**FORECASTING DEMAND FOR GAMIS CLOTHES IN FASHION GALLERY USING THE WEIGHTED MOVING AVERAGE METHOD**

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# Abstract: This research discusses the prediction of demand for robes at the Fashion Gallery. Where the Fashion Gallery often experiences shortages or accumulations of the number of robes to be marketed, it does not match the number of requests from consumers. If stock is abundant, shop owners have to face additional burdens such as storage costs and demand costs which can be financially detrimental. On the other hand, if stock is too low, it can cause losses because the goods needed are not available, resulting in lost transactions. Therefore, in this research a program was created that implements the weighted moving average method to help predict the number of future requests for robes at the Fashion Gallery. The Weighted Moving Average (WMA) method that will be used involves giving different weights to the available data. The selection of these weights is based on the assumption that the latest data has higher relevance for forecasting. Thus, this system is expected to be an effective tool in inventory management, assist in making more informed decisions, and support sustainable growth in the fashion industry.

**Keywords:** Forecasting, Weighted Moving Average Method, Robe Request

**Abstrak:** Penelitian ini membahas tentang prediksi permintaan baju gamis pada Fashion Gallery. Dimana Fashion Gallery sering terjadinya kekurangan maupun penumpukkan jumlah baju gamis yang akan dipasarkan, tidak sesuai dengan jumlah permintaan dari konsumen. Jika stok berlimpah, pemilik toko harus menghadapi beban tambahan seperti biaya penyimpanan dan biaya permintaan yang dapat merugikan keuangan. Sebaliknya, jika stok terlalu minim, dapat menimbulkan kerugian karena barang yang dibutuhkan tidak tersedia, mengakibatkan kehilangan transaksi. Maka dari itu, dalam penelitian ini dibuat sebuah program yang mengimplementasikan metode *weighted moving average* untuk membantu memprediksi jumlah permintaan baju gamis untuk masa yang akan datang pada Fashion Gallery. Metode *Weighted Moving Average* (WMA) yang akan digunakan melibatkan pemberian bobot berbeda pada data yang tersedia. Pemilihan bobot ini didasarkan pada asumsi bahwa data terbaru memiliki relevansi yang lebih tinggi untuk peramalan. Dengan demikian, sistem ini diharapkan dapat menjadi alat yang efektif dalam manajemen persediaan, membantu dalam pengambilan keputusan yang lebih tepat, dan mendukung pertumbuhan yang berkelanjutan dalam industri fashion.

**Kata kunci : *Forecasting*, Metode *Weighted Moving Average*, Permintaan Baju Gamis.**

**INTRODUCTION**

Fashion business has now become an inseparable part of people's lives, especially because clothing is an essential need that cannot be avoided in various daily activities. This phenomenon is very striking, especially among the younger generation of women who like to explore various styles and the latest fashion trends. For them, looking stylish and following the latest trends is a way to look cooler and in line with the times[1].

One type of clothing that is popular, especially when celebrating Eid, is the gamis, especially for women. Gamis is characterized by its length that covers the ankles and long sleeves. Made from loose and comfortable materials such as cotton or rayon, gamis provides comfort for the wearer. Apart from that, the popularity of robes is also supported by a variety of designs and ornaments that can be adapted to the taste and needs of the wearer[2].

Gamis is not only a choice for formal events, but is also often used on various occasions, both religious and daily activities. This phenomenon reflects how fashion has become self-expression and an integral part of the lifestyle of modern society[3].

Fashion Gallery is a business operating in the fashion sector that has been established since 2020 , at the address on Jalan Sisingamaraja No.042 (under the tracks), Kisaran Timur District, Regency Sharpening. The products marketed by Fashion Gallery include tops, robes, trousers and skirts.

The main component in trading is inventory of goods. Merchandise inventory plays a crucial role in the world of trade. A small mistake in managing stock can have a big impact on the balance of the business. If stock is abundant, shop owners have to face additional burdens such as storage costs and demand costs which can be financially detrimental. On the other hand, if stock is too low, it can cause losses because the goods needed are not available, resulting in lost transactions. Fashion Gallery often experiences shortages or accumulations of the number of robes to be marketed, which does not match the number of requests from consumers .

