Jurnal ICT : Information and Communication Technologies, 16 (2) (2025) 329-340

Published by: Marq & Cha Institute

Jurnal ICT : Information and Communication Technologies

Journal homepage: www.ejournal.marqchainstitute.or.id/index.php/JICT

Multiple Linear Regression Method in Product Stock Prediction at PT. Kartika Mandiri Abadi

Jhea Armaya[1], Muhammad Hari Ramadhan[2]
[1,]Sistem Informasi, Universitas Potensi Utama, Medan, Indonesia
[2] Sistem Informasi, Universitas Tjut Nyak Dhien, Medan, Indonesia

Article Info

Article history

Received : Oct 20, 2025
Revised : Oct 28, 2025
Accepted : Oct 30, 2025

Keywords:

Inventory Management;
Inventory Prediction;
Multiple Linear Regression;
Product Distribution;
Web-Based System.

Abstract

Inaccurate inventory management often leads to stock shortages or surpluses, which impact operational efficiency and customer satisfaction in medium-sized distribution companies such as PT. Kartika Mandiri Abadi. This study aims to develop a website-based stock prediction system using the Multiple Linear Regression (MLR) method to produce more accurate stock estimates and support managerial decision-making. The research methods included collecting historical sales and product inventory data, designing a web-based system using the Unified Modeling Language (UML) model, implementing MLR to predict inventory levels based on independent variables such as monthly sales and initial inventory, and testing the functionality and accuracy of the system. The results show that the MLR-based inventory prediction system is capable of producing more stable and consistent estimates compared to manual methods, reducing the risk of stock shortages or surpluses, and facilitating management in inventory planning and distribution scheduling. The implementation of a web-based system provides real-time access, data visualization, and structured reports that support faster and data-driven decision making. These findings emphasize the importance of integrating statistical methods with information technology to improve operational efficiency and inventory planning in distribution companies. This research also opens up opportunities for further development by incorporating external variables or hybrid approaches to improve prediction accuracy in dynamic market conditions.

Corresponding Author:

Jhea Armaya
Sistem Informasi,
Universitas Potensi Utama,
Jl.K.L Yos Sudarso KM 6.5 Tj.Mulia, Medan, 20241, Indonesia
Email : Jheaarmaya@gmail.com

1. Introduction

Prediction, or forecasting, is a scientific process used to estimate future conditions based on historical data, typically analyzed using quantitative and statistical approaches. In business environments, forecasting plays an essential role in supporting organizational planning, risk mitigation, and strategic decision-making (Makridakis et al., 2019). Accurate forecasting enables companies to anticipate fluctuations in demand, allocate resources effectively, and minimize uncertainty in operational processes. In the economic and industrial sectors, particularly those involving supply chain and

distribution activities, the ability to foresee future stock requirements becomes critical for maintaining service continuity, avoiding operational disruptions, and enhancing overall efficiency (Chopra & Meindl, 2021). PT. Kartika Mandiri Abadi, a distributor of consumer products located in Medan Deli – Titi Papan, faces these challenges in its daily operations. High product turnover and fluctuating demand contribute significantly to the complexity of inventory management. Without reliable forecasting, companies risk either stockouts—which lead to lost sales and dissatisfied customers—or overstocking, which increases storage costs and reduces working capital effectiveness. As modern businesses increasingly shift toward data-driven decision-making, organizations such as PT. Kartika Mandiri Abadi require analytical tools that can support systematic, accurate, and real-time stock prediction. Among various forecasting techniques, Multiple Linear Regression (MLR) stands out as one of the most widely applied statistical methods to analyze the relationship between multiple independent variables and a dependent variable, making it a relevant method to address the stock prediction challenges faced by the company (Montgomery et al., 2021).

Despite the crucial role of inventory management in the continuity of business operations, PT. Kartika Mandiri Abadi still relies heavily on manual procedures for determining stock levels. Decisions are frequently based on personal judgment, intuition, or unstructured historical data that are not systematically documented or analyzed. This traditional approach often leads to significant inaccuracies in estimating product demand, resulting in problems such as stock shortages during high demand periods and excessive inventory during low demand cycles. Both conditions negatively impact operational performance: stockouts reduce sales opportunities and harm customer satisfaction, while overstocking increases storage and maintenance costs (Silver et al., 2017). The lack of an integrated information system also prevents management from accessing real-time stock information, further limiting their ability to respond quickly to market fluctuations. Moreover, the absence of analytical tools based on statistical methods such as Multiple Linear Regression restricts the company's capability to quantitatively evaluate the influence of factors such as historical sales, seasonality, promotional events, and market trends. Consequently, PT. Kartika Mandiri Abadi faces considerable risk in its decision-making processes, which can hinder strategic planning and disrupt product distribution efficiency. In today's competitive business environment, where timely and accurate data processing is indispensable, the company's current inventory management approach is no longer adequate. Therefore, there is an urgent need for a system capable of providing accurate, efficient, and evidence-based stock predictions to support better operational decisions and improve inventory performance.

