

# STRATEGIC POLICY OPTIONS TO DEVELOP MAIZE AND FEED PRODUCTION IN INDONESIA

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## INTRODUCTION

### Background

Maize is the most popular ingredient of manufactured feed in the world, particularly in the tropic region. In Indonesia, maize is a major component of feed, accounting for about 51 percent of feed ingredient. Efforts to substitute some other crops for maize in Indonesia are likely unsuccessful (Tangendjaja, 2003).

Maize is also the second important food crop after rice. It was indicated by the percentage of area planted to maize, relative to total area planted for food crops. Kasryno (2002) reported that area planted to maize was about 19 percent of the total area planted to food crops during the period of 1970-2000. Rice occupied about 61 percent of the total area planted to food crops. Another 20 percent was dedicated for other food crop plantation (palawija) such as soybean, mungbean, peanut, cassava, and sweet potato.

In the last three decades, the FAO data showed that maize production has shown a substantial growth from 2.83 million metric tons in 1970 to 10.89 million metric tons in 2003. This increase was mainly attributed to the adoption of improved technology, especially high yielding varieties, including hybrid varieties, resulting in a higher productivity. The rapid growth of production, however, failed to meet the domestic demand, causing a rapid increase in net import. In the 1969-1975 periods, Indonesia reached self sufficiency in maize, with the indices of 1.02, to 1.26 (Swastika, 2002). Since 1976, the net import was increasing from 0.05 million metric tons in 1976 to 0.60 million metric tons in 1996 and reached its peak of 1.26 million metric tons in 2000. To obtain self-sufficiency on maize for both food and feed, a breakthrough seems necessary. This study aims to identify potential, opportunity, and constraints of maize and feed production system, and to formulate strategic policy alternatives to develop maize and feed production.

### Objectives and Expected Output

The objectives of this study are: (a) to evaluate potential, weaknesses, opportunities, and constraints for expanding maize and feed production in Indonesia, and (b) to formulate strategic policy options to promote sustainable development of maize and feed production in Indonesia.

The expected output of the study consists of: (a) better understanding on potential, weaknesses, opportunities and constraints for expanding maize and feed production in Indonesia, and (b) strategy and policy recommendations to promote maize and feed production in Indonesia,

## SWOT ANALYSIS

SWOT analysis is applied in order to develop better understanding on potential and constraint of maize production and feed industry in Indonesia. Following Sianipar and Entang (2001), the analysis comprised of various steps, from identification of internal and external factors, determination of weighted internal and external factors (BF), computation of linkage weighted value among internal and external factors (NBK) =  $BF * NRK$ , and lastly, computation of total weighted value (TNB) =  $NBD + NBK$ .

Based on the value of TNB, the most important strength, weakness, opportunity, and threat of each feed and feed crops expansion is respectively determined. Thus, strategy, policy option, programs and ultimate goal of feed industry as well as feed crop expansion in Indonesia is then formulated (Adnyana, 2004).

## RESULTS AND DISCUSSION

### Analysis of Maize Production

Domestic maize production is characterized by strengths and weaknesses (internal factors) and opportunities and threats (external factors) as depicted in Table 1. Strengths of maize production are: (a) low labor wage, (b) abundant land resource in the outer islands of Java, and (c) well developed hybrid seed industry. On the other hand, weaknesses of maize production are: (a) inappropriate post harvest handling that leads to low quality of grain, (b) low direct access to sources of capital, and (c) seasonal price fluctuation. Some opportunities are available to expand domestic maize production, namely; (a) strong domestic demand for maize used as one of main feed raw materials, (b) production partnership between feed producers and maize growers, and (c) highly potential yield improvement through application of hybrid varieties. Some identified threats relatively potential to limit maize production are: (a) increasing trend of maize import, (b) long drought possible to hamper maize production, and (c) high competition with other crops in terms of planted area.

Based on SWOT analysis, the most essential internal and external factors are concluded as follows: (a) existing hybrid seed industry is highly developed (strength), (b) farmers usually do not conduct post harvest handling appropriately (weakness), (c) strong domestic demand for maize as the main raw materials for feed industry (opportunity), and (d) increasing maize import directly competing with domestic maize production. Following identification of four internal and external factors, the strategy of

developing domestic maize production is formulated as: (a) increasing maize yield by utilizing hybrid seed to encounter strong domestic demand, (b) enhancing domestic maize production by utilizing hybrid seed to reduce dependence on imported maize, (c) improving maize grain quality by adopting proper post harvest technology to satisfy domestic demand, and (d) developing grain quality of maize by adopting appropriate post harvest technology to partially substitute imported maize (Table 2).

Table 1. Internal and External Factors of Maize Production in Indonesia

No.	Internal Factors		External Factors	
	Strengths	Weaknesses	Opportunities	Threats
1.	Low labor wage	Inappropriate post harvest handling	Strong domestic demand	Increasing trend of maize import
2.	Abundant land resource	Low direct access to sources of capital	Production partnership between feed producers and farmers	Long drought
3.	Well developed hybrid seed industry	Seasonal price fluctuation	Highly potential yield improvement	High competition with other crops

Table 2. Formulated Strategy of Maize Production in Indonesia

EXTERNAL FACTORS	INTERNAL FACTORS	STRENGTHS	WEAKNESSES
			Well developed hybrid seed industry
OPPORTUNITIES Strong domestic demand for maize		STRATEGY : SO Increasing maize yield by utilizing hybrid seed to encounter strong domestic demand.	STRATEGY : WO Improving maize grain quality by adopting proper post harvest technology to satisfy domestic demand.
THREATS Increasing trend of maize import.		STRATEGY : ST Increasing domestic maize production by utilizing hybrid seed to reduce dependence on imported maize.	STRATEGY : WT Improving grain quality of maize by adopting appropriate post harvest technology to partially substitute imported maize.

