

UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

**A COMPARATIVE STUDY OF LEAST SQUARE
METHOD, EXPONENTIAL SMOOTHING METHOD AND
MOVING AVERAGE TO
PREDICT FUTURE SALES OF PHARMACY**

SITI NAJIHAH BINTI MD AJEMAN (2019422894)

QASHRINA BALQIS BINTI JAMIL (2019405798)

FATIN NURUL IZZAH BINTI AHMAD HASBULLAH (2019415338)

(P48M22)

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ABSTRACT

The Least Square Method (LSM) is widely utilized in data fitting, with the best fit minimizing the residual squared sum and can be used to forecast pharmacies sales. LSM can be divided into two categories, linear LSM and nonlinear LSM. Apart from LSM, Exponential Smoothing (ESM) and Moving Average (MA) are also used for forecasting. ESM is a time series forecasting method for univariate data that can be extended to support data with a systematic trend or seasonal component while MA is a statistical method used for forecasting long-term trends. These methods are only accurate when there is a reasonable amount of continuity between the past and the future. This study is to determine a model that fits the pharmacy data using LSM, ESM and MA. This study will compare which method is preferable by comparing their error using Root Mean Square Error (RMSE) and Mean Absolute Percentage Error (MAPE). We can predict the future sales of pharmacy for the next 5 years (2022-2026) using the preferable method. From the results of the study, the function that is obtained from LSM is quartic which is the best fit. It can be concluded that prediction analysis by using quartic can be used to predict the sales for the coming period based on the pharmacies data in the previous years, because it produces the smallest error. It can show that the pharmacies sales are decreasing after the pandemic Covid-19 because due to a price war between other pharmacies offering cheaper prices. The recommendation for the next study is to use Box-Jenkins based ARIMA model, Euler Method and Runge-Kutta to make prediction of pharmacies sales. Not only that, but it is also better to use larger data to make the curve fitting smoother for forecasting.