculates the DRP of each outlet in the dataset. The example used is the Ahsan outlet. The DRP calculation of Ahsan outlet can be seen in Figure 4. DRP calculation starts with determining safety stock. Because the product is ordered by the customer, the safety stock is automatically not used, so the safety stock is equal to 0. The period in this calculation is based on sales per month. Then, calculate the past due period. Past due is the initial stage of the calculation. In the past due period, the number of products in the Ahsan outlet is unknown, so the projected number on hand is 0. In the April period, the customer gross requirement was 234, so the initial release order plan needed 234. When PD, the value of plan order release is 234, but in April, the value of plan order receipts is 234. Next, the net requirement calculation is carried out in the April period.

$$NR = GR + SS - POH_{(t-1)} \qquad NR = 234 + 0 - 0 \qquad NR = 234$$

Then, the NR value in April is 234. After completing the calculation in the April period, do the calculation again in the next period. Then the calculation results are shown in Figure 4.

	Priode						
	PD	Apr - 23	May - 23	Jun - 23	Jul - 23	Aug - 23	Sep - 23
Gross Requirement		234	183	190	239	203	233
Projected On Hand	0	0	0	0	0	0	0
Net Requirement		234	183	190	239	203	233
Plan Order Receipt		234	183	190	239	203	233
Plan Order Release	234	183	190	239	203	233	

**Figure 4.** DRP Algorithm Process at Ahsan Outlet

On the trend moment algorithm page, the system automatically calculates the total sales for sales prediction in the next period based on the dataset used, can be seen in figure 5. The first three months are used, namely April, May, and June. The y value is the sales value. The y value is obtained based on the sales dataset used. The x value is the time in the sales period starting from 0. Furthermore, the calculation starts from the first period, namely April. The x value<sup>2</sup> is 0 because in the first period the x value is equal to 0. Then, the x\*y value is 0 because, in the first period, the x value is equal to 0. Continue the calculation until the third period. After getting the value of each period, the next step is to create an equation using the formula  $\sum y = (n \times a) + (b \times \sum x)$  and  $\sum xy = (a \times \sum x) + (b \times \sum x^2)$ .

$$\sum y = (n \times a) + (b \times \sum x) \qquad 22270 = (3 \times a) + (b \times 3) \qquad 22270 = 3a + 3b \qquad (1)$$

$$\sum xy = (a \times \sum x) + (b \times \sum x^2) \quad 22526 = (a \times 3) + (b \times 5) \quad 22526 = 3a + 5b \quad (2)$$

After getting the two equations above, elimination is done to find the value of b, and substitution is done to find the value of a.

$$\begin{aligned} 22270 &= 3a + 3b \\ \underline{22526} &= \underline{3a + 5b} \\ -256 &= -2b \\ b &= -\frac{256}{-2} \\ b &= 128 \end{aligned} \qquad \begin{aligned} 22270 &= 3a + 3b \\ &= 3a + 3 \times 128 \\ &= 3a + 384 \\ &= 22270 - 384 \\ &= 21886 \\ &= \frac{21886}{3} a = 7.295,333 \end{aligned}$$

After getting the values of a and b, substitute the values of a and b obtained into the trend moment equation, namely,  $Y = a + bX$ . Then, the trend moment formula is obtained, namely  $Y = 7,295.33 + 128x$ . To calculate sales predictions in July, enter an x value of 3 into the equation. Then we get a sales prediction in July of 7679, likewise for the next period.

No.	Nama Barang	Priode	Penjualan (y)	Waktu (x)	x <sup>2</sup>	x * y
1	WN GALON GOLD	Apr - 23	6862	0	0	0
2	WN GALON GOLD	May - 23	8290	1	1	8290
3	WN GALON GOLD	Jun - 23	7118	2	4	14236
Total			22270	3	5	22526
Proyeksi 3 Priode Kedepan						
4	WN GALON GOLD	Jul - 23	7679	3	-	-
5	WN GALON GOLD	Aug - 23	7807	4	-	-
6	WN GALON GOLD	Sep - 23	7935	5	-	-

Rumus  $y = 7,295.33 + 128.00x$

**Figure 5.** Trend Moment Algorithm Process

### 3.2. Mean Absolute Percentage Error Result

Mean absolute percentage error is used to test the error rate of forecasting done by the trend moment algorithm. The first step taken is to reduce the actual data value with the forecast value, as in Figure 6.