Numerous studies have emphasized the importance of forecasting and data mining techniques in improving inventory management. Prior research has demonstrated that the application of Multiple Linear Regression is effective in identifying relationships between dependent variables, such as stock quantities, and multiple independent variables, including sales patterns, promotional activities, and seasonal factors (Han et al., 2022). For example, studies conducted by Rahmawati and Sutanto (2020) showed that the implementation of data mining methods in inventory prediction significantly reduced errors in stock allocation decisions. Other studies, such as those conducted by Prasetyo (2021), highlighted that using regression-based forecasting models led to improved accuracy in predicting demand for retail products. Another relevant study by Saputra et al. (2022) concluded that applying the Multiple Linear Regression algorithm allowed businesses to trace patterns between variable interactions more effectively, enabling companies to optimize their stock planning processes. Their findings showed that data-driven prediction systems assisted decision-makers in identifying the most frequently purchased products and determining optimal stock levels accordingly. However, most previous studies focused on general retail, electronics, or fast-moving consumer goods, and few have specifically investigated the implementation of MLR in the context of product distribution environments similar to PT. Kartika Mandiri Abadi. Additionally, many existing systems did not integrate forecasting models into website-based platforms that provide real-time analytics. Therefore, there remains a research gap in exploring the application of Multiple Linear Regression within a web-enabled stock prediction system that is directly tailored to the operational needs of medium-scale distributors.

The purpose of this research is to develop and implement a website-based stock prediction system using the Multiple Linear Regression method to assist PT. Kartika Mandiri Abadi in managing inventory more accurately and efficiently. This system is designed to produce real-time forecasting results based on historical sales and other relevant variables that influence product demand. By integrating MLR into a web application, the research aims to create a solution that is accessible, user-friendly, and capable of supporting management in making informed decisions regarding stock replenishment, storage allocation, and distribution scheduling. Specifically, the study seeks to: (1) analyze the current inventory management practices of PT. Kartika Mandiri Abadi and identify key factors contributing to stock fluctuation; (2) design and build a predictive model based on Multiple Linear Regression that incorporates multiple independent variables; (3) implement the model within a website-based system that can visualize prediction outcomes and generate systematic reports; and (4) evaluate the accuracy, usability, and performance of the developed system through testing and validation. Ultimately, this research is intended to help reduce inventory-related risks, optimize stock levels, and improve the company's operational efficiency. Furthermore, the findings are expected to contribute to the growing body of literature on data mining applications in inventory management, particularly in Indonesian distribution companies. By providing a model that can be adapted to similar business environments, this research also has the potential to support broader adoption of data-driven decision-making practices in the inventory management domain.

A review of previous literature reveals that although Multiple Linear Regression has been widely applied in various forecasting contexts, its integration within a website-based predictive system tailored specifically for medium-sized distributors remains limited. Most earlier studies focused on offline analytical models or desktop-based systems without real-time data processing capabilities (Rahmawati & Sutanto, 2020; Saputra et al., 2022). Furthermore, few research projects have examined the application of MLR for inventory prediction in distribution companies that experience rapid stock movement, such as PT. Kartika Mandiri Abadi. This gap highlights the need for a more practical, accessible, and operationally aligned solution. The novelty of this study lies in its development of a fully integrated web-based forecasting system that employs Multiple Linear Regression to analyze multiple independent variables simultaneously, providing real-time, data-driven stock predictions. This integration enables more dynamic decision-making compared to traditional manual or spreadsheet-based forecasting methods. In addition, the system includes visualization features and automated reporting that enhance managerial interpretation and support more accurate forecasting. The justification for conducting this research is grounded in the persistent inventory management issues experienced by PT. Kartika Mandiri Abadi, including recurring stock shortages and surpluses caused by inaccurate manual predictions. By introducing a scientifically grounded forecasting model, the company can significantly reduce risk, improve operational efficiency, and better meet consumer demand. The research also contributes academically by demonstrating how MLR can be operationalized within a web-based environment, thereby expanding existing knowledge and offering a practical framework that can be replicated by other distribution businesses.

