AGRICULTURAL SECTOR MODELLING:ENHANCING THE DEVELOPMENT OF SMALLHOLDERS

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This paper presents the benefit of using agricultural sector modeling (e.g. MAgPA) to enhance the development of smallholders in Malaysia. Malaysian Agricultural Policy Analysis (MAgPA) is an analytical tool to forecast major variables in the commodity sector as well as to simulate the impact of changes in macroeconomic variables both in the domestic and international fronts as well as other predetermined variables on the overall agricultural sector. The aims of MAgPA are: (i) to develop and build an empirical **forecasting model** for the agricultural sector as well as for the related agricultural commodities based on time series data and econometric models; (ii) to perform **simulations** for tracing responses of policy changes and to determine the impact of changes in the international environment on the Malaysian agricultural sector; (iii) to **train and build capacity of selected officers** from related ministries and agencies the process of developing and building empirical forecasting model for the agricultural sector; and (iv) to prepare **a complete manual** for the purpose of developing and building a complete empirical forecasting model for Malaysian agriculture. Figure 1 describes the process of MAgPA model development.

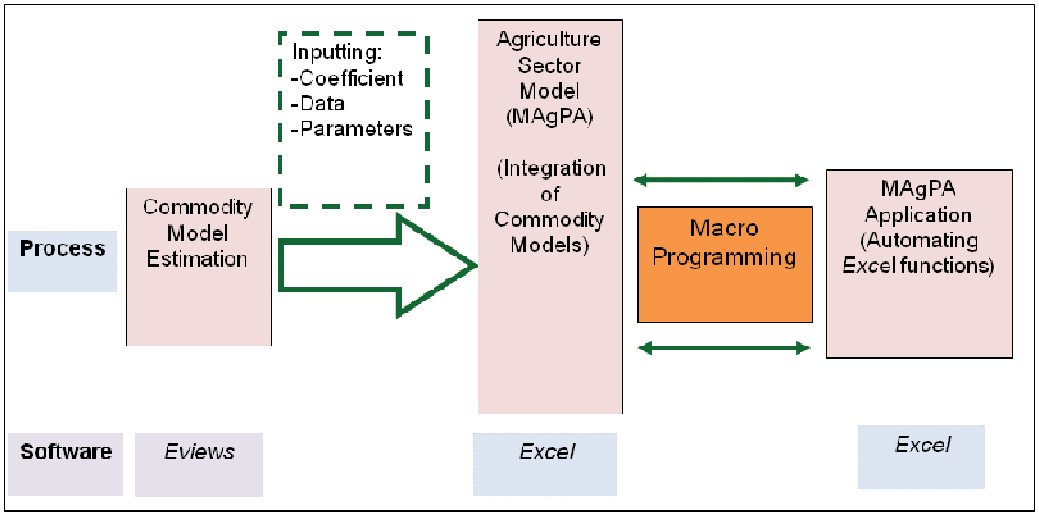

Figure 1. Processes of MAgPA Model Development

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Meanwhile, commodities included in the model are categorized into 6 groups of commodities namely: (i) industrial crops (i.e., palm oil, rubber, cocoa, pepper and tobacco); food crops (i.e., paddy and rice, fruits, vegetables and pineapple); (iii) livestock (i.e., ruminants and non-ruminants); (iv) fisheries (i.e., marine and aquaculture); (iv) saw-logs; and (vi) others (i.e., sago, herbs and floriculture). The big picture: of Commodity and Policy Modeling System is presented in Figure 2.