Stock management is important because it is a key step in maintaining the stock level of an item at an optimal level. If stock is managed well, it can prevent unnecessary additional costs and ensure adequate availability of goods for customers. Therefore, stock control is not only about minimizing the risk of excess or shortage of stock, but also creating efficiency in business operations. Proper planning in inventory management not only optimizes profits, but also increases customer satisfaction by ensuring the availability of desired products. Therefore[4], Fashion Galleries must carefully monitor and adjust their stock to match demand levels and avoid potential problems that could harm the business by forecasting or predicting.

Forecasting is a technique or method used to assess feasible future conditions based on past data as a reference for planning preparation and decision making[5]. The forecasting capability in scope is to assess the amount of demand for merchandise in one or more following time periods depending on previous supply information.

For this reason, a system is needed to estimate the number of requests for gamis clothes using the *Weighted Moving Average* (WMA) method. The main objective of this system is to predict how much robe inventory needs to be prepared in the next period, so that it can efficiently fulfill customer demand at the Fashion Gallery. The *Weighted Moving Average (WMA)* method that will be used involves giving different weights to the available data. The selection of these weights is based on the assumption that the latest data has higher relevance for forecasting[6]. Therefore, the most recent data will be given greater weight in the calculations, resulting in more accurate predictions[7]. By implementing this system, it is hoped that we can maximize the number of requests for robes in the next period. Thus, this system is expected to be an effective tool in inventory management, assist in making more informed decisions, and support sustainable growth in the fashion industry.

**METHOD**

**Research Stages**

At this stage it will The research stages and research methodology are described which contain the steps in solving problems at the Fashion Gallery including:

**Studying Literature**

Search for reference information in the form of books, journals and study materials related to the topic of forecasting discussion.

**Data collection**

The data collection process carried out is in the form of interviews and observations to carry out observations and analysis of the process of predicting demand for robes at the Fashion Gallery so as to obtain the required data and information. Next, the data is analyzed for data processing.

**System planning**

System design is a critical stage in the software development cycle that involves transforming the results of system analysis into a detailed and implementable design. At this stage, the main focus is detailing how the information system will be organized and implemented to meet user needs and achieve business goals.

**System Implementation**

This stage is the stage in the software development cycle where the design that has been created is realized into code that can be run. This process involves building an application or system based on previously established specifications and designs. The following is a further explanation regarding the system implementation stage

**Use of the *Weighted Moving Average Method***

The system that will be created is a forecasting system for predicting demand for robes using the *Weighted Moving Average method.* Prediction of demand for the next month, namely January 2024. Based on a 1 year demand data table. To complete calculations using the *Weighted Moving Average (WMA) method* , you can use the formula[8],[9]:

………… .( 1)

Where

X t = Actual data in a certain period (t).

W = Weight

Forecasting error is measured by comparing actual data for the t-th period with forecast results for the same period. If the resulting error rate is smaller, the forecasting results will be more accurate. Error or error in forecasting is defined as the difference between the actual value and the value predicted by the model. The smaller the error value, the closer the forecasting results are to reality. Therefore, measuring and managing error rates is an important aspect in evaluating the performance of a forecasting method and improving prediction accuracy.

.........(2)

Where

Et : Error value

X t : Actual data for the t-th time period

F t : Forecast for the t period

For estimating the accuracy of numbers by averaging the assessed errors (direct value of each error) can use the following equation:

Mean square error is used to assess the determination strategy. The consequences of that error are quadratic. The calculation used for the error value in the experience is:

......................(4)

Where

Et 2 : Squared error value

n : Lots of data

**RESULTS AND DISCUSSION**

The first step is to analyze the system. Historical data on demand for robes at the Fashion Gallery will be calculated using the *Weighted Moving Average method* to find predictions of the number of requests for robes in the next period/month. Then the predicted value will be tested or the error value calculated using the *Mean Squared Error* (MSE) method. so that in the end a prediction value with the smallest error will be obtained. The data that will be used in this research is historical data on the number of requests for gamis clothes, from January 2023 to December 2024.

