Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024
DOI : https://doi.org/10.33395/sinkron.v8i3.13791
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Inventory Information System Using Fifo And Holt Winters Multiplicative Methods

Verdi Tri Firmansyah[1)], Anik Vega Vitianingsih[2)], Litafira Syahadianti[3)*], Pamudi[4)], Alda Raharja[5)]
[1,2,3,4,5)] Teknik Informatika, Universitas Dr. Soetomo, Surabaya, Indonesia
[1)] triverdi02@gmail.com, [2)] vega@unitomo.ac.id, [3)] litafira@unitomo.ac.id, [4)] pamudi@unitomo.ac.id, [5)] alda.raharja@unitomo.ac.id

Submitted : Jun 26, 2024 | **Accepted** : Jul 17, 2024 | **Published** : Jul 27, 2024

Abstract: In the era of society 5.0, information technology plays an important role in daily life, company operations, and management. Medium-scale stores such as Nisrina Mart require an inventory control process to determine the number of products to be restocked quickly and accurately. However, what happened was the opposite, shop owners experienced a lot of losses because the inventory control process carried out manually had the potential to experience inaccurate data and material losses. Based on these problems, this research tries to propose the development of an inventory information system for reporting incoming and outgoing goods using the First In First Out (FIFO) method. Stock forecasts based on previous sales data are generated to project future stock needs using the Holt-Winters Multiplicative trend moment method. The software development model uses a waterfall which includes requirements, design, implementation, testing, and maintenance. The test results of the Holt Winter multiplication method show a prediction error rate of 0.27. Meanwhile, the level of accuracy in predicting goods sales is 73%. The implementation of this information system is expected to provide convenience in stock monitoring, reduce prediction errors, and increase the accuracy of product data analysis reports to support more effective and efficient management decision-making.
Keywords: FIFO Method; Holt-Winters Multiplicative; Inventory System; Trend Moment Method.

INTRODUCTION

Information technology plays a major role in human life and is essential for daily life, company operations, and management. Utilize information technology more thoroughly and effectively and make the most of it in the era of society 5.0 (Fauzi et al., 2023). Advances in information technology provide many advantages and conveniences, including the ability to analyze data and present inventory information in an agency, corporation, or organization (Pratiwi et al., 2021). All warehouse activities, such as monitoring incoming and outgoing stock, are entered into the inventory system, which the company uses as data (Pribachtiar & Utomo, 2021). The storage of unfinished goods, raw materials, or finished goods that are stored for use later or within a certain time is called inventory. Inventory is a term used to describe the products or resources that a company owns and ships to support its operations and meet customer or consumer demand (Hidayatuloh & Fadillah, 2022).

Nisrina Mart is one of the members of KSPPS BMT Sri Sejahtera. Nisrina Mart is a supermarket that provides daily necessities, such as staples to secondary needs. Nisrina Mart is under the management of KSPPS BMT Sri Sejahtera, located at Jl. Lidah Wetan No.10 / Jl. Raya Menganti No.886A is adjacent to the KSPPS BMT Sri Sejahtera Lidah branch office.

Interviews were conducted with one of the staff, Nisrina Mart does not use a computerized system in the data processing process for the inventory process. Documenting goods received and issued takes a long time because the manual system method has various weaknesses, including the possibility of data entry errors. To improve operational efficiency and prevent errors in managing, recording, and analyzing stock data predictions, an inventory information system must be built. If a computerized system is not

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

built immediately, it will cause : (1) Orders for goods that are more than those available or shortages of goods in stock (Biandari & Hrahap, 2021), (2) Due to the wide variety of commodities available and manual data collection procedures, there may be discrepancies in stock data, inaccuracies in stock calculations, or discrepancies between the actual number of items in the warehouse and the stock data (Ilham & Paryanti, 2023) and (3) Risks associated with inaccurate purchasing and expenditure data may result in material losses (Gilang Sonar Amanu, 2015).

With the problems faced, there is a need for a forecasting system in an inventory system. Forecasting is the process of projecting the future by providing in-depth data based on trends in collecting data using specialized methods known as forecasting (Maysofa et al., 2023). The purpose of this forecasting procedure is to reduce prediction errors to improve the effectiveness of planning and decision-making (Anggraini et al., 2020). Implementation of a forecasting information system is needed to facilitate stock inventory monitoring, thereby enabling better operational efficiency and avoiding errors in analyzing sales stock data predictions.

This research aims to develop a stock forecasting information system by utilizing sales data from the previous period. The First In First Out (FIFO) method itself is a method that helps avoid the risk of decreasing inventory value by ensuring that older goods are not stored too long in the warehouse (Sari et al., 2022). In this method, products that first enter the warehouse will be prioritized for sale or use, ensuring that items that have been in the warehouse longer will be used or sold first (Lefrandy Pradana et al., 2022). Calculated value results are given in a relevant manner when using the FIFO approach (Dwiza Ramadhan & Misbahudin, 2023).

In the calculation process, the Holt-Winters method is used. The Holt-Winters method is a smoothing technique that involves two parameters and is suitable for data that shows a trend (Mariz et al., 2017). There are two variations in this method: (1) Holt Winters Multiplicative which uses seasonal multiplication to handle seasonal jaw growth or decline and (2) Holt Winters Additive which uses seasonal multiplication to handle seasonal calendars that remain constant (Ginting & Gultom, 2024). With a small MAPE value, the Holt-Winters approach accurately estimates the pattern of change (Chen, 2023). In several studies as a whole, the results show that the Holt-Winters Method has much better performance, especially when the distribution and correlation of the data are adequate (Rosita & Moonlight, 2024).

This research is expected to help the leadership of Nisrina Mart in conducting audits, especially of incoming and outgoing goods data, and in monitoring inventory control. The result of this research is an information system for inventory management that is more accurate and reliable and can be used as a guide by Nisrina Mart staff to make more accurate and reliable product data analysis reports.

LITERATURE REVIEW

In the Robenisia Product Supply division, the inventory system using the FIFO method was studied in 2023. The results showed that analysis using black box testing and the FIFO research method effectively and efficiently facilitated the monitoring of incoming and outgoing goods (Dwi et al., 2023). Another study conducted in 2021, which used the Re-Order Point method in the Obyth Store goods inventory system, found that the available sales data is still below the safety limit and there has been no reorder because the stock of goods still exceeds the safety stock (Mamit Thalia et al., 2021).

Furthermore, in 2022, research on chicken meat price comparison using the Multiplicative Holt-Winters Model and backpropagation Artificial Neural Network. The results showed that with the right price forecasting results, chicken meat processing could be optimized to increase revenue, with a MAPE value of 12.63%, higher than the Backpropagation Artificial Neural Network value of 18.016% (Haris et al., 2022). Additional research he conducted in 2021 at Kedai Psycoffe using the Exponential Smoothing method showed that accuracy testing with MSE, RMSE, and MAPE on six types of coffee did not reach 50% (Rizal Kurniawan et al., 2021).