2. Research Methodolgy

In developing the system, the author uses the waterfall model or software life cycle, the software life cycle has the following stages:

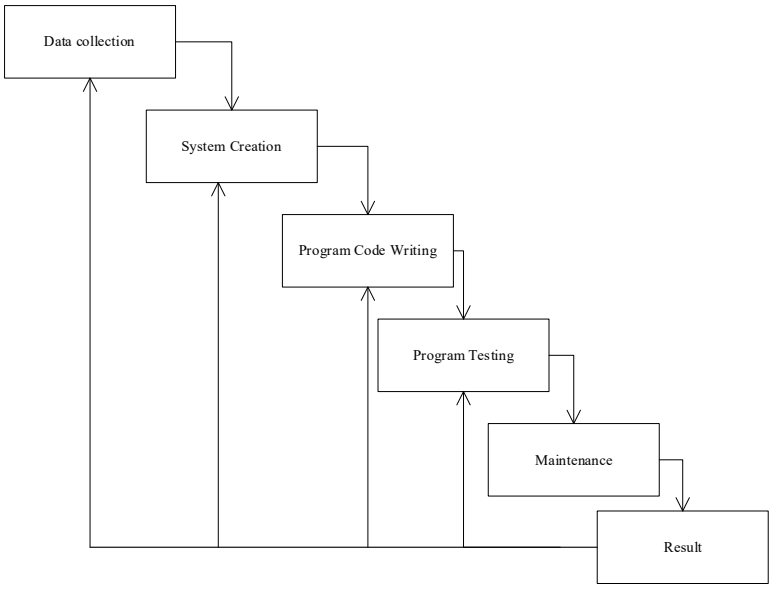

Figure 1. Waterfall Diagram

The development of the Waterfall method has several stages: requirements analysis, system design, coding, program testing, and system maintenance.

1. Data Collection

The researcher collected data containing the elements required for the design to be able to solve the existing problem and meet the objectives. The data required for system design included estimated sales data, user data, and the programming language used to create the application, PHP.

2. System Development

In general, the implementation of the Multiple Linear Regression Method for Product Sales Estimation at PT. Kartika Mandiri Abadi, based on the website, used the Unified Modeling Language design model, namely use case diagrams, class diagrams, activity diagrams, and sequence diagrams.

3. Method

The author chose the Multiple Linear Regression method to design sales estimates using the Linear Regression method. This method is one of the most important approaches in engineering for: (a) regression or equation formation from discrete data points (in modeling), and (b). Measurement error analysis (in model validation).

4. Program Testing

At this stage, comprehensive application testing is conducted, including functional testing and system robustness testing. Black box (interface) testing is software testing that tests the application's functionality against its internal structure or operation.

5. Maintenance

Software that is difficult to deliver to system users will inevitably undergo changes. These changes can be caused by errors as the software must adapt to the new environment. Overall, the research results indicate that implementing the Multiple Linear Regression method in a website-based system can help companies predict product inventory more accurately, efficiently, and quickly. This system also facilitates management in inventory planning and strategic decision-making to prevent excess or shortages in the future.

6. Results

The researcher used the Sales Estimation System with Data Mining Techniques using the Multiple Linear Regression method. The results of this research were obtained from the process of

collecting sales and product demand data at PT. Kartika Mandiri Abadi over a certain period, which was used as the basis for building a stock prediction model. The collected data was then analyzed using the Multiple Linear Regression method with the dependent variable being the number of product stocks and several independent variables such as monthly sales data, consumer demand, and time (period).

3. Results and Discussion

The flowchart of the multiple linear regression method is as follows:

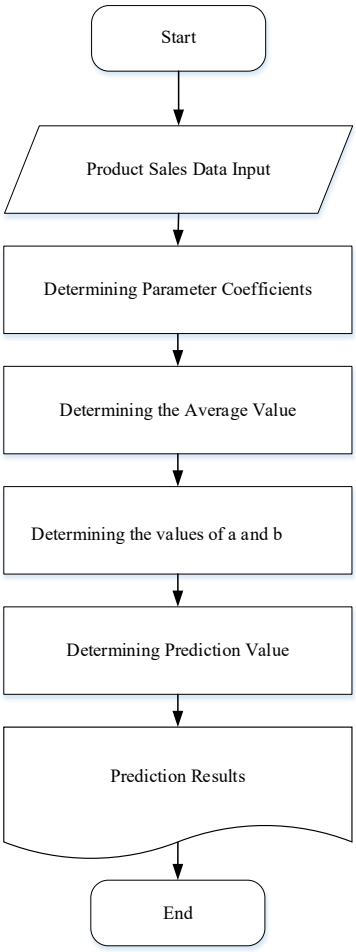

Figure 2. Method Flowchart

Case Study:

The author will predict Chessy Stick sales for the period January 2020 to August 2024. Sales data can be seen in Table 1 below:

Table 1. Cheesy Stick Sales Data

No	Product name	Month	Year	Sold (X1)	Initial Stock (X2)	Product in (Y)
1	Chessy Stik	Januari	2020	104	67	80
2	Chessy Stik	Februari	2020	120	120	200
3	Chessy Stik	Maret	2020	120	89	120
4	Chessy Stik	April	2020	140	120	90
5	Chessy Stik	Mei	2020	120	78	100

No	Product name	Month	Year	Sold (X1)	Initial Stock (X2)	Product in (Y)
6	Chessy Stik	Juni	2020	145	210	60
7	Chessy Stik	Juli	2020	145	120	80
8	Chessy Stik	Agustus	2020	120	54	80
9	Chessy Stik	September	2020	120	90	100
10	Chessy Stik	Oktober	2020	140	120	180
11	Chessy Stik	November	2020	80	180	90
12	Chessy Stik	Desember	2020	230	165	80
13	Chessy Stik	Januari	2021	210	187	90
14	Chessy Stik	Februari	2021	210	180	90
15	Chessy Stik	Maret	2021	100	200	120
16	Chessy Stik	April	2021	190	320	100
17	Chessy Stik	Mei	2021	230	200	100
18	Chessy Stik	Juni	2021	180	200	100
19	Chessy Stik	Juli	2021	200	180	54
20	Chessy Stik	Agustus	2021	80	204	87
21	Chessy Stik	September	2021	200	120	120
22	Chessy Stik	Oktober	2021	120	120	80
23	Chessy Stik	November	2021	90	140	200
24	Chessy Stik	Desember	2021	100	120	120
25	Chessy Stik	Januari	2022	60	145	90
26	Chessy Stik	Februari	2022	80	145	100
27	Chessy Stik	Maret	2022	80	120	60
28	Chessy Stik	April	2022	100	120	80
29	Chessy Stik	Mei	2022	180	140	80
30	Chessy Stik	Juni	2022	90	80	100
31	Chessy Stik	Juli	2022	80	330	180
32	Chessy Stik	Agustus	2022	90	210	90
33	Chessy Stik	September	2022	90	210	80
34	Chessy Stik	Oktober	2022	120	100	90
35	Chessy Stik	November	2022	100	190	90
36	Chessy Stik	Desember	2022	100	230	120
37	Chessy Stik	Januari	2023	100	180	100
38	Chessy Stik	Februari	2023	54	200	100
39	Chessy Stik	Maret	2023	87	80	100
40	Chessy Stik	April	2023	120	200	54
41	Chessy Stik	Mei	2023	120	120	87
42	Chessy Stik	Juni	2023	120	90	120
43	Chessy Stik	Juli	2023	140	100	145
44	Chessy Stik	Agustus	2023	120	60	187
45	Chessy Stik	September	2023	145	80	89
46	Chessy Stik	Oktober	2023	145	80	110
47	Chessy Stik	November	2023	120	100	120
48	Chessy Stik	Desember	2023	120	180	200
49	Chessy Stik	Januari	2024	140	90	130
50	Chessy Stik	Februari	2024	80	80	190
51	Chessy Stik	Maret	2024	330	200	150
52	Chessy Stik	April	2024	210	90	210
53	Chessy Stik	Mei	2024	210	120	120
54	Chessy Stik	Juni	2024	100	100	130
55	Chessy Stik	Juli	2024	190	100	130
56	Chessy Stik	Agustus	2024	230	100	130
57	Chessy Stik	September	2024	180	54	280
58	Chessy Stik	Oktober	2024	200	87	120
59	Chessy Stik	November	2024	145	120	170
60	Chessy Stik	Desember	2024	150	130	130

Based on the explanation of the table above, the results of the Constant Value and Regression Coefficient are as follows:

Table 2. Constant Values and Regression Coefficients

Month	Year	X1	X2	Y	X1*Y	X2*Y	X1*X2	X1^2	X2^2	Y^2
Januari	2020	104	67	80	8.320	5.360	6.968	10.816	4.489	6.400
Februari	2020	120	120	200	24.000	24.000	14.400	14.400	14.400	40.000
Maret	2020	120	89	120	14.400	10.680	10.680	14.400	7.921	14.400
April	2020	140	120	90	12.600	10.800	16.800	19.600	14.400	8.100
Mei	2020	120	78	100	12.000	7.800	9.360	14.400	6.084	10.000
Juni	2020	145	210	60	8.700	12.600	30.450	21.025	44.100	3.600
Juli	2020	145	120	80	11.600	9.600	17.400	21.025	14.400	6.400
Agustus	2020	120	54	80	9.600	4.320	6.480	14.400	2.916	6.400
September	2020	120	90	100	12.000	9.000	10.800	14.400	8.100	10.000
Oktober	2020	140	120	180	25.200	21.600	16.800	19.600	14.400	32.400
November	2020	80	180	90	7.200	16.200	14.400	6.400	32.400	8.100
Desember	2020	230	165	80	18.400	13.200	37.950	52.900	27.225	6.400
Januari	2021	210	187	90	18.900	16.830	39.270	44.100	34.969	8.100
Februari	2021	210	180	90	18.900	16.200	37.800	44.100	32.400	8.100
Maret	2021	100	200	120	12.000	24.000	20.000	10.000	40.000	14.400
April	2021	190	320	100	19.000	32.000	60.800	36.100	102.400	10.000
Mei	2021	230	200	100	23.000	20.000	46.000	52.900	40.000	10.000
Juni	2021	180	200	100	18.000	20.000	36.000	32.400	40.000	10.000
Juli	2021	200	180	54	10.800	9.720	36.000	40.000	32.400	2.916
Agustus	2021	80	204	87	6.960	17.748	16.320	6.400	41.616	7.569
September	2021	200	120	120	24.000	14.400	24.000	40.000	14.400	14.400
Oktober	2021	120	120	80	9.600	9.600	14.400	14.400	14.400	6.400
November	2021	90	140	200	18.000	28.000	12.600	8.100	19.600	40.000
Desember	2021	100	120	120	12.000	14.400	12.000	10.000	14.400	14.400
Januari	2022	60	145	90	5.400	13.050	8.700	3.600	21.025	8.100
Februari	2022	80	145	100	8.000	14.500	11.600	6.400	21.025	10.000
Maret	2022	80	120	60	4.800	7.200	9.600	6.400	14.400	3.600
April	2022	100	120	80	8.000	9.600	12.000	10.000	14.400	6.400
Mei	2022	180	140	80	14.400	11.200	25.200	32.400	19.600	6.400
Juni	2022	90	80	100	9.000	8.000	7.200	8.100	6.400	10.000
Juli	2022	80	330	180	14.400	59.400	26.400	6.400	108.900	32.400
Agustus	2022	90	210	90	8.100	18.900	18.900	8.100	44.100	8.100
September	2022	90	210	80	7.200	16.800	18.900	8.100	44.100	6.400
Oktober	2022	120	100	90	10.800	9.000	12.000	14.400	10.000	8.100
November	2022	100	190	90	9.000	17.100	19.000	10.000	36.100	8.100
Desember	2022	100	230	120	12.000	27.600	23.000	10.000	52.900	14.400
Januari	2023	100	180	100	10.000	18.000	18.000	10.000	32.400	10.000
Februari	2023	54	200	100	5.400	20.000	10.800	2.916	40.000	10.000
Maret	2023	87	80	100	8.700	8.000	6.960	7.569	6.400	10.000
April	2023	120	200	54	6.480	10.800	24.000	14.400	40.000	2.916
Mei	2023	120	120	87	10.440	10.440	14.400	14.400	14.400	7.569
Juni	2023	120	90	120	14.400	10.800	10.800	14.400	8.100	14.400
Juli	2023	140	100	145	20.300	14.500	14.000	19.600	10.000	21.025
Agustus	2023	120	60	187	22.440	11.220	7.200	14.400	3.600	34.969
September	2023	145	80	89	12.905	7.120	11.600	21.025	6.400	7.921

Month	Year	X1	X2	Y	X1*Y	X2*Y	X1*X2	X1^2	X2^2	Y^2
Oktober	2023	145	80	110	15.950	8.800	11.600	21.025	6.400	12.100
November	2023	120	100	120	14.400	12.000	12.000	14.400	10.000	14.400
Desember	2023	120	180	200	24.000	36.000	21.600	14.400	32.400	40.000
Januari	2024	140	90	130	18.200	11.700	12.600	19.600	8.100	16.900
Februari	2024	80	80	190	15.200	15.200	6.400	6.400	6.400	36.100
Maret	2024	330	200	150	49.500	30.000	66.000	108.900	40.000	22.500
April	2024	210	90	210	44.100	18.900	18.900	44.100	8.100	44.100
Mei	2024	210	120	120	25.200	14.400	25.200	44.100	14.400	14.400
Juni	2024	100	100	130	13.000	13.000	10.000	10.000	10.000	16.900
Juli	2024	190	100	130	24.700	13.000	19.000	36.100	10.000	16.900
Agustus	2024	230	100	130	29.900	13.000	23.000	52.900	10.000	16.900
September	2024	180	54	280	50.400	15.120	9.720	32.400	2.916	78.400
Oktober	2024	200	87	120	24.000	10.440	17.400	40.000	7.569	14.400
November	2024	145	120	170	24.650	20.400	17.400	21.025	14.400	28.900
Desember	2024	150	130	130	19.500	16.900	19.500	22.500	16.900	16.900
Average		137		139	116					
Total	n = 60	8.220	8.345	6.983	970.045	940.148	1.148.258	1.292.326	1.369.255	929.085

