

Universiti Teknologi MARA

**Forecasting Of Pharmaceutical Products
Using Arima Model And Exponential Smoothing**

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STUDENT'S DECLARATION

I certify that this report and the research to which it refers are the product of my own work and that any ideas or quotation from the work of other people, published or otherwise are fully acknowledged in accordance with the standard referring practices of the discipline.

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ABSTRACT

The pharmaceutical industry creates, manufactures, and sells vaccines or pharmaceutical drugs as medications to be prescribed (or self-administered) by patients for healing, vaccinating, or alleviating symptoms. The expiry date is the most important thing to be aware of to avoid consumer purchasing an expired product. It would harm their well-being where the customer then may take legal actions. Therefore, it is crucial to know how much to stock up the product. In this research, the selected methods include a single and double exponential smoothing model and the ARIMA model. Data on two types of pharmaceutical products, Paracap 500mg and Bena Expectorant 120ml, were collected from a pharmacy's database in Kangar from January 2015 to December 2019. Microsoft Excel and R Programming were used to analyze the data. As the result, between both exponential smoothing models, single exponential smoothing is the best model to forecast the demand of Paracap 500mg and Bena Expectorant 120ml. For the ARIMA model, depending on the smallest value of MSE, ARIMA (2,1,1) is the best model to forecast the demand of Paracap 500mg, while ARIMA (1,1,2) for Bena Expectorant 120ml. Finally, for the final and the best option, a comparison of MSE, RMSE and MAPE values was made between single exponential smoothing and ARIMA model for Paracap 500mg and Bena Expectorant 120ml. The result indicates that single exponential smoothing has been selected for both product as the best model to forecast the demand starting from January 2020.

Keywords : Time series, exponential smoothing, ARIMA models, pharmaceutical products, expiration date

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