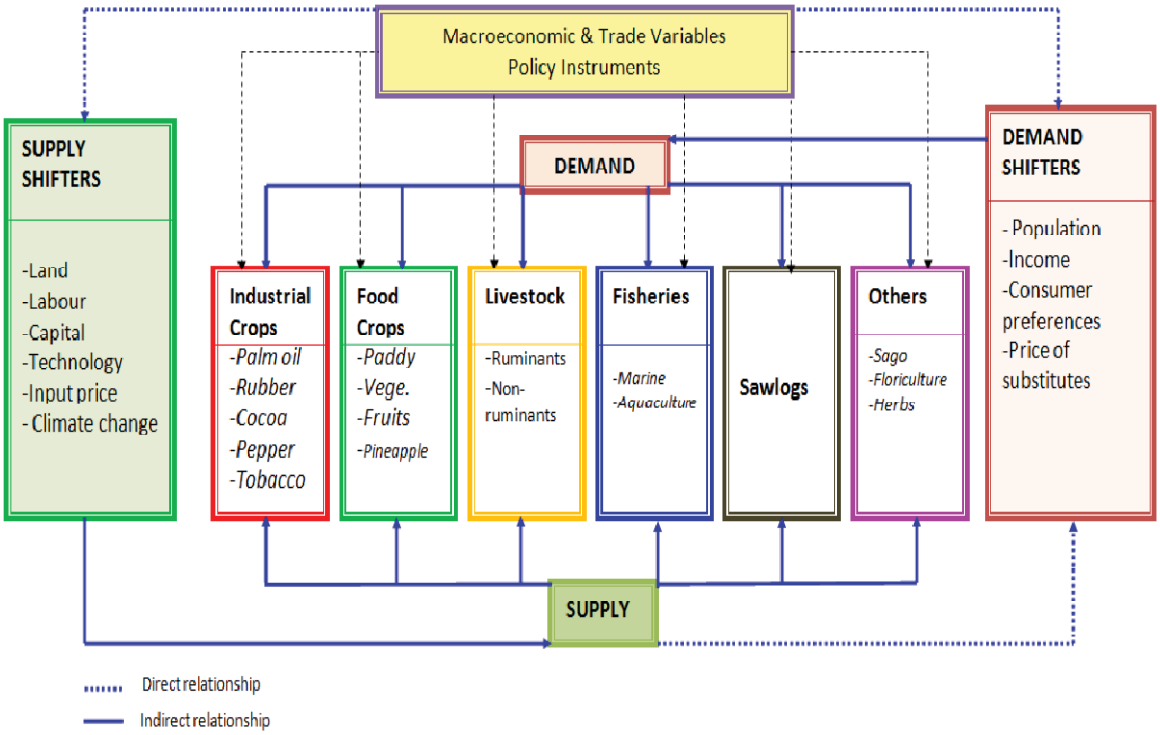

Figure 2. The Big Picture: Commodity and Policy Modeling System

Figure 2 shows that MAgPA Model system involves a range of macroeconomic variable data series (both domestic and international), pre determined variables, parameters and policy variables. More detail of MAgPA model system is described in Figure 3.