Additional research he conducted in 2022 at PT Perusahaan Es Siantar using the probabilistic EOQ method showed that total inventory costs using the conventional method (Company) could be reduced by 44.18% (Situmorang, Leonardo & Purwaningsih, 2021). The same study was carried out in 2021

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

using the EOQ method on CV Syahdika. In this case, the savings in raw material supply costs within one year are smaller than those obtained through company policy (Ratningsih et al., 2021).

Innovations such as the inventory system for selling goods and forecasting found through previous research are used as a reference for this research. This research includes the development of web applications that are easy to use and effectively utilized.

METHOD

Software Development Method

This research uses the waterfall software development model, which involves a software development process in stages, similar to a stream of water flowing down like a waterfall (Abdul Wahid, 2020).

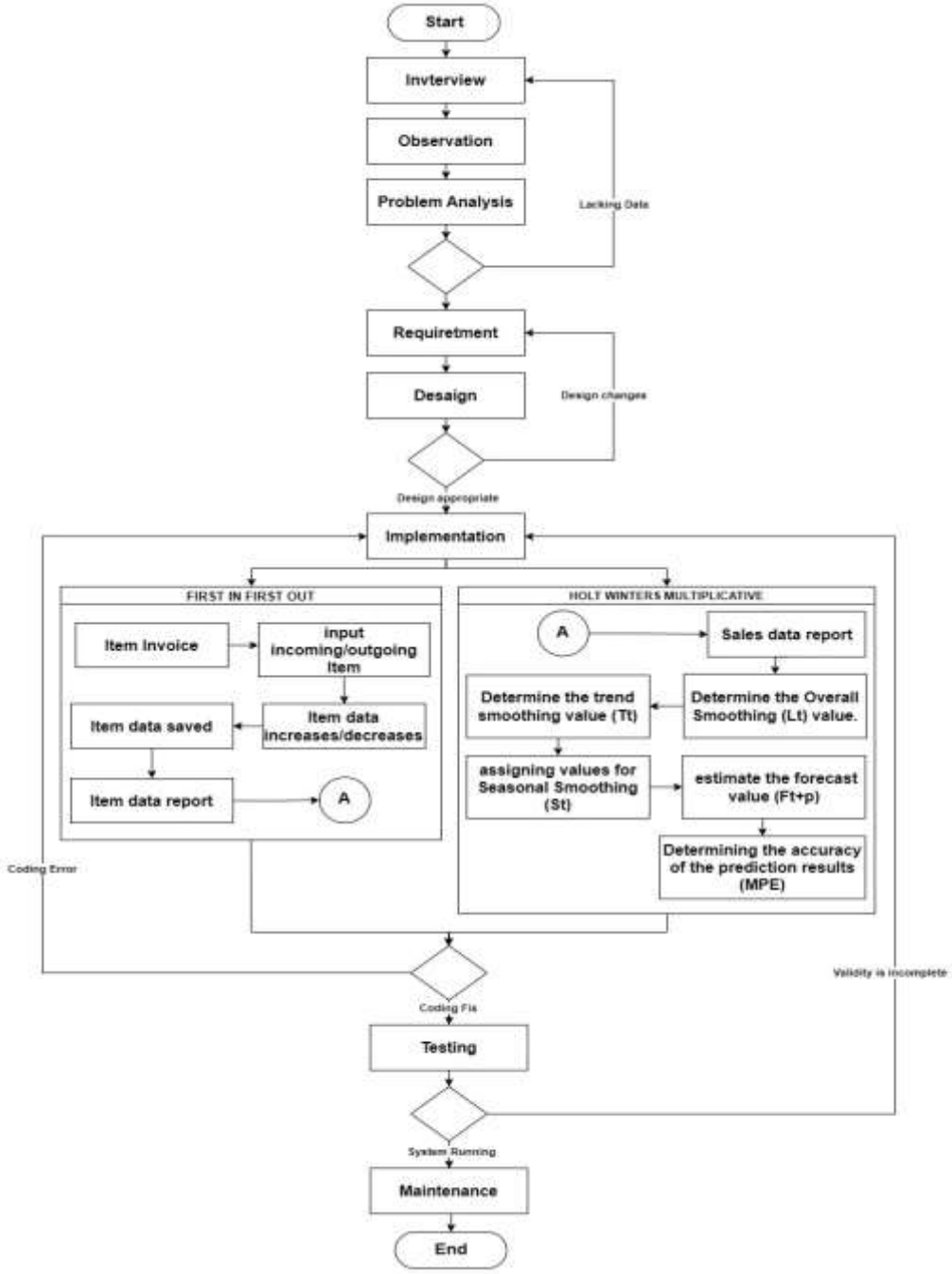

Figure 1. Flowchart of the research

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

This waterfall approach consists of five main stages in its development, consisting of:

1) *Requiretment:* The problem analysis stage is based on the results of direct observation or interviews. By analyzing the needs of this system, it is hoped that the system to be developed can be described in detail into basic components so that the system is following the needs of the project.
2) *Desaign:* The system design stage through functional analysis of the system is applied using the Unified Modeling Language (UML) and designing the interface.
3) *Implementation:* The code program implementation stage is carried out by utilizing Visual Studio Code as a text editor assisted by the Laravel framework and the PHP programming language. Apart from that, this system is designed with the support of several additional software such as XAMPP, and uses the FIFO method for reporting incoming and outgoing goods and the Holt Winter Multiplicative method for estimating stock based on previous sales data.
4) *Testing:* The purpose of this stage is to determine the suitability of the system with the design, and system functionality, and to prevent bugs or errors in the system.
5) *Maintenance:* After system testing is complete, the next stage is the use of the system by users. At this stage, the developer can fix if there are errors in the system used by the user.

Fifo Method

The First In First Out (FIFO) method is an approach where the first product to enter the warehouse will be sold or used first rather than products that have been in the warehouse longer. This avoids the risk of losing inventory value by ensuring that items that have been in the warehouse longer are not stored for too long (Lefrandy Pradana et al., 2022).

Inventory Analysis

Data from the last two years is used to predict future sales and determine the amount of inventory for the upcoming period using Holt-Winters Multiplicative calculation. Nisrina Mart has sales records from the previous year. Beverage sales records from January 2023 to April 2024 are shown in Table 1.

