# Investigate ARIMA and ARIMAX Models for predicting paddy production in Vavuniya district in Sri Lanka

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In time series analysis, an Autoregressive Integrated Moving Average (ARIMA) modeling technique is used. When an ARIMA model includes other time series as input variables, the model is referred to as an ARIMAX model. The rainfall is the main factor which influences the production levels of paddy which we shall refer to as intervention events. Some of the other important factors are the harvested area, sown area, year of production and Agro-mechanical techniques etc. used. Due to the unsettled situation for last two decades in this district, the data source centers could not collect data in this period to study the production level to implement developing programs particularly rainfall data but harvested area, sown area of paddy yield are available in this period. Although rainfall data is available for a large number of metrological stations in Sri Lanka, Vavuniya district has not been included in their list of stations. Metrological department has developed an advanced substation for this district recently and therefore it was not possible to obtain reliable rainfall data from 1979 to 2010 in Vavuniya district. More sophisticated models could be developed using ARIMA and ARIMAX modeling techniques for the production levels of paddy by using the most correlated factors Sown and Harvested area of paddy production level. We used ARIMAX (0, 1, 1) for Maha season and ARIMAX (2, 1, 0) for Yala season with Sown and harvested areas as covariates. When comparing the ARIMAX covariate model with the baseline univariate ARIMA models, we found that inclusion of covariates improve the fit RMSE by 14.36% for Maha season and 11.32% for the Yala season.

Keywords: ARIMA, ARIMAX, Univariate model and Covar

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