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**Report to**  
**The Asian Development Bank**  
**on**  
**Technical Assistance to the Economic Planning Unit**  
**on**  
**Agricultural Sector Planning**  
**[MAL/Agriculture Sector Planning]**

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**FINAL REPORT**

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## Background

The Asian Development Bank funded a 1-year Technical Assistance to Malaysia in March 1994 designed to improve the capability of the Economic Planning Unit (EPU) of the Prime Minister's Department to conduct long term agricultural forecasts and carryout policy analysis for agriculture. The TA employed two foreign consultants--a team leader and an econometrician--and a local consultant to develop a long term agriculture projections model and train staff from EPU and the agriculture ministries and departments in the use of the model and forecasting methods. The current project is an update and a refinement of the model developed during that project.

The Technical Assistance to the Economic Planning Unit (EPU) on the Malaysia Agriculture Sector Planning and Policy Analysis was funded on January 20, 1997 for 42 calendar days with the flexibility to work on a half time basis over a period of 3 months.

The Terms of Reference of the TA (Appendix A) requires that the staff consultant, "...in collaboration with the Director of the Agriculture Section and the EPU consultant team, will decide which of the priority model revisions need to be addressed in the time available. These revisions, then, will be carried out simultaneously with an updating of the base period for the model projections...." The TOR identifies 4 major tasks:

- Assist in the update and documentation of the MASA model base year data to reflect the most current data available for the Mid-Term Review analysis;
- Assist in the review and revision of model parameters, as necessary, to reflect the structure of Malaysia's agricultural commodity markets and assure consistency with the Macro Section's projections for the sector as a whole;
- Work with EPU staff to identify ways to streamline the model and facilitate its use; and
- Document all changes and revisions to the model.

Subsequent to this agreement, the EPU was able to engage the services of Dr. Mad Nasir Shamsudin and Dr. Kim Hjort, the original local consultant and econometrician, respectively. Although the TA contract originally specified a termination date of 01 May 1997, it was subsequently extended at the request of the EPU to 31 July 1997 in order to allow the ADB consultant to collaborate with other two consultants hired directly by the EPU. The report which follows includes the accomplishments of all 3 team members as well as that of the staff of the Agriculture Section of the EPU. The project has been a collaborative effort and it is difficult to separate out the work of a single person. The initial funding from the ADB made the engagement of two additional consultants and a research assistant from internal sources possible. Consequently, the ADB deserves much of the credit for the accomplishments of the project even though it bore only a portion of the financial cost.

## Project Review and Assessment

The actual commencement of work on the project was delayed until early April through mutual agreement between the staff consultant and the Director of the

Agriculture Section. A heavy workload at EPU during February and March combined with Muslim and Chinese holidays made April a more realistic starting date. It also enabled the Director to seek internal funding for two additional consultants and a research assistant.

The first two weeks of April included initial meetings with meetings with Ahmad Konchong and his staff to assess current problems with using the Malaysia Agricultural Sector Analysis (MASA) Model. From these meetings, we realized that there was very limited understanding of what the model could do or how the model worked. Many of the staff, including the Director himself, had only recently joined the Section. Therefore, on April 16th, Dr. Nasir and I presented an all-day seminar on the MASA model to help Ahmad Konchong, his staff and invited participants from outside agencies become familiar with the capabilities of the MASA model. The seminar helped build a base of common understanding of the model's capabilities and weaknesses.

In the week that followed, we agreed to set the following 5 major priorities which, except for the last, correspond closely to the tasks outlined in the TOR:

1. Update and document MASA model including:
  - Shift base year for Mid-Term Review;
  - Review of current documentation--revise and update as needed;
  - Summarize model information in user-accessible tables
2. Assist in the review and revision of MASA model parameters including,
  - Identification of key issues confronting EPU in the Mid-Term Review;
  - Evaluate how MASA model would be used to evaluate these issues;
  - Specify model modifications needed to better address these issues;
  - Re-estimate parameters and revise model structure as needed.
3. Streamline Model and facilitate its use.
4. Document all changes and revisions to the model.
5. Develop a user handbook.