Table 1. Beverage Sales Data 2023 – 2024

Year	Month	Sales Data
2023	January	848
2023	February	852
2023	March	746
2023	April	737
2023	May	859
2023	June	987
2023	July	851
2023	August	808
2023	September	928
2023	October	921
2023	November	751
2023	December	820
2024	January	852
2024	February	979
2024	March	930
2024	April	920

To predict beverage sales in January 2024, Table 2 was next created to calculate the values of Lt, Tt, and St. In this process, the alpha, beta, and gamma parameters were assigned values of 0.1.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

Table 2. Multiplicative Holt-Winters Calculation

Year	Month	Yt	Lt	Tt	St	Ft	MPE
2023	January	848	848	0	1		
2023	February	852	852	0	1		
2023	March	746	746	0	1		
2023	April	737	737	0	1		
2023	May	859	859	0	1		
2023	June	987	987	0	1		
2023	July	851	851	0	1		
2023	August	808	808	0	1		
2023	September	928	928	0	1		
2023	October	921	921	0	1		
2023	November	751	751	0	1		
2023	December	820	820	0	1		
2024	January	852	??	??	??	??	??
2024	February	979					
2024	March	930					
2024	April	920					

In calculating the variable t is worth 13 and the variable s is worth 12, while the parameter values used for the variables α, β, γ are 0.1.

where
t : Period to be searched
s : Seasonal length (1 year = 12 months)
α, β, γ : Parameters with a value range between 0.1 to 0.9
Lt : Smoothing value for the tth level
Yt : Data from the previous time
Tt : Trend forecast
St : Seasonal forecast
Ft+p : Equation value for the next p periods
MPE : The value used to assess the prediction result

Step-1: To estimate the Overall Smoothing *(Lt)* value. At this stage, the predicted value for a given period is calculated using *Eq*:

$$Lt = \alpha \frac{Yt}{S_{t-s}} + (1 - \alpha)(L_{t-1} + T_{t-1}) \quad (1)$$

$$Lt = 0{,}1 \frac{Yt}{S_{13-12}} + (1 - 0{,}1)(L_{13-1} + T_{13-1}) \quad (2)$$

$$Lt = 0{,}1 \frac{Y_{13}}{1} + (1 - 0{,}1)(L_{12} + T_{12}) \quad (3)$$

$$Lt = 0{,}1 \frac{852}{1} + (0{,}9)(820 + 0) \quad (4)$$

$$Lt = 0{,}1\,(852) + (0{,}9)\,(820) \quad (5)$$

$$Lt = 85{,}2 + 738 \quad (6)$$

$$Lt = 823{,}2 \quad (7)$$

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

Step-2: Determine the trend smoothing value *(Tt)*. In the second step, an estimate of the increasing or decreasing trend is calculated using *Eq*:

$$Tt = \beta\ (L_t - L_{t-1}) + (1 - \beta)\, T_{t-1} \quad (8)$$
$$T_{13} = 0{,}1\ (L_{13} - L_{13-1}) + (1 - 0{,}1)\, T_{13-1} \quad (9)$$
$$T_{13} = 0{,}1\ (L_{13} - L_{12}) + (0{,}9)\, T_{12} \quad (10)$$
$$T_{13} = 0{,}1\ (823{,}2 - 820) + (0{,}9)\, 0 \quad (11)$$
$$T_{13} = 0{,}1\ (3{,}2) \quad (12)$$
$$T_{13} = 0{,}32 \quad (13)$$

Step-3: assigning values for Seasonal Smoothing *(St)*. At this stage, the forecast value for each season is calculated using the *equation:*

$$St = \gamma\ \frac{Y_t}{L_t} + (1 - \gamma)\, S_{t-s} \quad (14)$$
$$S_{13} = 0{,}1\ \frac{Y_{13}}{L_{13}} + (1 - 0{,}1)\, S_{13-12} \quad (15)$$
$$S_{13} = 0{,}1\ \frac{852}{823{,}2} + (0{,}9)\ (1) \quad (16)$$
$$S_{13} = 0{,}1\ (1{,}035) + (0{,}9) \quad (17)$$
$$S_{13} = 0{,}10 + 0{,}9 \quad (18)$$
$$S_{13} = 1 \quad (19)$$

Step-4: To estimate the forecast value *(Ft+p)*, this step involves calculating the estimated sales for January 2024 by applying an *Eq:*

$$F_t + p = (L_t + T_t\, p) + S_{t-s} + p \quad (20)$$
$$F_{12} + 1 = (L_{12} + T_{12}\, x\, 1) + S_{12-12} + 1 \quad (21)$$
$$F_{13} = (820 + 0\ x\ 1) + 1 \quad (22)$$
$$F_{13} = 820 + 1 \quad (23)$$
$$F_{13} = 821 \quad (24)$$

Step-5: Determining the accuracy of the prediction results *(MPE).* At this stage, it is done using *Eq*:

$$MPE = \sum_t^n \frac{PE_t}{n} \quad (25)$$

Where
Pet : Percentage error calculated by (Yt - Ft) x 100
Et : Period t error (Yt - Ft)
Yt : Actual value at period t
N : Total number of periods

$$PE_t = \left(\frac{Y_{13} - F_t}{Y_{13}}\right) 100 \quad (26)$$

$$PE_{13} = \left(\frac{852 - 821}{852}\right) 100 \quad (27)$$

$$PE_{13} = 3{,}63 \quad (28)$$
$$MPE = PE_t\ /\ n \quad (29)$$
$$MPE = 3{,}63\ /\ 13 \quad (30)$$
$$MPE = 0{,}27 \quad (31)$$

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

Conclusion of Analysis

The test results show a prediction error rate of 0.27. While the accuracy level of predicting sales of goods for January 2024 with a value of 73%.

RESULT

System Desaign

The design process is carried out with the help of the Unified Modeling Language (UML) modeling language. Unified Modeling Language (UML) is a good modeling language standard for software development that uses object-based programming methods. Class, use case, and activity diagrams are some types of diagrams commonly used in UML (Arianti et al., 2022).

Use Case Diagram

The interactions between elements and all system operations are depicted in the use case diagram (Setiawansyah et al., 2022). Figure 2 displays the use case diagram designed to show the features of the inventory management system. The admin is the only actor who communicates with the system. This interaction includes login, master data management, incoming and outgoing report data, and sales forecasting.