Table 1. Data on demand for Fashion Gallery robes

|  |  |  |
| --- | --- | --- |
| **Period** | **Gamis Request** | |
| **God** | **Small child** |
| Jan 2023 | 158 | 65 |
| Feb 2023 | 160 | 73 |
| Marc 2023 | 178 | 86 |
| Aprl 2023 | 180 | 90 |
| May 2023 | 168 | 78 |
| Jun 2023 | 172 | 89 |
| Jul 2023 | 159 | 66 |
| Augs 2023 | 160 | 71 |
| Sept 2023 | 153 | 69 |
| Octo2023 | 155 | 62 |
| Nove 2023 | 144 | 57 |
| Decem 2023 | 140 | 54 |

WMA = (( 178 \* 3) + ( 160 \* 2) + ( 158 \* 1 ) ) / (3 + 2 + 1) = 168.66667

WMA = (( 180 \* 3) + ( 178 \* 2) + ( 160 \* 1 ) ) / (3 + 2 + 1) = 176

WMA = (( 168 \* 3) + ( 180 \* 2) + ( 178 \* 1 ) ) / (3 + 2 + 1) = 173.6667

WMA = (( 172 \* 3) + ( 168 \* 2) + ( 180 \* 1 ) ) / (3 + 2 + 1) = 172

WMA = (( 159 \* 3) + ( 172 \* 2) + ( 168 \* 1 ) ) / (3 + 2 + 1) = 164.83333

WMA = (( 160 \* 3) + ( 159 \* 2) + ( 172 \* 1 ) ) / (3 + 2 + 1) = 161.83333

WMA = (( 153 \* 3) + ( 160 \* 2) + ( 159 \* 1 ) ) / (3 + 2 + 1) = 156.33333

WMA = (( 155 \* 3) + ( 153 \* 2) + ( 160 \* 1 ) ) / (3 + 2 + 1) = 155.16667

W MA = (( 144 \* 3) + ( 155 \* 2) + ( 153 \* 1 ) ) / (3 + 2 + 1) = 149.16667

W MA = ((140 \* 3) + ( 144 \* 2) + ( 155 \* 1 ) ) / (3 + 2 + 1) = 143.83333

The calculation of forecasting error using Mean Absolute Deviation (MAD), Mean Square Error (MSE), and Mean Absolute Percentance Error (MAPE) is as follows:

MAD = ( 11.33333333 + 8+ \_ 1.666666667 + 13 + 4.833333333 + 8.888888887 +

1.333333333 + 11.6666667 + 9.166666667 )

9

= **7.685185**

M S E = ( 128,444 + 64+ \_ 2.77778+ \_ 169+23.3611+75.1111+1.77778+

124.694 + 84.0278 )

9

= **74.79938**

MAPE = (6% + 5% + 1% + 8 % + 3% + 6% + 1% + 8% + 7% )

9

= **5%**

Table 2. Calculation of Predicted Demand for Gamis Clothes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Period** | **Request** | **Ft** | **Error** | **ABS Error** | **Error^2** | **MAPE** ( **%)** |
| Jan 2023 | 158 | - |  |  |  |  |
| Feb 2023 | 160 | - |  |  |  |  |
| Marc 2023 | 178 | - |  |  |  |  |
| Aprl 2023 | 180 | 168.66667 | -11 | 11.33333333 | 128,444 | 6% |
| May 2023 | 168 | 176 | 8 | 8 | 64 | 5% |
| Jun 2023 | 172 | 173.66667 | 2 | 1.666666667 | 2.77778 | 1% |
| Jul 2023 | 159 | 172 | 13 | 13 | 169 | 8% |
| Augs 2023 | 160 | 164.83333 | 5 | 4.833333333 | 23.3611 | 3% |
| Sept 2023 | 153 | 161.66667 | 9 | 8.666666667 | 75.1111 | 6% |
| Octo2023 | 155 | 156.33333 | 1 | 1.333333333 | 1.77778 | 1% |
| Nove 2023 | 144 | 155.16667 | 11 | 11.16666667 | 124,694 | 8% |
| Decem 2023 | 140 | 149.16667 | 9 | 9.166666667 | 84.0278 | 7% |
| January 2024 | **Prediction** | **143.83333** |  |  |  |  |