Based on Table III.2, the following equations are obtained using the multiple linear regression method:

a. The stages of the sales prediction data mining process can be seen in equations I through VI below:

$\sum Y^2 = \sum Y^2 - n\ Y^2$

$\sum Y^2 = 929085 - (60 * (116 * 116))$

$\sum Y^2 = 929085 - 60 * 13456$

$\sum Y^2 = 929085 - 807360$

$\sum Y^2 = 121725$

b. Next, the multiple linear regression equation is calculated using the following formula:

$\sum X1^2 = \sum X1^2 - n\ X1^2$

$\sum X1^2 = 1292326 - (60 * (137 * 137))$

$\sum X1^2 = 1292326 - 60 * 18769$

$\sum X1^2 = 1292326 - 1126140$

$\sum X1^2 = 166186$

c. Then carry out the elimination process between equation (3) and equation (2) as follows

Equation III:

$\sum X2^2 = \sum X2^2 - n\ X2^2$

$\sum X2^2 = 1369255 - (60 * (139 * 139))$

$\sum X2^2 = 1369255 - 60 * 19321$

$\sum X2^2 = 1369255 - 1159260$

$\sum X2^2 = 209995$

d. Then carry out the elimination process between equation (3) and equation (4) as follows

Equation IV:

$\sum X1Y = \sum X1Y - n\ X1Y$

$\sum X1Y = 970045 - (60 * (137 * 116))$

$\sum X1Y = 970045 - 60 * 15892$

$\sum X1Y = 970045 - 953520$

$\sum X1Y = 16525$

Equation V :

$\sum X2Y = \sum X2Y - n\ X2Y$

$\sum X2Y = 940148 - (60 * (139 * 116))$

∑X2Y = 940148 - 60 * 16124
∑X2Y = 940148 - 967440
∑X2Y = -27292
Equation VI
∑X1X2 = ∑X1X2 - n X1X2
∑X1X2 = 1148258 - (60 * (137 * 139))
∑X1X2 = 1148258 - 60 * 19043
∑X1X2 = 1148258 - 1142580
∑X1X2 = 5678
e. Thus, the results obtained for the constant value a and the regression coefficients b1 and b2 are as follows:

$$b_1 = \frac{(\sum X_2^2)(\sum X_1 Y) - (\sum X_1 X_2)(\sum X_2 Y)}{(\sum X_1^2)(\sum X_2^2) - (\sum X_1 X_2)2}$$

b1 = (209995*16525)-(5678*-27292) / (166186*209995)-(5678)²
b1 = (3470167375 – (-154963976) / 34898229070 - 32239684
b1 = 3625131351 / 34865989386
b1 = 0.10397328212506

$$b_2 = \frac{(\sum X_1^2)(\sum X_2 Y) - (\sum X_1 X_2)(\sum X_1 Y)}{(\sum X_1^2)(\sum X_2^2) - (\sum X_1 X_2)2}$$

b2 = (166186*-27292)-(5678*16525) / (166186*209995)-(5678)²
b2 = -4535548312 – 93828950 / 34898229070 – 32239684
b2 = -4629377262 / 34865989386
b2 = -0.13277630560683
f. Then to determine the value of a is as follows:
a = Y - $b_1X_1 - b_2X_2$
a = 116 - (0.10397328212506 * 137) - (-0.13277630560683 * 139)
a = 116 – 14,24433936 – (-18,4559071)
a = 120.21156682822 atau sama dengan 120
g. So the regression equation model obtained from the results of the calculations in the case above is as follows:

Y = a + b1X1 + b2X2 + ... bnXn ..... (2)

Once the linear regression equation model is obtained, the next step is to predict sales volume for the upcoming period. The following is an example of the results of a prediction calculation using the Multiple Linear Regression method.