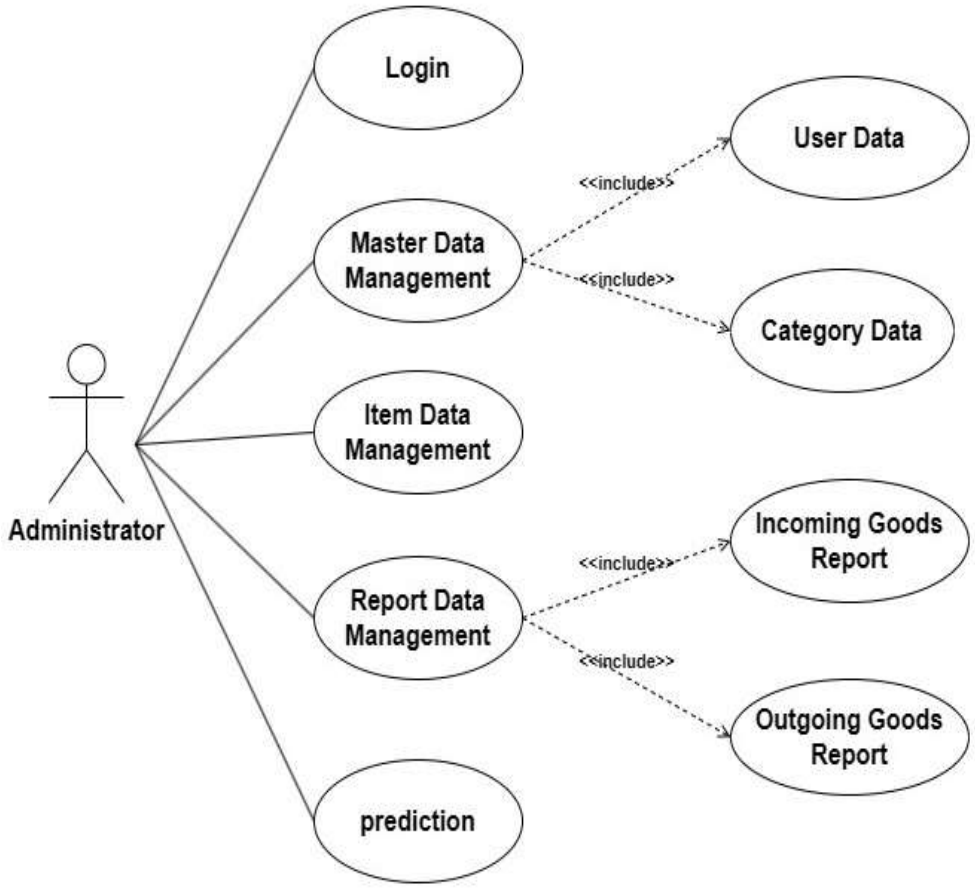

Figure 2. Usecase Diagram

Activity Diagram

Figure 3 shows the inventory system activity diagram, which includes three swimlanes of admin, system, and database. The function of this swimlane is to divide the activity diagram into rows and columns, to separate the tasks of objects that carry out activities (Azkiya et al., 2022).

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

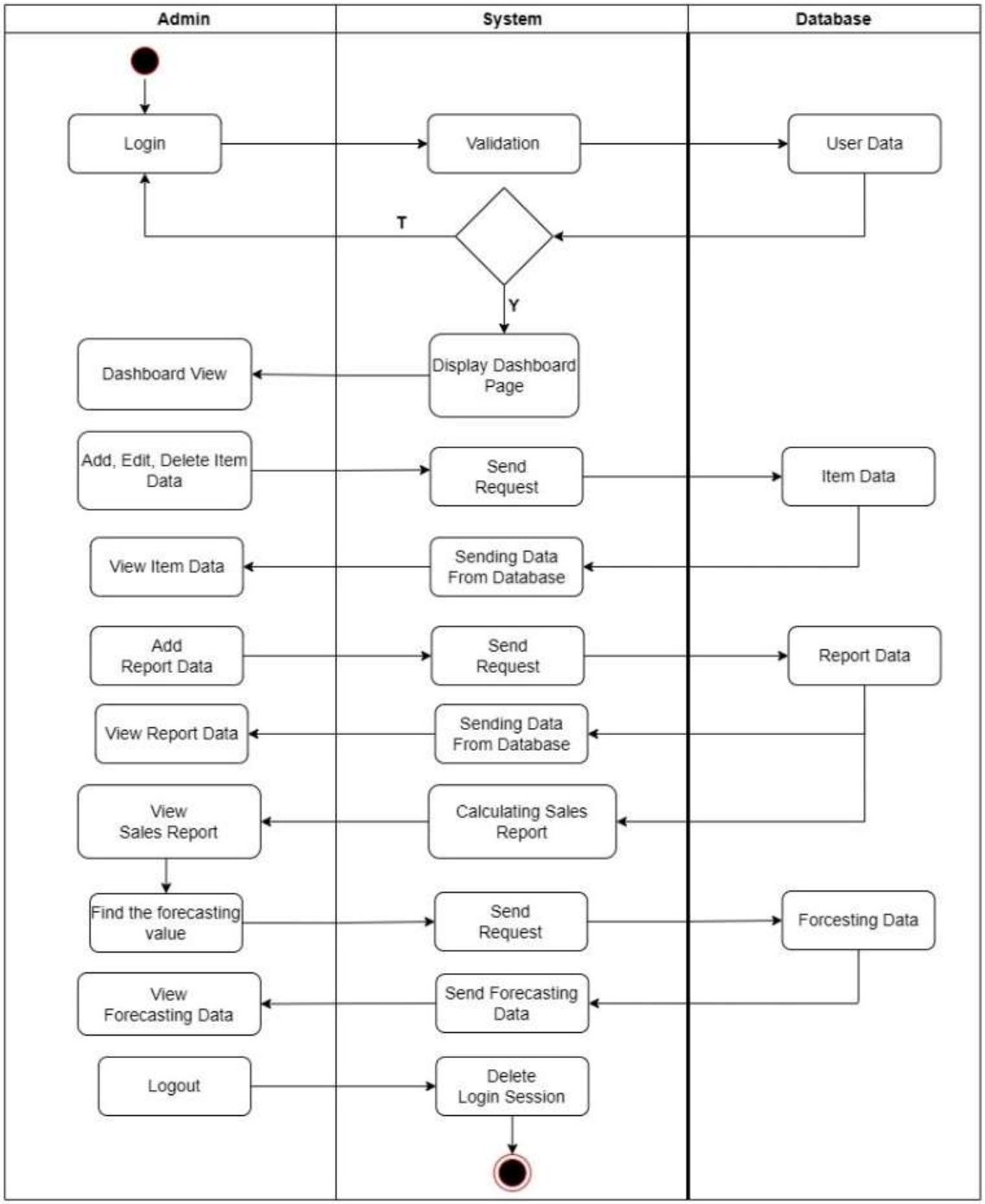

Figure 3. Activity Diagram

Class Diagram

A class diagram is a graphical representation of the structure of a system that focuses on identifying the classes required in the construction of the system. In this diagram, there are three essential components: class names, attributes, and operations (Suli & Nirsal, 2023). Figure 4 shows that the inventory system requires five main classes, namely: User table, Goods table, Goods receipt report table, Goods expenditure report table, and Goods prediction table.

