



Australian Government
**Australian Centre for
International Agricultural Research**

Eastern Indonesia-Agribusiness Development Opportunities (EI-ADO)

Maize Value Chain Study Executive Summary



Locations: East Java, West Nusa Tenggara (NTB), and East Nusa Tenggara (NTT)

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Executive Summary Maize

Background on AIPD-Rural / EI-ADO

This project is one of five lead commodity value chain studies undertaken as part of the larger \$1 million Australian Government's Department of Foreign Affairs and Trade (DFAT) funded project Eastern Indonesia Agribusiness Development Opportunities (EI-ADO). In this project, Australian Centre for International Agricultural Research (ACIAR) commissioned research to identify lead commodity value chains to be the focus of a new DFAT program Australia Indonesia Partnership for Decentralisation – Rural Economic Program (AIPD-Rural).

The goal of AIPD-Rural is a 30 percent increase in incomes for more than 1,000,000 male and female smallholder farmers by 2022.

The objective is in increased competitiveness of poor male and female farmers, realised through:

- Increased productivity;
- Improved business performance;
- A growing share of an expanding market; and
- The continuous adoption of innovations that contribute to productivity, performance, and market growth.

The expected outcomes are:

- Improved farmer practices;
- Increased access to input and output markets; and
- Improved business enabling environment at the sub national level.

The strategy to be used is to address the systemic growth constraints in rural agricultural sectors that are most relevant to small farmers in the districts in which the Program operates.

The Program is to take a market-led approach of working with on- and off-farm market stakeholders to stimulate both increased access to and the sustained delivery of inputs and services that are likely to increase the incomes of poor farmers.

Background on Maize VC Study

From October 3 to 25, 2012, on behalf of the AIPD-Rural program, Action for Enterprise (AFE) conducted value chain analysis on maize in the Eastern Indonesian provinces of West Nusa Tenggara (NTB), East Java (EJ) and East Nusa Tenggara (NTT). This report presents the findings as well as recommendations for further program development to AIPD-Rural.

AFE used the markets for the poor or M4P analytical framework, interviewing market actors as well as other key informants such as relevant government agencies and local non-governmental organizations. Information from these actors was solicited to evaluate the relations between buyers and suppliers, end markets and competitiveness, value chain dynamics, and the major constraints faced by each VC actor. In addition to VC analysis, the potential for selected VC market actors to provide “market-based solutions” (MBS) to address VC constraints in a sustainable manner was assessed.

The study team interviewed VC market actors in NTB from October 3-8, 2012 including the target districts of East and West Lombok, Dompu and Bima. Interviews were then conducted in EJ from October 10-16 and in NTT from October 18-23.

A broad picture of the dynamics and key constraints within the value chain - as well as the role of key market actors was established. Each of the three targeted provinces presented both unique characteristics and commonalities in terms of market channels and competitiveness.

The constraints facing targeted producers in the value chain as well as prospective “market-based solutions” (MBS) to address those constraints are presented below. The concept of MBS is that they are (or could potentially be) provided by private sector actors in a sustainable manner as part of their commercial relationships with the producers from whom they buy and to whom they sell. It is important to note that a more detailed assessment of each of the targeted MBS will need to be done as part of project start-up and implementation.

International Context

Indonesia is the sixth largest producer of maize in the world, contributing nearly 2 percent to global production with 18.3 million tonnes in 2010 and 17.6million tonnes in 2011.

From 1995 to 2011, productivity and production of maize in Indonesia doubled, while the harvested area remained relatively unchanged.

Much of the growth is being fuelled by the rapidly expanding poultry industry (human consumption of maize remains relatively low). Indonesia remains, however, a net importer of maize having imported 2.89 MMT in 2011/12.

National Context

After rice, maize is the second most important cereal crop in Indonesia. As such, maize plays a role in Indonesia’s food security policies (Jakarta Food Security Summit 2012), and is a priority crop according to government officials interviewed in all three target provinces.

Production in EJ is constrained by long-term pressure on land availability. The maize area cannot increase significantly from expansion into new areas. By contrast, the maize production in NTT and NTB is not strongly land-limited. Despite this, EJ produces more maize than any other Indonesian province, accounting for 30 percent of national production in 2011 (Ministry of Agriculture 2012). Collectively the island of Java dominates Indonesian maize production, for example supplying 53 percent of the 2011 harvest. Javanese production is characterized by high levels of inputs and irrigation and high levels of adoption of hybrid varieties.

The NTB provincial government has given its highest priority to increasing maize production. There is considerable potential to increase total production through intensification in the rainy season without displacing other cropping activities and without irrigation, especially in Sumbawa (the largest island within NTB). Nevertheless, total production of maize in NTB is still quite low at 2.5 percent of national production and rain-fed crop production is inherently highly variable.