These tasks closely match the TOR.

### **Update and Documentation of the MASA Model**

The consultant team worked closely with the staff of the EPU Agricultural section to update the data for all of Malaysia's agricultural commodities to at least 1995 and often to 1996. The consultant team had developed a set of commodity data files in LOTUS spreadsheets during the previous ADB Technical Assistance project. These contained the source data and source documentation for the MASA model.

Although these files provided a useful starting point in the data update, they were, in a way, redundant because the MASA Model is itself a spreadsheet and contains historical data back to 1978 to enable the analyst to compare projections with recent history. The data files had been created early in the previous TA before the full MASA model was known. We considered eliminating the data files but soon came to the conclusion that we needed to keep them but better integrate them into the model update procedures for the following reasons:

- The MASA model does not contain data source references. Space limitations prevent us from including this in the model itself.

- Some data series go back farther than 1978, the first historical year in the MASA model. We want to keep this information for future reference and also to provide as long a series as possible for re-estimating model parameters as it becomes necessary.
- Updating the MASA model directly is a tedious task--as we soon discovered. Original data is difficult to distinguish from data generated from formulas.

We updated 14 of the 15 commodity files including oil palm, rubber, cocoa, pepper, coconut, rice, tobacco, pineapple, vegetables, beef, mutton, pork, chicken and fish. We were not able to update the data on forestry because no new published data has been made available since the original project was completed in 1995. Despite repeated efforts of the consultant team, EPU staff and the assistance of the Director of the Agriculture Section, the Forestry Department would not make any updated information available.

In addition to the existing files, the consultant team added new information on fruits and added aquaculture to the fish data. Although palm oil is Malaysia's largest export crop and accounts for 45% of agriculture's value added, we had considerable difficulty in updating the data for this commodity. We found some inconsistencies in the earlier data which required a reassessment of how the data are collected and reported. We also updated information on macroeconomic variables such as interest rates, population, economic growth, bank loans to agriculture, etc.

At the time of the previous TA, neither the consultant team nor the EPU fully appreciated the difficulties involved in updating the MASA model. We had anticipated the need to do so but had not had the time or the motivation to fully develop procedures. A key accomplishment of this short project is that we have not only updated the model, but have also made changes which should greatly facilitate future updates. These changes include:

- Revising the commodity data files to make sure that information in the data files corresponded with the MASA commodity sheets. Variable names (and range names) were incomplete and inconsistent between the MASA model and the data files.
- Developing a macro in the MASA model which uses a set of common rangenames to update data in the model by going to the commodity file. The macro link to the data files would enable the EPU staff to update the series in the data files manually and then let the update macro find the appropriate series in the data file and copy the updated information to the appropriate row in the MASA model.
- Color coding was revised to help the user identify data, formulas, projections and guesses.

### **Review and Revision of the Model Parameters**

Review and revision of model parameters involves two activities. The first is the identification of areas where model projections are inaccurate or incomplete in addressing the expected requirements of the EPU. The second, and more important, activity is the development of a set of guidelines with instructions and training on how EPU staff should carry out a review of projections and, if necessary, revise model

parameters themselves. New issues will emerge which will change analytical requirements. The Section's staff must feel comfortable in adapting the model to address the issue of the day.

The priority for the first activity was to incorporate the new data and move the base year. To the extent possible, we also wanted to make adjustments in the model to make it possible to address additional topics or issues. We identified 5 areas where we could make modifications which would have a potentially high payoff at minimal cost:

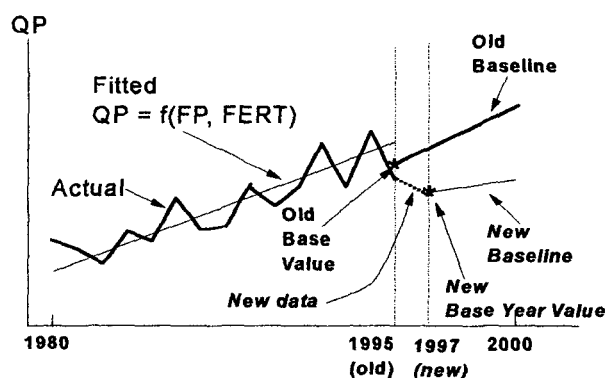
- add aquaculture to the fish model;
- build a fruit data file and a corresponding MASA fruit analysis sheet; and
- build an expected returns specification (which relies on cost of production data) into rubber and palm oil to enable better analysis of changing input requirements and costs such as labor;
- change the export specification of the palm oil model to make it possible to analyze trade liberalization effects; and
- incorporate a table of food demand elasticities to insure that homogeneity and consistency conditions are met.

The last of these five areas was added only after we discovered that high projected income growth assumptions had a tendency to cause some of the livestock commodity models to "blow up". Enforcing demand conditions on elasticities would help prevent this occurrence.

The process of generating a new baseline solution with the new updated data proved to be more complicated in practice than we had anticipated. Figure 1 illustrates the problem. The original baseline projection for a hypothetical series called QP was based on elasticities estimated from data

up to 1995 and generated from a starting base year value shown by the "\*" symbol in the dashed line marking the 1995 base year. New data, represented by the dotted line between the old and the new base years, changes perceptions of future trends. It requires a new base year value and may cause you to "adjust" or re-estimate the elasticities to generate a baseline projection which, in this example, increases more slowly than the old base year projection.

Figure 1. New data, new base year, new baseline projection



The second set of activities associated with the review and revision of model parameters included the development of a set of guidelines (or steps) on how to review and revise the model. We held 5 half-day training sessions in which we

demonstrated these procedures. A handout explaining the theory and logic as well as the procedures is attached in Appendix B.

### **Ways to Streamline the Model and Facilitate Its Use**

There are two approaches to facilitating the use of the MASA model. The first is to improve the functioning and the ease of use of the model itself. The second is to improve users' understanding of the model and its capabilities. The project has used both approaches.

#### *Streamlining the Model*

Three steps were taken to streamline the model:

1. Development of the update macro;
2. Upgrading software to LOTUS 97 on a computer with a pentium-based CPU; and
3. Development of a base year macro.

The update macro, and the changes in the data files which were needed to make it work, has already been discussed. It should greatly simplify any future update procedure.

Upgrading software and putting the model on a faster machine has yielded significant gains in speed and stability of the model. The earlier version of the model became very slow and subject to locking up the computer's operating system if all the commodity sheets were loaded at the same time. The new version of the model still operates adequately in LOTUS 5.0 on a 486-CPU machine.

A macro to automate the shifting of the base year has been developed and is currently being tested. The current model already has the base year set for 1996 which is adequate for the Mid-Term Review. The macro, however, will save considerable time and confusion in future updates.

#### *Improving Understanding of the MASA Model*

Effective the use of the MASA model, or any model, requires an investment of time and effort to understand how it works. Because MASA is based on a LOTUS spreadsheet, users need at least (1) a general knowledge of spreadsheet software, (2) an understanding of economics and the basic principles of regression and projecting time series, and (3) a mental picture of the general layout of the model so they can find information contained in the model.

Our training sessions, including the first session in April, were designed to address only the third of these requirements. Time constraints made it necessary for us to assume that those attending the training sessions already had sufficient knowledge of economics and the basic functions and capabilities of spreadsheet software. This was not always the case, and was particularly apparent for the software. Some of the potential users who attended our training sessions will need to make additional investment in learning LOTUS or some other spreadsheet package if they are to be able to feel comfortable with the MASA model.

## **Documentation of Changes and Revisions**

We have documented the data collection. The basic source information is included in the data files where users can compare and verify the historical series with the numbers in updated publications. We have also assembled a hard copy notebook with a copy of the table and source from which the most recent data series were obtained.

We have documented procedures for reviewing and modifying the model--which were not contained in the previous documentation. This documentation includes a step by step procedure for carrying out a model review, validation and revision. For most people who work with projections models, this process is driven by logic and experience. Our documentation is designed to give users who may not have much experience some basic guidelines and a sequence of activities for validating and revising a model.