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

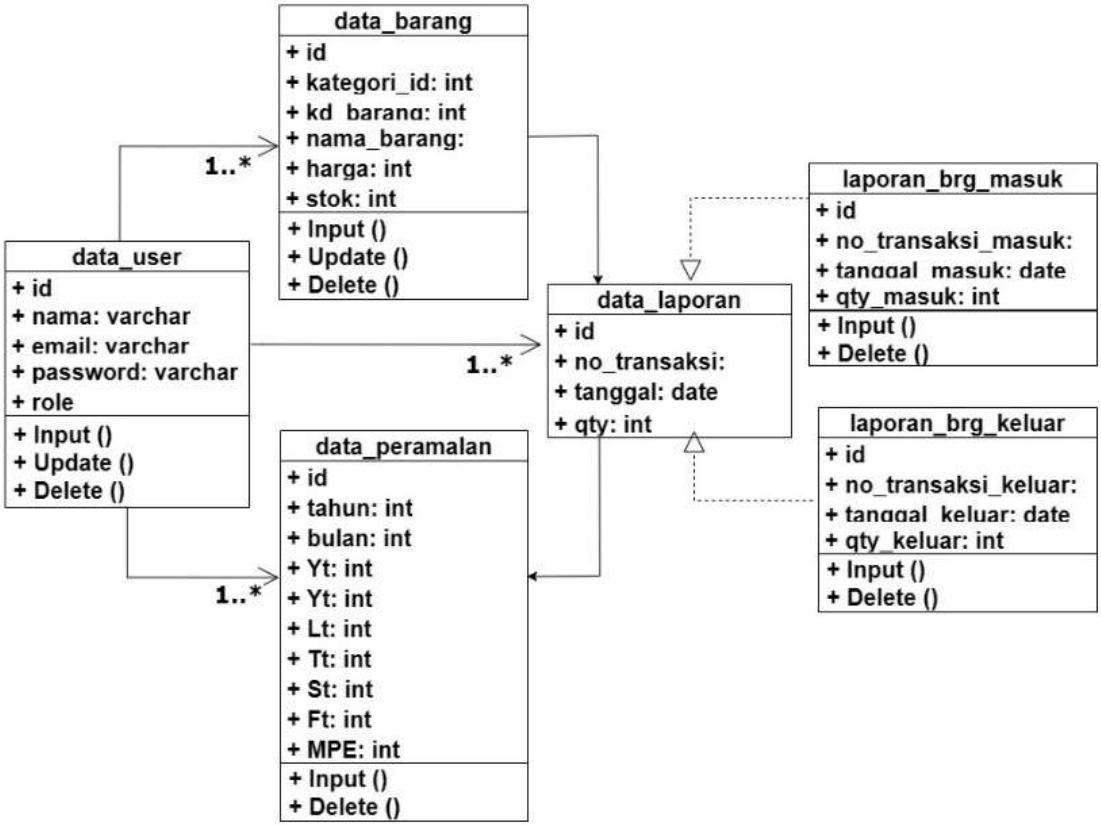

Figure 4. Class Diagram

System Implementation

The process of implementing program code in the PHP programming language includes converting system specifications into a usable system, resulting in an interface that makes it easy for users to access each feature.

Login view

The login page is shown in Figure 5, where an administrator is asked to enter the user's username and password to access the application. Upon successful login, the administrator will be directed to the dashboard page.

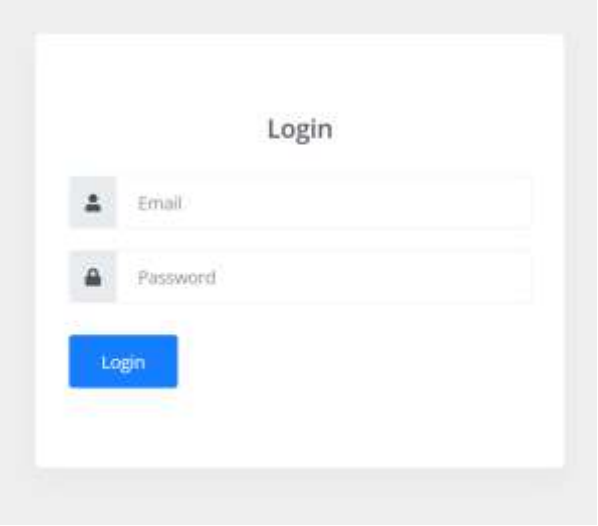

Figure 5. Login Page

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024
DOI : https://doi.org/10.33395/sinkron.v8i3.13791
e-ISSN : 2541-2019
p-ISSN : 2541-044X

Dashboard View

Figure 6 displays the dashboard page, where the admin can monitor user data, the number of item categories, as well as incoming and outgoing item data.

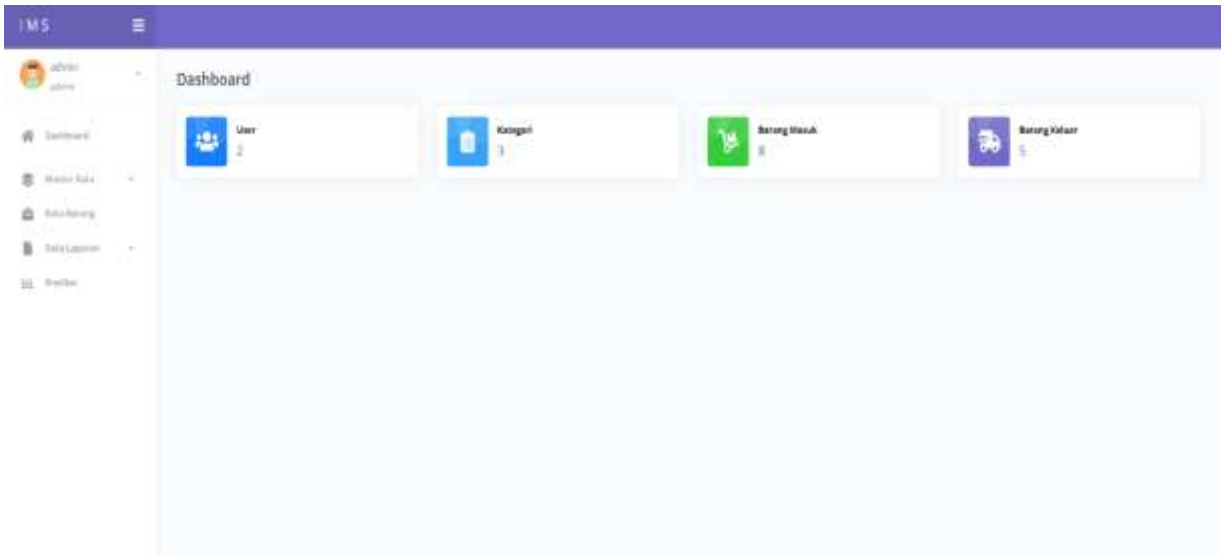

Figure 6. Dashboard Page

Item Data View

Figure 7 shows the item data page which includes item code, item name, category, stock, price, and buttons to edit and delete item data.