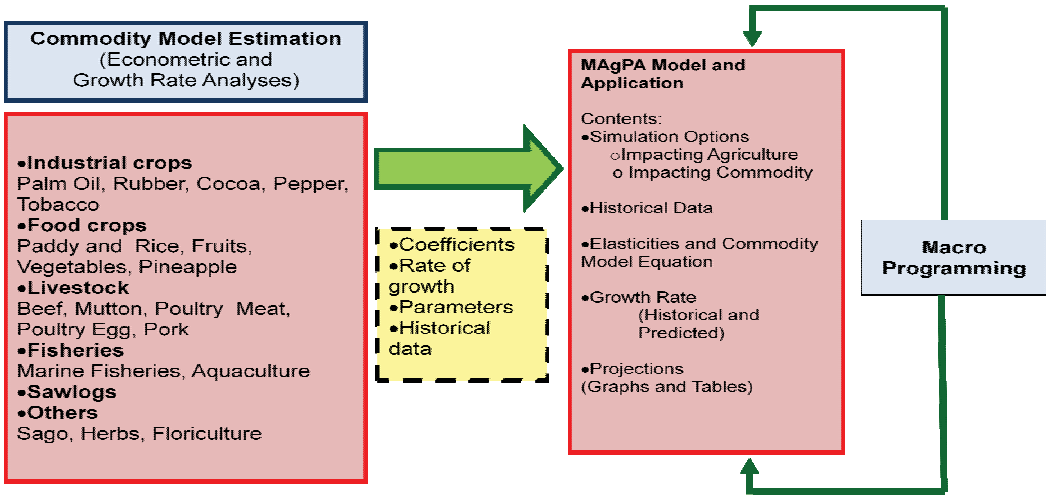

Figure 3. MAgPA Model System

Conclusion and Implications

Based on some observations towards MAgPA model, some advantages of using the MAgPa models are identified including:

1. MAgPA model is richer vs current agricultural sector model in Malaysia-capable of estimating forecasts and simulating macroeconomic variable changes both for commodity sectors and for the agriculture sector as a whole. The model is able to estimate the impact of the macroeconomic changes on the agriculture value added as well as the contribution from the sub-sectors within; in which the role of smallholders are important and therefore should be prioritized.
2. The model has three major applications
   a. Policy simulation analysis;
   b. Projections – i.e. to project supply and demand of commodity; and
   c. Policy guidance.
3. The model is able to estimate the behavioural linkage between selected sectors.

Some disadvantages, however, are also found in the system including:

1. Data limitation as shown in the case of fruits and vegetables, sawlogs (inadequate data for Sabah and Sarawak) and “other” crops.
2. Omission of relevant variables such as technology and labor cost, also due to data problem.
3. Feedback loop analysis is limited.

Implications of the models in the long run include:

1. Generally agricultural GDP will increase due to fundamental factors, ie., in supply and demand shifters (population, income, prices, input etc).
2. Little change in the GDP composition, i.e.,
   a. Dominance of palm oil, sawlogs and fisheries continue with a slight decline in share of each.
   b. Fisheries from marine source is expected to decline while aquaculture will increase.
   c. Livestock – beef is expected to see an increase in contribution, while the share of poultry meat will decline.
   d. Fruits and vegetables show an increasing trend due to high historical growth rate and demand.
3. The impact of an increase in world income appears to be small. This is not surprising as the agricultural sector as defined is limited to the **primary production sector.**
4. The demands for agricultural outputs are mainly derived demand and any structural change that may take place will take time to go up the value chain.
5. Agriculture sector requires extensive investment on all fronts.
6. Crude oil price plays an important role in agriculture as it affects cost of inputs and transportation. It may affect production in a negative way.

Research implications derived from the results are listed as follows:

1. A single analytical tool is limited in analysis as different problems require different tools. To understand the agriculture sector better, a number of other methodologies should be experimented such as CGE, system dynamics, etc.
2. Need to define the levels of aggregation in the agriculture sector model particularly for the commodity model sector. Specific commodity problem should be studied in more detail in the individual commodity models.
3. The quality of any model is dependent on the quality of the data used to generate the results. More econometric studies can be conducted to validate and improve the elasticities generated by the models.

Further Readings

Fatimah Mohamed Arshad, Mad Nasir Shamsudin, Kusairi Mohd Noh, Khalid Abdul Rahim, Zainal Abidin Mohamed, Mohd Mansor Ismail, Shaufique Fahmi Ahmad Sidique, Amna Awad Abdel Hameed, Gazi Nurul Islam, Tai Shzee Yew, Mohd Shahwahid Othman, Kelly Wong Kai Seng, Mark Buda, Ahmad Hanis Izani Abdul Hadi, Emmy Farha Alias, Nur Alina Jabir, Aswani Farhana Mohd Noh, Nurjihan Idris, Syahaneem Mohamad Zainalabidin, Intan Nurdiah Mohd Haris, Ng Xin Khai, Saiful Ramadzan Hairani (2012). *Malaysian Agricultural Policy Analysis Model (MAgPA) Volume I*: Commodity Market Models, research report submitted to Economic Planning Unit (EPU), Prime Minister's Office, Malaysia, 510 pp.

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