We have begun to update the documentation of each commodity including the policy environment, the structure of the model, and the baseline projection. This part of the work was not intended as part of the ADB project but is related to the ongoing research work of the staff consultant and Dr. Mad Nasir Shamsuddin at the University Putra Malaysia. This base of commodity information will be very useful to policy makers and others doing current and future work on Malaysian agriculture.

## **Further Work Related to the Consultancy**

Planning and analysis of Malaysian agriculture is constantly changing and adapting to new issues and requirements. To meet these challenges, the Agriculture Section of the EPU needs to be able to adapt the MASA model to fit changing circumstances. Because the TOR for this consultancy emphasized updating the model for the Mid-Term Review of the Seventh Plan as well as building in procedures to facilitate future updates and revisions, we have not given as much attention to training and transfer of knowledge as would be desirable. The staff consultant and Dr. Nasir, consequently, will continue to work with the EPU as necessary in three areas:

1. Provide additional training in the use of the MASA model and the statistical and economic theory on which it is based.
2. Continue to review and discuss of baseline projections with those who have policy and market knowledge to assure ourselves and the EPU staff that the model results are consistent with the current view of Malaysia's agricultural development.
3. Collaborate with EPU on the development and projection of policy alternative scenarios of importance to Malaysian agricultural development. This will be extremely valuable to the EPU in learning how to apply the MASA model to current issues.

We expect much of this collaboration to continue over the next few months after the completion of the consultancy merely because it is in the mutual interest of both the EPU and the staff consultant and Dr. Nasir to do so.

## Lessons and Recommendations

### *Lessons:*

This consultancy benefited tremendously from the involvement of the same consultant team in this short term project. The knowledge base of the work which had been done earlier made it possible to complete in 6 weeks what might have taken another team more than 6 months to do.

This consultancy has also rekindled a working relationship between the new Director of the Agriculture Section of the EPU and some of the newer staff with the consultant team. Collaboration and follow-up work will be easier for both parties.

### *Recommendations for future work:*

A number of issues confront Malaysia in the development and evolution of its agricultural sector but none is of greater importance to the country's economic development than how best to confront the problem of reliance on foreign labor. Although this issue cuts across all sectors of the Malaysian economy, agriculture is, perhaps, the most affected because it may have the most difficulty adjusting. It is particularly relevant for the work of the EPU which, with its broader view of economic and agricultural development, will have to provide the government with information on the potential impact of limitations on the inflow of migrant workers.

Malaysia will likely fund much of work on this very sensitive issue themselves, but there may be a potential role for the Bank in encouraging a broader discussion of the issue through a forum or workshop. Both a discussion of the issue on a regional basis as well as a review of the successes and failures of policy measure taken by other countries are topic areas which could be better organized by an international organization and would have a significant impact on the understanding of the issue by Malaysia's policy makers.

## Appendix A

### TERMS OF REFERENCE

The initial assessment activity will generate a priority list of model revisions which will include revision of parameters, minor changes in the model structure and changes in the macro programming and/or organizational changes in the model to make it more user-friendly. The staff consultant, in collaboration with the Director of the Agriculture Section and the EPU consultant team, will decide which of the priority model revisions need to be addressed in the time available. These revisions, then, will be carried out simultaneously with an updating of the base period for the model projections.

The model is reasonably complete in so far as the three perennials (rubber, oil palm and cocoa) are concerned. More development is required for the other crops including the annuals and livestock as well as fisheries, which at the moment remains a major gap in the model. Partly due to these data gaps and partly also to the structural inadequacies, the model is not able to generate realistic projections.

#### Tasks

1. Assist in the update and documentation of the MASA model base year data to reflect in the most current data available for the Mid-Term Review analysis;

2. Assist in the review and revision of model parameters as necessary to better reflect the structure of Malaysia's agricultural commodity markets and to ensure forecasts which will generate output that is consistent with Macro Section's value-added projections for the sector as a whole;

3. Work with EPU staff to identify ways to streamline the model and facilitate its use;  
and

4. Document all changes and revisions to the model.