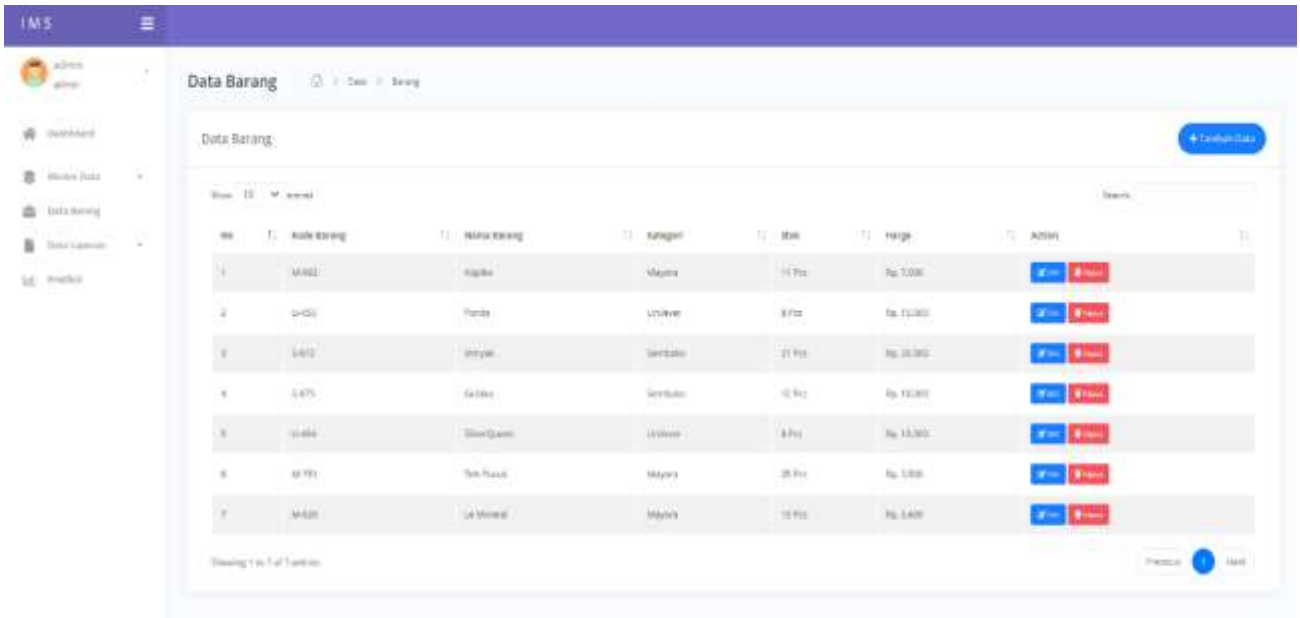

Figure 7. Item Data Page

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

Incoming Goods Report View

Figure 8 displays the incoming goods page which includes the transaction number, item name, date of entry, and the number of items received.

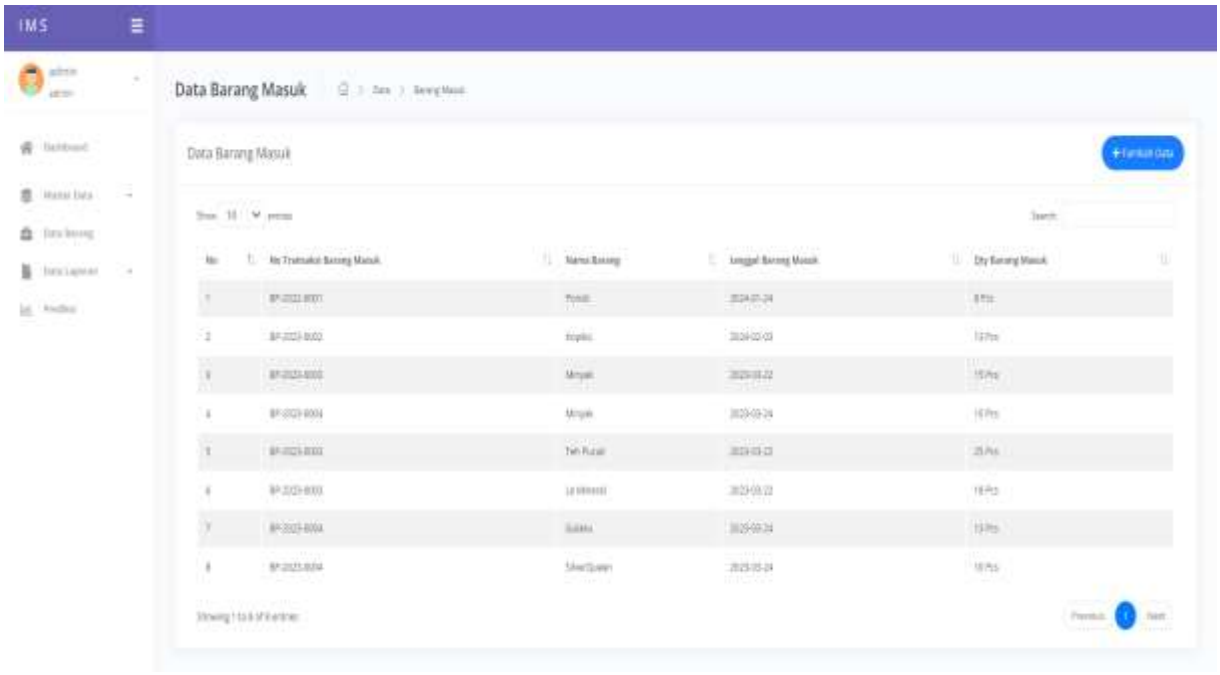

Figure 8. Incoming Goods Report Page

Outgoing Goods Report View

The goods exit page is shown in Figure 9 which includes the transaction number, item name, exit date, and the number of goods issued.

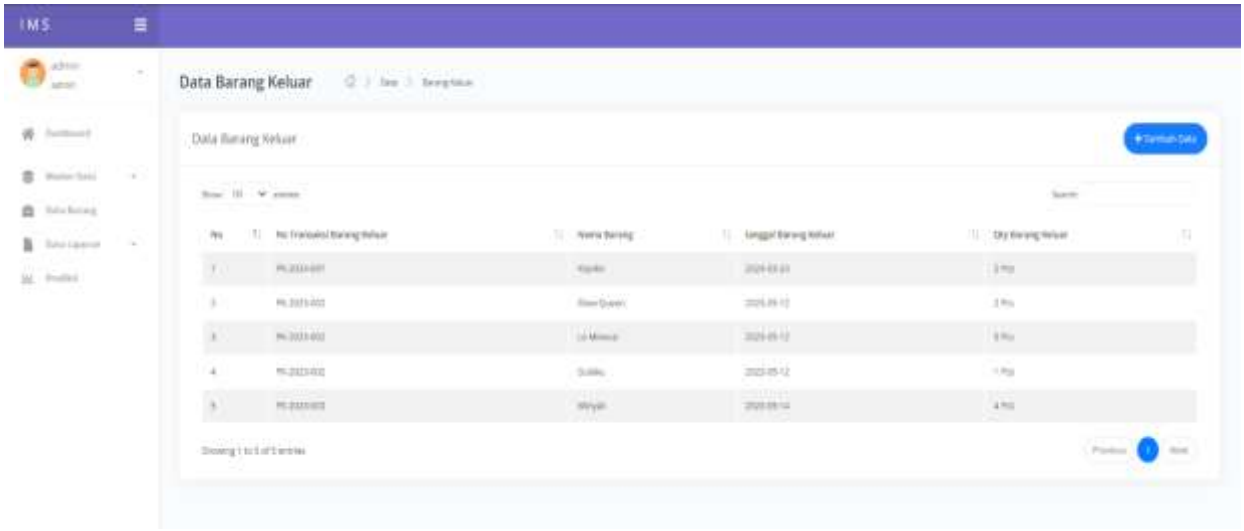

Figure 9. Outgoing Goods Report Page

*name of corresponding author

Sinkron : Jurnal dan Penelitian Teknik Informatika
Volume 8, Number 3, July 2024 e-ISSN : 2541-2019
DOI : https://doi.org/10.33395/sinkron.v8i3.13791 p-ISSN : 2541-044X

Prediction View

Figure 10 shows the prediction results made using the Holt-Winters calculation method, with the projected results in tabular form.