Month	Year	Y = a + b1X1 + b2X2	Forecast Amount
Januari	2025	Y = 120 + (0.10*104) + (-0.13*67)	122
Februari	2025	Y = 120 + (0.10*120) + (-0.132*120)	117
Maret	2025	Y = 120 + (0.10*120) + (-0.13*89)	121
April	2025	Y = 120 + (0.10*140) + (-0.13*120)	119
Mei	2025	Y = 120 + (0.10*120) + (-0.13*78)	122
Juni	2025	Y = 120 + (0.10*145) + (-0.13*210)	107
Juli	2025	Y = 120 + (0.10*145) + (-0.13*120)	119
Agustus	2025	Y = 120 + (0.10*120) + (-0.13*54)	125
September	2025	Y = 120 + (0.10*120) + (-0.13*90)	121
Oktober	2025	Y = 120 + (0.10*140) + (-0.13*120)	119
November	2025	Y = 120 + (0.10*80) + (-0.13*180)	104
Desember	2025	Y = 120 + (0.10*230) + (-0.13*165)	122122

Discussion

The findings of this study demonstrate that the implementation of the Multiple Linear Regression (MLR) method within a web-based predictive system provides substantial improvements in the accuracy and efficiency of inventory forecasting at PT. Kartika Mandiri Abadi. The analysis shows that previously unstructured and experience-based stock estimations can be significantly enhanced when historical sales data, seasonal patterns, and additional relevant variables are systematically integrated into a statistical model. The predictive system generated more stable and consistent stock forecasts, reducing both overstock and stock-out occurrences that had previously hindered operational performance. These results align with existing literature asserting that MLR is a reliable approach for modeling multivariate relationships in demand prediction, particularly in distribution-based businesses. In practice, the use of a web-based interface further strengthened managerial decision-making by enabling real-time access to prediction outputs, structured reporting, and visualized data trends, which collectively facilitated more responsive inventory planning. Moreover, the integration of MLR into an automated information system demonstrated that statistical models can be operationalized effectively within small-to-medium enterprises (SMEs) to address practical forecasting challenges. The improvement in forecasting accuracy observed in this study justifies the adoption of data-driven inventory management systems as a strategic tool for minimizing operational risks and enhancing service quality. Overall, the research contributes by validating the applicability of MLR in a real-world business setting and by offering an accessible technological framework that supports informed decision-making, operational efficiency, and long-term sustainability in inventory management.

4. Conclusion

Based on the results of this study, it can be concluded that the application of the Multiple Linear Regression (MLR) method in a website-based stock prediction system significantly improves the accuracy and efficiency of inventory forecasting at PT. Kartika Mandiri Abadi. The main findings show that integrating historical sales data, seasonal patterns, and other supporting variables into the MLR model produces more stable and consistent inventory predictions, thereby reducing incidents of excess or shortage of stock that previously disrupted operational performance. The implications of these findings indicate that the implementation of a statistics-based prediction system not only supports real-time managerial decision-making but also strengthens inventory planning, distribution optimization, and the effective use of working capital. However, this study has limitations, including its focus on a specific product (Cheesy Stick) and its use of only quantitative variables available from the company's internal historical data, meaning that the prediction model may not fully consider external factors such as changes in market trends, competitor promotions, or macroeconomic conditions. For future research, it is recommended to expand the product scope and include relevant external variables through big data integration or hybrid machine learning approaches, so that the prediction model can be more adaptive to complex market dynamics. In addition, the development of a more interactive user interface and integration with Enterprise Resource Planning (ERP) systems can also increase the effectiveness of the system in supporting overall operational decisions. This research makes an important contribution to the inventory management literature by offering a practical framework that can be replicated by medium-sized distribution companies to support the implementation of data-driven practices in inventory management.

References

Alfina, O. (2019). Pemodelan UML sistem pendukung keputusan dalam penentuan kelas siswa tunagrahita. Methomika: Jurnal Manajemen Informatika & Komputerisasi Akuntansi.

Amaludin, A., Abidin, A. Z., Martha, M. A., & Saputra, S. (2024). Perancangan sistem absensi berbasis web menggunakan bahasa pemrograman PHP dan MySQL di Sekolah Yayasan Ashaabul Ardhi (Sahabat Bumi). BIN: Bulletin of Informatics, 2(2), 227–235.

Aris. (2020). Rancang bangun sistem informasi penilaian kinerja pegawai berbasis web menggunakan metode fuzzy: Studi kasus Dinas Tata Ruang dan Bangunan Pemerintahan Kabupaten Tangerang (Bachelor's thesis). Fakultas Sains dan Teknologi, Universitas Islam Negeri Syarif Hidayatullah Jakarta.