Next, calculate the MAPE value for each period using the formula  $MAPE = \frac{1}{n} \sum \left| \frac{y_t - y'_t}{y_t} \right| \times 100$ . The following is the calculation of the error value in July.

$$MAPE = \frac{1}{n} \sum \left| \frac{y_t - y'_t}{y_t} \right| \times 100 \quad MAPE = \frac{1}{1} \sum \left| \frac{117}{7796} \right| \times 100 \quad MAPE = 0,015007 \times 100 \quad MAPE = 1,5007$$

I obtained an error value of 1.50% in July. Do the same calculation for the next period. After the error value for each period is obtained. Next, calculate the average error value with the formula  $\bar{X} = \frac{\sum MAPE}{n}$ .

$$\bar{X} = \frac{\sum MAPE}{n} \quad \bar{X} = \frac{1,50 + 3,21 + 0,43}{3} \quad \bar{X} = \frac{5,14}{3} \quad \bar{X} = 1,71$$

The MAPE testing results obtained an average error value of 1.71%, so it can be said to be very accurate based on Table 1.

No.	Nama Barang	Periode	Aktual (y)	Forecast (y)	y - y'	MAPE
1	WN GALON GOLD	Jul - 23	7796	7679	117.00	1.50
2	WN GALON GOLD	Aug - 23	8066	7807	259.00	3.21
3	WN GALON GOLD	Sep - 23	7969	7935	34.00	0.43
Presentase MAPE						1.71%

**Figure 6.** MAPE process

### 3.3. Black Box Testing Result

Blackbox testing is needed to find out if every function in the system can run properly and reduce errors when the system is running. [15]. The dataset used is in Figure 2. The dataset is entered into a web-based distribution system. The following are the results of system testing using black box testing.

**Table 2.** Black Box Testing

Feature	Feature Function	Result
Login	Login as admin to access the website	Success
Input, edit, and delete customer or outlet data	Can input, edit, and delete data in the customer or outlet data section	Success
Input, edit, and delete product data	Can input, edit, and delete data in the product data section	Success
Input, edit, and delete sales data	Can input, edit, and delete data in the sales data section	Success
Import xls files in the sales data section	Can import xls files in the sales data section	Success
DRP Process	The system will calculate DRP to customers or outlets based on the inputted data.	Success
Trend moment process	The system will predict the total product sales in the following months.	Success
MAPE Process	The system will calculate the error rate of actual sales data and forecasting results data.	Success

### 3.4. Discussion

The results of this research indicate that the distribution system website created can run well. The system creation process begins with creating a flowchart, collecting sales data, determining an algorithm that can manage the supply chain, and determining an algorithm that can predict data that shows trends. The algorithms chosen are the distribution requirements planning algorithm and the trend moment algorithm which are applied to a web-based system. Implementation of a web-based distribution system using the DRP algorithm and Trend Moment method brings several benefits, including increased operational efficiency, reduced costs, and improved customer service. However, challenges such as data security, system integration, and telecommunications infrastructure availability still need to be considered. By paying attention to these challenges and taking appropriate steps, companies can optimize their distribution systems to achieve competitive advantage in an increasingly competitive business environment. This research has several limitations that need to be considered so that they can

be improved in further research, namely limited scope, limited data, limited generalization, limited affordability, and limited time. By considering these limitations, it is hoped that future research can evaluate additional factors that may influence the implementation of distribution systems in the future.

#### **4. Conclusion**

Based on the results of the distribution system testing using distribution requirement planning algorithms and trend moment algorithms, it can be concluded that the system is functioning well. The system can input, edit, and delete data in customer or outlet data, product data, and sales data. Additionally, the system can carry out DRP calculations as a whole or per customer or outlet. Moreover, the system is capable of forecasting using a trend moment algorithm, which produces an error value of 1.71%, indicating high accuracy. Implementing a web-based distribution system can provide various benefits for companies like PT Anugrah Wina Sentosa. By utilizing the DRP algorithm and the Trend Moment method, companies can improve operational efficiency and respond to market changes. Through this system, companies can manage stock more efficiently, optimize product distribution strategies, and enhance customer service, as evidenced by the results observed in MAPE and black box testing. However, it is essential to address challenges such as data security and system integration to ensure the smooth operation of the distribution system. By addressing these challenges and taking appropriate steps, companies can optimize their distribution systems to achieve a competitive advantage in an increasingly competitive business environment. Nevertheless, several limitations of the study need to be noted. Firstly, there is a limited scope, as this research may not cover all relevant aspects of implementing a web-based distribution system, such as organizational, financial, or operational factors. Secondly, there are data limitations, as this research is based on limited data, thereby limiting the depth of analysis or conclusions that can be drawn. Furthermore, limited generalizability implies that the findings from this study may not be directly applicable to all business or industrial contexts. Additionally, there are limitations in affordability, making it challenging for small or medium-sized companies with limited resources to implement the research findings. Lastly, there are time constraints, as this study may not have been able to capture all relevant time factors. By acknowledging these limitations, future research can be directed to evaluate additional factors that may influence the implementation of distribution systems more comprehensively.