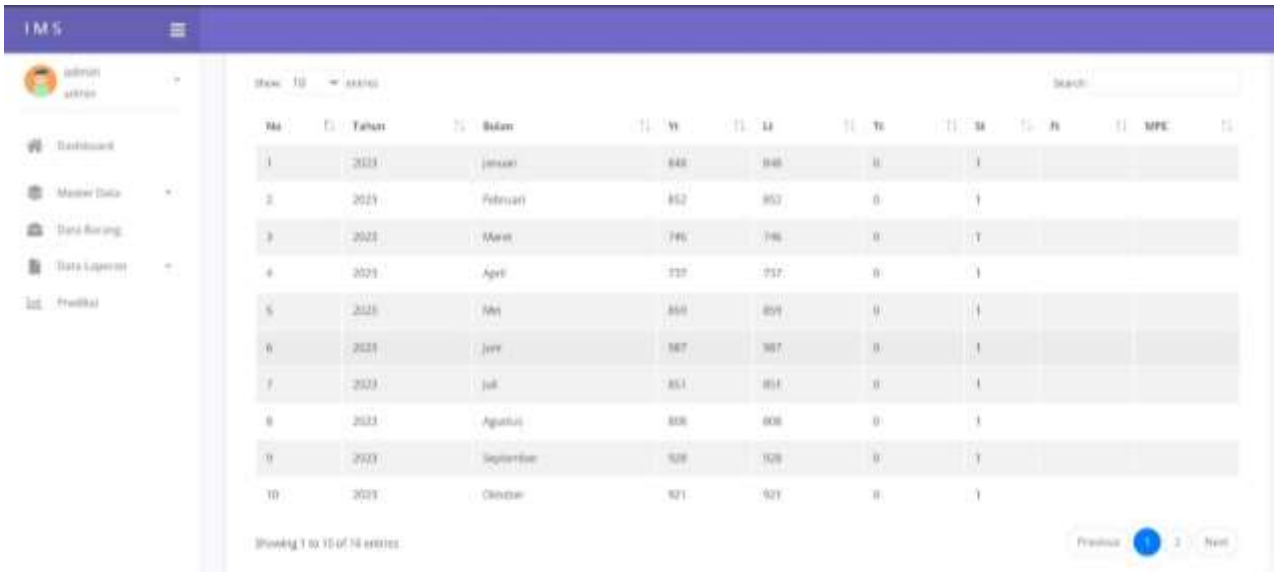

Figure 10. Prediction Page

System Testing

In Table 3 the black box testing method is used to evaluate the inventory system and how the software created works. The purpose of this check is to ensure that the application operation is by the specified requirements.

Table 3. Black Box Testing

Testing Activity	Expected Realizations	Testing Results	Conclusions
Login Button	To Dashboard Page	The login button works normally	**Valid**
Dashboard Page	Connect with database	Display Dashboard Page	**Valid**
Item Data View	able to display, edit, and delete	Display the Item Data Page	**Valid**
Create incoming and outgoing items button	Able to add incoming and outgoing goods	Able to add incoming and outgoing goods	**Valid**
Prediction Page	Able to display the prediction page	Display sales prediction	**Valid**

DISCUSSIONS

Every month, this inventory information system will track the sales of Nisrina Mart. The system uses one user, the administrator, to manage the incoming and outgoing sales report data. The system has several features, such as a dashboard page that displays overall system data and other features, such as master data, incoming and outgoing sales report data, and prediction data. The data needed by the system for this research was obtained directly from interviews with Nisrina Mart employees. The advantage of this system is the ability to monitor sales results and predict during a certain month period with the Holt-Winters Multiplicative method. In addition, the Waterfall software development method is used in this inventory system, so that each process flow in the system becomes clearer and more detailed.

*name of corresponding author

CONCLUSION

The conclusion of the inventory system design or IMS uses the FIFO method and the Holt-Winters multiplication method for sales forecasting analysis. Based on the results of testing beverage sales data in the January 2024 period, a prediction error rate of 0.27 was obtained, which shows a sales prediction accuracy rate of 73%. Based on the conclusions that have been obtained, there are several recommendations for future research. Researchers can improve the accuracy of inventory data by applying barcode scanning technology, which will help improve the speed and accuracy of data recording. In addition, future researchers are also advised to expand and develop analysis methods by integrating various other testing methods.

REFERENCES

Abdul Wahid, A. (2020). Analisis Metode Waterfall Untuk Pengembangan Sistem Informasi. *Jurnal Ilmu-Ilmu Informatika Dan Manajemen STMIK*, 1–5.

Anggraini, Y., Pasha, D., Damayanti, D., & Setiawan, A. (2020). Sistem Informasi Penjualan Sepeda Berbasis Web Menggunakan Framework Codeigniter. *Jurnal Teknologi Dan Sistem Informasi*, *1*(2), 64–70. https://doi.org/10.33365/jtsi.v1i2.236

Arianti, T., Fa'izi, A., Adam, S., & Wulandari M. (2022). Perancangan Sistem Informasi Perpustakaan Menggunakan Diagram Uml (Unified Modelling Language). *Jurnal Ilmiah Komputer Terapan Dan Informasi*, *1*(1), 19–25.

Azkiya, A., Kurniawan, R., & Sinurat, Y. (2022). Sistem Informasi Posyandu Berbasis Web Pada Posyandu Seroja Rt.15 Kelurahan Pangkalan Sesai Ahmedika. *Lentera Dumai*, *13*(1), 17–25.

Biandari, T. R., & Hrahap, L. (2021). Perancangan Sistem Pengendalian Internal Persediaan Barang Guest Supplies Pada Department Housekepping Di Hotel XYZ. *Competitive Jurnal Akuntansi Dan Keuangan*, *5*(2), 41–60.

Chen, Y. (2023). Prediction of Car License Auction Price in Guangzhou: Application of the Time-series Decomposition Model, the Holt-Winters Exponential Smoothing Model and the SARIMA Model. *Highlights in Science, Engineering and Technology*, *47*, 160–171. https://doi.org/10.54097/hset.v47i.8185

Dwi, F., Sofalina, J., & Handayani, N. (2023). Sistem Informasi Inventory Barang Dengan Metode FIFO Berbasis Website di Divisi Product Supply Robonesia.ID. *KESATRIA: Jurnal Penerapan Sistem Informasi (Komputer & Manajemen)*, *4*(1), 58–65.