NTT is dominated by subsistence maize production and accounts for little of the total Indonesian harvest: only 3 percent in 2011.

Value Chain Constraints

- 1. Technical information for farmers on production and post-harvest handling to increase yields and income**

Many farmers lack technical knowledge about maize production (the advantages and correct use of improved seed varieties, the effective utilization of agro-chemicals, post-harvest handling, etc.) which limits their yields and income. Government extension is unable to effectively satisfy this need. This lack of knowledge is evidenced by low levels of productivity throughout the country, especially in provinces such as NTT.

2. Lack of access to improved seed varieties

Of all the inputs used in maize production, none has the ability to affect productivity as much as seed. If farmers can obtain improved maize seed that performs well under local conditions, the efficiency of all other inputs is increased and productivity rises. Despite commendable progress at introducing new and improved maize seed varieties the majority of farmers, especially in more remote areas, lack access and are not well informed about these improved varieties. This is due in part to the lack of private sector distribution channels that reach all farmers with both seed and technical information.

Improved seed can address many issues including disease. Farmers in the target provinces increasingly face problems with pests and diseases such as '*bulai*', or downy mildew, which in the last three years has caused up to 50 percent losses for some farmers, particularly in high intensity agriculture areas such as EJ. The identification, development and marketing of improved varieties to address problems such as this could result in dramatic increases in both production and income levels of farmers.

Moreover, the majority of maize used by the feed industry is produced using hybrid varieties. With the rapid growth of the animal feed business, feed mills will be looking to source increasing quantities of maize that is produced with improved varieties.

3. Lack of access to input credit

Many farmers that were interviewed stated they lack the financial capacity to purchase the seed and agro-chemicals they need for optimal production. This is exacerbated by the rising costs of these inputs. Farmers' inability to finance inputs can lead them to forego the use of inputs and/or purchase inferior quality inputs which has ramifications on their productivity and profits. One of the reasons that farmers lack access to inputs on credit is the lack of more formal procurement arrangements with buyers – whereby the buyers are sometimes willing to pre-finance the producers.

4. Lack of access to: a) appropriate and affordable crop drying technologies, and; b) tools and methods for maize moisture measurement.

One of the most important product standards for maize is moisture content. The moisture level for feed maize in Indonesia is high, ranging from 17-20 percent. Sun-drying maize grain is a common practice of farmers, collectors and traders but is problematic when there is high rainfall and humidity during the post-harvest period. Most farmers, collectors and traders lack equipment and facilities to effectively dry maize grain, particularly during the rainy season, which results in lower overall quality of maize in the supply chain. They also lack effective tools and methods for testing the moisture content of their maize.

Effectively drying maize is essential for preventing germination of the grain, the growth of micro - organisms and insect infestation once the grain is put into storage. Artificial drying is necessary in unfavourable climatic conditions (such as high rainfall and humidity) to ensure safe storage. In spite of the importance of properly dried maize as well as a system of 'discounts' or penalties imposed by buyers when the MC is higher than the industry standard of 17 percent, most farmers and traders do not yet see the cost-benefit advantage of improved drying though several collectors and traders

interviewed in EJ and NTB expressed the need for more efficient ways to dry maize (and other commodities they trade).

5. Lack of appropriate technologies and methods to store maize

Subsistence level farmers in NTT consume the majority of maize they produce and face losses of up to 50 percent due to poor post-harvest storage conditions (which subject the maize to infestation with mice and weevils). Poor storage and weevil infestations also render the maize even more susceptible to Aflatoxin.

Research from East Timor shows that local maize varieties are more resistant to weevils than modern high yielding open pollinated varieties when using traditional storage methods. This discourages the use of the improved varieties that create much higher yields.

Current higher yielding varieties can be weevil resistant when they are stored in airtight containers. The storage of local varieties can also benefit from this. Local (and modern) varieties can have zero incidence of weevils when stored in sealed airtight containers for up to 33 weeks. As previously noted however, public sector and NGO efforts to introduce such containers in NTT have faced many challenges and the uptake by farmers of such things as jerry cans and both plastic and steel barrels has been slow.

Maize Value Chain Development Prospects

1. Provision of technical information for farmers on production and post-harvest handling to increase yields and income.

Corresponding constraint: Limited access of farmers to technical knowledge, from planting to effective use of agro-chemicals and post-harvest handling, thereby limiting their yields and income. Government extension service is limited to satisfy the need for technical information and training, nor is it equipped to do so.

Proposed Provider(s) of MBS 1: Input supply manufacturers, maize wholesalers, retailers, feed mills.

Challenges and Incentives for Providers of the Market-Based Solution

Challenges: The targeted providers' staff is not well equipped with technical knowledge and skills to advise farmers. The geographic coverage for many Providers is also limited due to lack of staff. Finally, some farmers are unable to read information provided in training materials.

