School of Postgraduate Studies &

Researchis pleased to announce

the oral defense of thesis of

Muse M. Kalinle

Entitled

Modeling and Forecasting Impact of Climatic and Non-Climatic Factors on Maize Production in Somalia. An Integrated Modeling Framework

For the degree of

Master of Science in Applied Statistics

Date: June 23, 2024

Venue: school of Postgraduate Studies & Research, Borama
Time: 2:00

Supervisor: Dr. Omran Salah
Panel Chairman: Dr. Sharmarke Jama (chair)
Panel member: Dr. Hamda Mowlid (Secretary)
Dr. Mohamoud Hussein
Dr. Werku Kasha Hareru
Dr. Tesfu
Dr. Abdisalan Hasan Muse

ABSTRACT

Maize is the second most abundantly produced cereal worldwide and is known as the queen of cereals due to its highest genetic yield potential. Its versatility and adaptability under varied agro-climatic conditions make it an emerging crop of global significance. Understanding and forecasting the impacts of climatic and non-climatic change factors on maize production is crucial for developing effective adaptation strategies and ensuring sustainable agricultural practices. the aims of this study are to contribute the broader understanding of maize production dynamics in the

face of changing climatic and non-climatic factors, ultimately promoting sustainable agriculture and food security.

The study used annual time series data for 58 years. The data were obtained from secondary data in FAO Centre and World Bank. The data analysis used Vector Autoregressive (VAR) and Autoregressive Distributive Lag (ARDL) model, to determine the stationary behavior of the variables, unit root tests such as the Augmented Dickey-Fuller (ADF) and Phillip-Perron (PP) tests were applied. The optimal lag order is chosen based on minimizing information criteria (AIC, SC, HQ) or maximizing the log-likelihood (LL). The results show that most variables become stationary after the first difference, except for CO_2 emissions and urban population. The researcher suggests using an autoregressive disturbed lag model instead of a Vector Autoregressive model. The optimal lag order is determined by minimizing information criteria or maximizing log-likelihood. In the long run, temperature, CO_2 emissions, and political stability have a significant positive impact on the dependent variable, while land under cereal, and urban population have negative significant impact on the depend variable. Furthermore all climatic and non-climatic factors have significant influence in the dependent variable.

We conclude that Both the ARDL bounds test and the Johansen and Juselius (JJ) cointegration test confirm the existence of a long-term equilibrium connection between climate variables, non-climate variables, agricultural output, and maize production. Finally, this indicates that climate factors, particularly temperature, have a notable and positive influence on maize output. But, non-climatic factors such as cultivated land and political stability also have a positive impact. These findings provide valuable insights for policymakers to tackle the challenges posed by climate change.

Keyword: Time Series, Maize Production, ARDAL, VAR, World Bank.