Table 3. Analysis of Prediction Errors in Demand for Adult Robes

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Period** | **Request** | **Ft** | **Error** | **ABS Error** | **Error^2** | **MAPE** ( **%)** |
| Jan 2023 | 158 | - |  |  |  |  |
| Feb 2023 | 160 | - |  |  |  |  |
| Marc 2023 | 178 | - |  |  |  |  |
| Aprl 2023 | 180 | 168.66667 | -11 | 11.33333333 | 128,444 | 6% |
| May 2023 | 168 | 176 | 8 | 8 | 64 | 5% |
| Jun 2023 | 172 | 173.66667 | 2 | 1.666666667 | 2.77778 | 1% |
| Jul 2023 | 159 | 172 | 13 | 13 | 169 | 8% |
| Augs 2023 | 160 | 164.83333 | 5 | 4.833333333 | 23.3611 | 3% |
| Sept 2023 | 153 | 161.66667 | 9 | 8.666666667 | 75.1111 | 6% |
| Octo2023 | 155 | 156.33333 | 1 | 1.333333333 | 1.77778 | 1% |
| Nove 2023 | 144 | 155.16667 | 11 | 11.16666667 | 124,694 | 8% |
| Decem 2023 | 140 | 149.16667 | 9 | 9.166666667 | 84.0278 | 7% |
| January 2024 | **Prediction** | **143.83333** |  |  |  |  |
|  | **MAD** | **7.685185** |  |  |  |  |
|  | **MSE** | **74.79938** |  |  |  |  |
|  | **MAPE (%)** | **5%** |  |  |  |  |

W MA = (( 86 \* 3) + ( 73 \* 2) + ( 65 \* 1 ) ) / (3 + 2 + 1) = 78.166667

W MA = (( 90 \* 3) + ( 86 \* 2) + ( 73 \* 1 ) ) / (3 + 2 + 1) = 85.833333

W MA = (( 78 \* 3) + ( 90 \* 2) + ( 86 \* 1 ) ) / (3 + 2 + 1) = 83.333333

W MA = (( 89 \* 3) + ( 78 \* 2) + ( 90 \* 1 ) ) / (3 + 2 + 1) = 85.5

W MA = (( 66 \* 3) + ( 89 \* 2) + ( 78 \* 1 ) ) / (3 + 2 + 1) = 75.666667

W MA = (( 71 \* 3) + ( 66 \* 2) + ( 89 \* 1 ) ) / (3 + 2 + 1) = 72.333333

W MA = (( 69 \* 3) + ( 71 \* 2) + ( 66 \* 1 ) ) / (3 + 2 + 1) = 69.166667

W MA = (( 62 \* 3) + ( 69 \* 2) + ( 71 \* 1 ) ) / (3 + 2 + 1) = 65.833333

W MA = (( 57 \* 3) + ( 62 \* 2) + ( 69 \* 1 ) ) / (3 + 2 + 1) = 60.666667

W MA = ((54 \* 3) + ( 57 \* 2) + ( 62 \* 1 ) ) / (3 + 2 + 1) = 56.333333

The calculation of forecasting error using Mean Absolute Deviation (MAD), Mean Square Error (MSE), and Mean Absolute Percentance Error (MAPE) is as follows:

Mean Absolute Deviation (MAD) to calculate the number of errors .

MAD = ( 11.83333333 + 7.833333333+ \_ 5.666666667 + 19.5 + 4.833333333

+ 3.333333333 + 7.166666667 + 8.833333333 + 6.666666667 )

9

= 8.388889

Mean Squared Error (MSE) to evaluate forecasting methods.

M S E = ( 140.0278 + 61.36111+ \_ 32.11111+ \_ 380.25 + 21.77778 + 11.11111

+ 51.36111 + 78.02778 + 44.44444 )

9

= 91.16358

Mean Absolute Percentage Error (MAPE) to calculate the percentage error.