Incentives: Input suppliers have an incentive to provide this MBS as it can help them to expand their distribution networks and increase sales with a new customer base. Buyers and mills can develop new and improved sources of supply. Farmers have the incentive to increase productivity and income.

Impact: An estimated 20,000 maize farmers in the target districts with greater applied technical knowledge on production practices, and increased yields and income.

2. Access to affordable, improved seed varieties for farmers, such as those with resistance to downy mildew and hybrids for higher yields.

Corresponding constraint: The majority of farmers in the target areas, especially in more remote areas, lack access to or are not well informed about improved maize seed varieties

Proposed Provider(s) of MBS 2: Private Sector Seed companies

Challenges and Incentives for Providers of the Market-Based Solution

Challenges: Private sector seed companies have limited distribution networks needed to reach targeted farmers in more remote areas. Their staff also need to improve their skills in training and extension for farmers. There is also the challenge of government subsidies seed that is difficult to compete with. Finally, developing new and improved seed varieties can take several years.

Incentives: Companies have an opportunity to increase sales by expanding their distribution networks and offering new products that satisfy farmer needs. Farmers can reduce loss and increase income with better seed varieties.

Impact: An estimated 40,000 maize farmers in the target districts can benefit from access to affordable, improved seed varieties, and increased yields and income

3. Access to: a) appropriate and affordable crop drying technologies, and; b) tools and methods for maize moisture measurement.

Corresponding constraint: The moisture level for feed maize in Indonesia is high, ranging from 17-20 percent. Effectively drying maize is essential for preventing germination of the grain, the growth of micro - organisms and insect infestation once the grain is put into storage. Most farmers, collectors and traders lack equipment and facilities to effectively dry maize grain. They also lack effective tools and methods for testing the moisture content of their maize.

Proposed Provider(s) of MBS 3: Feed Mills, Traders, Agricultural equipment suppliers

Challenges and Incentives for Providers of the Market-Based Solution

Challenges: Farmers' lack incentives to decrease moisture content because they are paid by weight, not clearly understanding the link between moisture content and price discounts. Traders are hesitant to invest in drying facilities if they can only use it for one crop.

Incentives: Potential for collectors and traders to increase income by avoiding penalties for moisture levels above the acceptable levels.

Impact: The provision of drying and moisture testing equipment will increase the competitiveness of the maize value chain in Indonesia and will have an impact on all value chain actors. If millers are able to source more maize that suits their requirements in Indonesia, they can rely less on imports and purchase more maize local, ultimately increasing the volume of sales for farmers and traders alike.

4. Access to and training in storage methods and appropriate technologies for maize.

Corresponding constraint: Farmers lack access to and training in storage methods and appropriate technologies for maize. Subsistence level farmers in NTT face losses of up to 50 percent due to poor post-harvest storage conditions (which subject the maize to infestation with

mice and weevils). Farmers find that local maize varieties are more resistant to weevils than improved seed which discourages the use of the improved varieties that can create much higher yields.

Proposed Provider(s) of MBS 4: Agricultural equipment suppliers, Input supply companies

Challenges and Incentives for Providers of the Market-Based Solution

Challenges: Farmers have used traditional storage methods for many years and are resistant to change. Companies lack business and marketing plans to effectively promote the most promising methods and equipment.

Incentives: Farmers can increase their food security reduce losses with better yields and storage. Development of new product lines for agricultural equipment suppliers and input suppliers.

Impact: Higher yields and increased food security for thousands of NTT farmers who rely upon maize as a staple crop for household consumption.

5. Access to input supply credit for maize farmers

Corresponding constraint: Many farmers lack the financial capacity to purchase the seed and agro-chemicals they need for optimal production. This is exacerbated by the rising costs of these inputs. One of the reasons that farmers lack access to inputs on credit is the lack of more formal procurement arrangements with buyers – whereby the buyers are sometimes willing to pre-finance the producers

Proposed Provider(s) of MBS 4: Feed Mills and Maize Buyers

Challenges and Incentives for Providers of the Market-Based Solution

Challenges: *Feed Mills and Buyers have difficulties in engaging in direct procurement operations with maize farmers (and providing inputs on credit) or have had negative experiences in the past*

Incentives: *The companies can develop a more assured source of supply, can have greater control of quality, and can have traceability*

Impact: The could impact up to 10,000 farmers who eventually engage in more formal procurement operations with buyers

Future Research Questions

Aflatoxin

Though AF poses a challenge for the maize value chain, the market actors generally lack market incentives to tackle the issue. As such, AF is a problem, but it is separated out from the market-based solutions and assessments as it is unclear that the existing market actors have sufficient commercial incentives to promote a learning campaign on AF.

Maize Storage

Why farmers reject appropriate storage technologies (such as jerry cans and plastic barrels) when they could benefit from higher yields and decreased food insecurity as a first step in further determining and assessing appropriate solutions to this farmer level constraint.