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#### **References**

- [1] K. Kulsum, Y. Muharni, and M. R. Mulyawan, "Product distribution scheduling with distribution requirement planning method (Case study of bottled drinking water products)," *Tech. J. Science and Technol.*, vol. 16, no. 1, p. 45, 2020, doi: 10.36055/tjst.v16i1.7800.
- [2] Y. Yulyanah and S. Y. Kusumastuti, "Tax Avoidance in Manufacturing Companies in the Goods and Consumption Industry Sector of the Food and Beverage Sub-Sector Listed on the Indonesia Stock Exchange for the Period 2013-2017," *Media Ekon.*, vol. 27, no. 1, pp. 17-36, 2019, doi: 10.25105/me.v27i1.5284.
- [3] E. A. Putri, R. Fayaqun, and A. S. P, "Analysis of Rice Distribution Scheduling at Perum Bulog Bengkulu Regional Office with Distribution Requirement Planning (DRP) Method," vol. 7, pp. 16660-16671, 2023.



- [4] S. L. Karundeng, Thessa Natasya Mandey and J. S. B. Sumarauw, "Analysis of Timber Distribution Channels (Case Study at Cv. Karya Abadi, Manado)," *J. EMBA J. Ris. Econ. Management, Business and Account.*, vol. 6, no. 3, pp. 1748-1757, 2018.
- [5] M. B. Muttaqin, S. Martini, and R. Aurachman, "Design and Scheduling of Household Product Distribution Activities Using the Distribution Requirement Planning (DRP) Method at PT XYZ to Align Product Delivery to Retail," *J. System Engineering. Ind.*, vol. 4, no. 01, p. 56, 2017, doi: 10.25124/jrsi.v4i01.210.
- [6] Z. Ulhaq Farid and E. Aristriyana, "Product Distribution Scheduling with the Distribution Requirement Planning (Drp) Method at Cv. Kijang Mas 69 in Ciamis," *J. Ind. Galuh*, vol. 3, no. 02, pp. 93-98, 2023, doi: 10.25157/jig.v3i02.2976.
- [7] D. C. T. Agustin and G. M. Sudiartha, "Optimization of Planning and Scheduling Distribution Activities (Empirical Study at Packed Drinking-Water Distribution Company in Bali, Indonesia)," *Academia.Edu*, no. 4, pp. 611-616, 2021, [Online]. Available: <https://www.academia.edu/download/66858644/ZZZA2154611616.pdf>
- [8] D. N. E. Ardini, "Sales Forecasting System Using Trend Moment Method at Desktop-Based Nabila Furniture Shop in Paguyangan Brebes," *J. Inform. Upgris*, vol. 5, no. 2, pp. 130-134, 2019, [Online]. Available: <http://journal.upgris.ac.id/index.php/JIU/article/download/4346/2895>
- [9] A. Kusna et al., "Chart Application Flowcharts Service as a Marketing Strategy of Education in Vocational Secondary School 2 Salahuddin Malang, Indonesia," vol. 508, no. 74, pp. 424-427, 2020, doi: 10.2991/assehr.k.201214.271.
- [10] E. Listiana and M. Aziz Muslim, "Application of Adaboost for Support Vector Machine Classification to Improve Accuracy in Diagnosing Chronic Kidney Disease," *Proceedings of SNATIF*, no. 2015, pp. 875-881, 2017.
- [11] I. Ilyas, F. Marisa, and D. Purnomo, "Implementation of Trend Moment Method (Forecasting) for New Students of Widyagama University Malang," *JOINTECS (Journal Inf. Technol. Comput. Sci.)*, vol. 3, no. 2, 2018, doi: 10.31328/jointecs.v3i2.785.
- [12] H. D. Budiana, S. Lestanti, and S. Nur Budiman, "Web-based Baby Diaper Stock Prediction Application with Trend Moment Method," *JATI (Journal of Mhs. Tech. Inform.)*, vol. 6, no. 1, pp. 26-30, 2021, doi: 10.36040/jati.v6i1.4362.
- [13] M. Fahrur Rizal and D. Wahyu Widodo, "Forecasting with the Trend Moment Method to Predict the Number of Sales of Healthy Products at CV. Surya Willis," *Semin. Nas. Inov. Technol.*, pp. 29-34, 2021.
- [14] M. A. Muzakki, M. A. Sabila, S. Sundari, and B. Wisnuadhi, "Analysis of Prophet Algorithm to Predict Food Prices in Bandung City," *Pros. Ind. Res. Work. Natl. Semin.*, vol. 12, pp. 659-664, 2021.
- [15] M. Jindan, H. R. Ngemba, S. Hendra, R. Laila, and S. Syahrullah, "Integrated Web-based Palu City Blood Donor Service Application Model Using ReactJS and ExpressJS," *Adv. Sustain. Sci. Eng. Technol.*, vol. 5, no. 3, p. 02303013, 2023, doi: 10.26877/asset.v5i3.17196.