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Generalized Space Time Autoregressive Integrated Moving Average (GSTARIMA) Model to Forecast Cocoa Export Volume

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Abstract. Generalized Space Time Autoregressive (GSTAR) is one of time series model used to forecast the data consisting the element of space and time. This model is limited to the stationary and non-seasonal data. Generalized Space Time Autoregressive Integrated Moving Average (GSTARIMA) is GSTAR development model that accommodates the non-stationary and seasonal data. In this research, the model was applied to the monthly cocoa export volume data from DKI Jakarta, Jawa Tengah and Jawa Timur in the last 8 years. Indonesian cocoa export volume in the third position in the world trade, after Ivory Coast and Ghana. Identification of the AR and MA are using the minimum value of AIC. Spatial order is chosen in first order because all of the provinces in this research are located in one island. From the two spatial weight matrix, which distance inverse and normalized cross-correlation between locations to the corresponding lag, we have the minimum MSE value to the data is distance inverse.

Keywords: *Space time, GSTAR, GSTARIMA, Cocoa*

INTRODUCTION

Export is important in obtaining foreign exchange and push the national economic growth. One of the Indonesian export commodity is cocoa, which is in the third position in the world trade after Ivory Coast and Ghana. Base on scientific bulletin from Department of Trade, Indonesian cocoa export volume has a seasonal pattern.

Volume of Indonesian cocoa export data are recorded simultaneously in several locations at the space time data, so it can be modeled with GSTARIMA procedure. GSTARIMA model is develop from ARIMA (George E. P. Box and Gwilym M. Jenkin, 1970) and STARIMA (Pfeifer and Deutsch, 1980) for non-stationary time series data in which has an autoregressive and moving average element.

This study used monthly volume of cocoa export data from DKI Jakarta, Jawa Tengah and Jawa Timur. Period of the data start from January 2008 until December 2015, which is provide by Statistics Indonesia (BPS). Background of this data selection is because these three locations are located in the same island and they constantly exporting cocoa in that period.

Forecasting cocoa export volume data can help the government to make better policy in exporting activity and also to predict balance of trade. The aims of this study are to develop GSTARIMA model for cocoa export volume data using inverse distance and cross correlation weight matrix and forecast the cocoa export volume.