Aryani, Y. (2020). Sistem informasi penjualan barang dengan metode regresi linear berganda dalam prediksi pendapatan perusahaan. Jurnal Riset Sistem Informasi dan Teknologi Informasi (JURSISTEKNI), 2(2), 39–51.

Ayuni, & Fitrianah. (2020). Analisis prediksi penjualan dengan metode regresi linear di PT. Eagle Industry Indonesia. Jurnal Informatika Teknologi dan Sains (Jinteks), 5(3), 398–403.

Dahlia, A. (2020). Implementasi data mining untuk peramalan persediaan obat pada Puskesmas Kertapati menggunakan regresi linear berganda. Building of Informatics, Technology and Science (BITS), 6(2), 1191–1200.

Sirait, D. C. F. (2021). Implementasi data mining untuk memprediksi tingkat penjualan peralatan elektronik menggunakan metode regresi linear berganda. Jurnal CyberTech.

Hermiati, R., Asnawati, A., & Kanedi, I. (2021). Pembuatan e-commerce pada Raja Komputer menggunakan bahasa pemrograman PHP dan database MySQL. Jurnal Media Infotama, 17(1).

Janis, J. W., Mamahit, D. J., Sugiarso, B. A., & Rumagit, A. M. (2020). Rancang bangun aplikasi online sistem pemesanan jasa tukang bangunan berbasis lokasi. Jurnal Teknik Informatika, 15(1), 1–12.

Jayanti, N. K. D. A. (2020). Penerapan metode triple exponential smoothing pada sistem peramalan penentuan stok obat. Jurnal Sistem dan Informatika (JSI), 9(2), 13–23.

Lase, M., Saripurna, D., & Sari, V. W. (2022). Estimasi penjualan Ice Cream Walls menggunakan metode regresi linear berganda. Jurnal Sistem Informasi Triguna Dharma (JURSI TGD), 1(5), 625–634.

Made, I., Ramayu, S., Susanto, F., & Mahendra, G. S. (2022). Penerapan data mining dengan algoritma C4.5 dalam pemesanan obat guna meningkatkan keuntungan apotek. Online SENADA, 5, 23245.

Manurung, B. (2023). Aplikasi peramalan penjualan Ice Cream Walls metode exponential smoothing pada PT. Bentoro Adisandi Duri (Doctoral dissertation). Universitas Lancang Kuning.

Masruroh, M., & Mauladi, K. F. (2020). Penerapan metode regresi linear berganda dalam sistem prediksi nilai ujian nasional siswa SMP. Jurnal Teknika, 12(1), 1–6.

Nurlifa, M., & Kusumadewi, A. (2020, March). Perancangan dan analisa website Rumah Sakit Graha Hermine Batam. In CoMBInES-Conference on Management, Business, Innovation, Education and Social Sciences (Vol. 1, No. 1, pp. 539–547).

Palaâ, E. I., Saerang, D. P., & Gamaliel, H. (2020). Analisis sistem informasi akuntansi penjualan pada PT. Wahana Wirawan Manado–Nissan Datsun Martadinata. Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis dan Akuntansi, 8(4).

Sadali, M., & Putra, Y. K. (2020). Sistem informasi berbasis web SMA Al-Mukhtariyah Mamben Lauk berbasis PHP dan MySQL dengan framework CodeIgniter. Infotek: Jurnal Informatika dan Teknologi, 3(1), 79–83.

Selay, A., Andigha, G. D., Alfarizi, A., Wahyudi, M. I. B., Falah, M. N., Encep, M., & Khaira, M. (2023). Sistem informasi penjualan. Karimah Tauhid, 2(1), 232–237.

Sutopo, D. (2020). Sistem informasi pengajuan cuti pegawai berbasis web pada Kantor Desa Sentul Jaya (Doctoral dissertation). Universitas Muhammadiyah Tangerang.

Utami, U., Yasdomi, K., Sabri, K., & Safitri, N. (2023). Rancangan sistem informasi promosi produk UMKM Desa Rambah Tengah Hulu berbasis web. REMIK: Riset dan E-Jurnal Manajemen Informatika Komputer, 7(1), 713–723.

Wahyudin, A. A. F. N., Primajaya, A., & Irawan, A. S. Y. (2020). Penerapan algoritma regresi linear berganda pada estimasi penjualan mobil Astra Isuzu. Techno. Com, 19(4), 364–374.

Wahyudin, Y., & Rahayu, D. N. (2020). Analisis metode pengembangan sistem informasi berbasis website: A literature review. Jurnal Interkom: Jurnal Publikasi Ilmiah Bidang Teknologi Informasi dan Komunikasi, 15(3), 119–133.