Dwiza Ramadhan, F., & Misbahudin, A. (2023). Analisis Sistem Penyimpanan PT Pindad (Persero). *Jurnal Ilmiah Multidisipline*, *1*(11), 731–736. https://doi.org/10.5281/zenodo.10380657

Fauzi, A. A., Harto, B., Mulyanto, M., Pramuditha, P., Sudipa, I. G. I., Dwipayana, A. D., Sofyan, W., Jatnika, R., & Wulandari, R. (2023). PEMANFAATAN TEKNOLOGI INFORMASI PADA MASA SOCIETY 5.0 (Pemanfaatan teknologi informasi diberbagai sektor pada masa Society 5.0). In *Pemanfaatan Teknologi Informasi Pada Masa Society 5.0*. PT. Sonpedia Publishing Indonesia.

Gilang Sonar Amanu, Y. I. (2015). Pengembangan Sistem Pendukung Keputusan Pengadaan Dan Persediaan Barang Dengan Metode Perpetualinventory Method Dan Economic Order Quantity. *Journal Compiler, 4(1), 21–30.*

Ginting, J. P., & Gultom, P. (2024). Prakiraan Persediaan Obat Pada Puskemas Glugur Kota dengan Metode Holt Winters dan Fuzzy Time Series Cheng. *INNOVATIVE: Journal Of Social Science Research*, *4*(2), 5928–5939.

*name of corresponding author

Haris, A., Slamet, H., Ischak, R., Wulandari, S. A., Brillyantina, S., Agribisnis, J. M., Jember, N., Ekonomi, F., Islam, B., Islam, A., & Ponorogo, N. (2022). Komparasi Metode Peramalan Harga Daging Ayam Broiler Di Kabupaten Banyuwangi Menggunakan Jaringan Syaraf Tiruan Backpropagation dan Model Multiplicative Holt-Winters Comparation Method of Forecasting Broiler Chicken Meat Prices in Banyuwangi Regency Using. *Jurnal Paradigma Agribisnis*, *4*(2), 54–68.

Hidayatuloh, S., & Fadillah, M. S. (2022). Analisis Dan Perancangan Sistem Informasi Inventory Barang Berbasis Web Pada Kecamatan Setu. *Tekinfo: Jurnal Bidang Teknik Industri Dan Teknik Informatika*, *23*(1), 95–109. https://doi.org/10.37817/tekinfo.v23i1.1882

Ilham, F., & Paryanti, A. B. (2023). Implementasi Metode Economic Order Quantity (Eoq) Dalam Sistem Pengendalian Inventory Di Pt Sinergi Kreasi Utama. *Jurnal Ilmiah M-Progress*, *13*(2), 137–149. https://doi.org/10.35968/m-pu.v13i2.1067

Lefrandy Pradana, A., Wijana, K., & Sutedjo, B. (2022). Sistem Informasi Inventory Bahan Baku Dan Barang Menggunakan Metode FIFO Studi Kasus Sinergi Co-Working. *Jurnal Terapan Teknologi Informasi*, *6*(1), 11–25. https://doi.org/10.21460/jutei.2022.61.203

Mamit Thalia, K., Oktaviyani, D., Sylviana, F., Timang, J. H., Upr, K., Nyaho, T., & Raya, P. (2021). Sistem Informasi Inventory Berbasis Website (Studi Kasus : Pada Toko Obyth). *JOINTECOMS (Journal of Information Technology and Computer Science)*, *1*(1), 78–86.

Mariz, E. P., Sobri, M., Putra, A., Informasi, J. S., Komputer, F. I., Darma, U. B., Jenderal, J., Yani, A., & Palembang, N. (2017). Sistem Informasi Prediksi Stok Barang Menggunakan Metode. *Jurnal Ilmiah Fak. Ilkom*, *1*(1), 1–11.

Maysofa, L., Syaliman, K. U., & Sapriadi. (2023). Implementasi Forecasting Pada Penjualan Inaura Hair Care Dengan Metode Single Exponential Smoothing. *Jurnal Testing Dan Implementasi Sistem Informasi*, *1*(2), 82–91.

Pratiwi, M., Ilhami Arsyah, U., Pramana Gusman, A., & Muhammad, A. (2021). Sistem Inventory Menggunakan Metode Supply Chain Management dalam Mengatur Jumlah Ketersediaan Obat pada Apotik. *Indonesian Journal of Informatic Research and Software Engineering (IJIRSE)*, *1*(2), 139–145. https://doi.org/10.57152/ijirse.v1i2.143

Pribachtiar, R. A., & Utomo, A. P. (2021). Perancangan Sistem Informasi Inventory Barang (E-Gudang) Pada Cv Jaya Water Solusindo Berbasis Website. *Jurnal IKRAITH-INFORMATIKA*, *5*(3), 54–63.

Ratningsih, S., Pengendalian, E., Bahan Baku, P., & Cv, P. (2021). Penerapan Metode Economic Order Quantity (EOQ) Untuk Meningkatkan. *Jurnal Ekonomi & Manajemen Universitas Bina Sarana Informatika*, *19*(2), 158–164. https://doi.org/10.31294/jp.v17i2

Rizal Kurniawan, M., Dedy Irawan, J., & Santi Wahyuni, F. (2021). Forecasting Penjualan Kopi Dengan Metode Exponential Smoothing Berbasis Web (Studi Kasus Kedai Psycoffee). *Jurnal Mahasiswa Teknik Informatika)*, *5*(2), 517–525.

Rosita, Y. D., & Moonlight, L. S. (2024). Perbandingan Metode Prediksi untuk Nilai Jual USD: Holt-Winters, Holt's, dan Single Exponential Smoothing. *JTIM : Jurnal Teknologi Informasi Dan Multimedia*, *5*(4), 322–333. https://doi.org/10.35746/jtim.v5i4.473

*name of corresponding author

Sari, I. P., Batubara, I. H., Ramadhani, F., & Wardani, S. (2022). Perancangan Sistem Antrian pada Wahana Hiburan dengan Metode First In First Out (FIFO). *Sudo Jurnal Teknik Informatika*, *1*(3), 116–123. https://doi.org/10.56211/sudo.v1i3.93

Setiawansyah, Lestari, D. T., & Megawaty, D. A. (2022). Sistem Informasi Pkk Berbasis Website Menggunakan Framework Codeigniter (Studi Kasus Kampung Purwoejo). *Jurnal Informatika Dan Rekayasa Perangkat Lunak (JATIKA)*, *3*(2), 244–253.

Situmorang, Leonardo, A., & Purwaningsih, R. (2021). Model Inventory Economic Order Quantity (Eoq) Probabilistik Dalam Pengendalian Persediaan Material Pada Pt Pabrik Es Siantar. In *Seminar dan Konferensi Nasional IDEC*.

Suli, K. T., & Nirsal, N. (2023). Rancang Bangun Sistem Informasi Desa Berbasis Website (Studi Kasus Desa Walenrang). *Jurnal Ilmiah Teknologi Informasi*, *13*(1), 24–32.

*name of corresponding author