MAPE = (13% + 10% + 6% + 30 % + 7% + 5% + 12% +15% + 12% )

9

= 12%

Table 4. Calculation of Predictions for Demand for Small Children's Dresses

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Period** | **Request** | **Ft** | **Error** | **ABS Error** | **Error^2** | **MAPE** ( **%)** |
| Jan 2023 | 65 | - |  |  |  |  |
| Feb 2023 | 73 | - |  |  |  |  |
| Marc 2023 | 86 | - |  |  |  |  |
| Aprl 2023 | 90 | 78.166667 | -12 | 11.83333333 | 140.0278 | 13% |
| May 2023 | 78 | 85.833333 | 8 | 7.833333333 | 61.36111 | 10% |
| Jun 2023 | 89 | 83.333333 | -6 | 5.666666667 | 32.11111 | 6% |
| Jul 2023 | 66 | 85.5 | 20 | 19.5 | 380.25 | 30% |
| Augs 2023 | 71 | 75.666667 | 5 | 4.666666667 | 21.77778 | 7% |
| Sept 2023 | 69 | 72.333333 | 3 | 3.333333333 | 11.11111 | 5% |
| Octo2023 | 62 | 69.166667 | 7 | 7.166666667 | 51.36111 | 12% |
| Nove 2023 | 57 | 65.833333 | 9 | 8.833333333 | 78.02778 | 15% |
| Decem 2023 | 54 | 60.666667 | 7 | 6.666666667 | 44.44444 | 12% |
| January 2024 | **Prediction** | **56.333333** |  |  |  |  |

Table 5. Analysis of Prediction Errors in Demand for Small Children's Dresses

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Period** | **Request** | **Ft** | **Error** | **ABS Error** | **Error^2** | **MAPE** ( **%)** |
| Jan 2023 | 65 | - |  |  |  |  |
| Feb 2023 | 73 | - |  |  |  |  |
| Marc 2023 | 86 | - |  |  |  |  |
| Aprl 2023 | 90 | 78.166667 | -12 | 11.83333333 | 140.0278 | 13% |
| May 2023 | 78 | 85.833333 | 8 | 7.833333333 | 61.36111 | 10% |
| Jun 2023 | 89 | 83.333333 | -6 | 5.666666667 | 32.11111 | 6% |
| Jul 2023 | 66 | 85.5 | 20 | 19.5 | 380.25 | 30% |
| Augs 2023 | 71 | 75.666667 | 5 | 4.666666667 | 21.77778 | 7% |
| Sept 2023 | 69 | 72.333333 | 3 | 3.333333333 | 11.11111 | 5% |
| Octo2023 | 62 | 69.166667 | 7 | 7.166666667 | 51.36111 | 12% |
| Nove 2023 | 57 | 65.833333 | 9 | 8.833333333 | 78.02778 | 15% |
| Decem 2023 | 54 | 60.666667 | 7 | 6.666666667 | 44.44444 | 12% |
| January 2024 | **Prediction** | **56.333333** |  |  |  |  |
|  | **MAD** | **8.388889** |  |  |  |  |
|  | **MSE** | **91.16358** |  |  |  |  |
|  | **MAPE (%)** | **12%** |  |  |  |  |

**CONCLUSION**

Based on the results of testing the forecasting calculations that have been carried out and analysis of the Error Forecasting table, several significant conclusions can be drawn. The Weighted Moving Average method has proven effective for predicting the number of requests for adult and small children's robes at the Fashion Gallery. The level of prediction accuracy of the Weighted Moving Average method is measured through several forecasting performance evaluation indicators. with a Mean Absolute Deviation (MAD) value of 7.685185, indicating that the average absolute error of predictions on actual data is relatively low. Mean Square Error (MSE) with a value of 74.79938 reflects a lower error rate overall. Mean Absolute Per-centage Error (MAPE) of 5% indicates that the average percentage error relative to actual demand is quite low. Thus, based on the values of the forecasting performance evaluation indicators, it can be concluded that the Weighted Moving Average method can be relied on to predict the demand for robes in the next period at the Fashion Gallery with a satisfactory level of accuracy.

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