The goals of domestic maize production are: (a) competitive domestic maize production in terms of production cost and grain quality, and (b) improved maize farmers'

income. It implies that efficient maize production which is characterized by good quality of grain will improve maize farmers' on-farm income. To accomplish such goals, four strategies are established consisting of four policy options and eight programs. The policy options are: (a) promotion of hybrid seed application, (b) intensive application of appropriate maize post harvest technology, (c) expansion of area planted to hybrid maize, and (d) maize grain quality improvement.

The programs comprise of: (a) maize intensification, (b) soft credit for maize production, (c) farmers training on post harvest handling, (d) provision of post harvest machineries through farm credit, (e) maize intensification, (f) partnership between farmers/farmers group and feed mills or food industry, (g) post harvest handling field school, and (h) grain quality promotion (Table 3).

Table 3. Ultimate Goal, Strategy, Policy Options and Development Programs of Maize Production in Indonesia

No	Goal	Strategy	Policy Options	Program
1.	Competitive domestic maize production in terms of production cost and grain quality.	SO Increasing maize yield by utilizing hybrid seed to encounter strong domestic demand.	Promotion of hybrid seed use	1. Maize intensification 2. Soft credit for maize production
		WO Improving maize grain quality by adopting appropriate post harvest technology to satisfy domestic demand.		
2.	Improvement of maize farmers' income.	ST Increasing domestic maize production by utilizing hybrid seed to reduce dependence on imported maize.	Expansion of area planted to hybrid maize	1. Maize extensification 2. Partnership between farmers and feed & food industries
		WT Improving grain quality of maize by adopting appropriate post harvest technology to partially substitute imported maize.		

## Analysis of Feed Industry

The internal (strengths and weaknesses) and external (opportunities and threats) factors of feed industry in Indonesia are identified, as presented in Table 4. This table exhibits that the strengths of feed industry are: (a) abundant labor and low wage, (b) strong vertical integration between feed and poultry industry, and (c) well develop feed production technology. In addition, the identified weaknesses are: (a) low quality of feed, (b) feed market structure tends toward oligopolistic state, and (c) present status that feed factories remain under capacity. On the other hand, opportunities to expand feed industry still widely open such as: (a) strong domestic demand, (b) opportunity for export promotion for standard quality feed, and (c) high potential to improve feed production quality. Nevertheless, serious threats are remain faced by feed industry in Indonesia such as: (a) highly dependence on imported raw material, (b) high interest rate of credit, and (c) immediate outbreak of poultry that significantly affecting feed industry.

Table 4. Internal and External Factors of Feed Industry in Indonesia

No	Internal Factor		External Factor	
	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
1	Abundant labor and low wage.	Low quality of feed.	Strong domestic demand of feed.	Highly dependence on imported raw material.
2	Strong vertical integration between feed and poultry industry.	Oligopolistic feed market structure.	Feed export promotion.	High interest rate of micro credit
3	Well develop feed production technology.	Under capacity of feed factory.	Potential to improve feed production capacity.	Immediate outbreak of poultry diseases

After exercising all steps of SWOT analysis, the most important internal and external factors were successfully identified, they are: (a) strong vertical feed industry (strength), (b) under capacity of feed industry (weakness), (c) domestic strong demand of feed (opportunity), and (d) highly dependence on imported raw material (threat). Based on these four internal and external factors, the strategy of feed industry development in Indonesia is then formulated that comprise of four main strategies such as: (a) maintaining feed industry vertical integration to increase production to meet domestic strong demand of feed (SO strategy), (b) strengthening vertical integration to optimally use the domestic raw materials (ST strategy), (c) improving production capacity of feed factories to fulfill domestic strong demand for feed (WO strategy), and

(d) improving production capacity of feed factories by using more domestic resources (Table 5).

Table 5. Formulated Strategy of Feed Industry Development in Indonesia

INTERNAL FACTOR	STRENGTHS Feed industry vertical integration	WEAKNESSES Under capacity of feed factories
EXTERNAL FACTOR		
OPPORTUNITIES Domestic strong demand for feed	STRATEGY: SO Maintaining feed industry vertical integration to increase production to meet domestic strong demand of feed.	STRATEGY : WO Improving production capacity of feed factories to fulfill domestic strong demand for feed.
THREATS Dependence on imported raw materials	STRATEGY : ST Strengthening vertical integration to optimally use the domestic raw materials.	STRATEGY : WT Improving production capacity of feed factories by using more domestic resources.

The goals of feed industry in Indonesia for future expansion are: (a) resilient and domestic resource based feed industry, and (b) efficient as well as competitive feed industry, especially export standard quality. In other word, least-cost is one among many characteristics of a competitive industry, so that feed industry in Indonesia should produce better quality of feed with less cost. To achieve the goals, four strategies comprises four policy options and eight alternative programs are proposed: (a) increasing investment in feed industry closer to maize production areas (rural agro industry), (b) enhancing partnership between feed industry and maize growers to sustain supply of domestic raw materials, (c) promoting new investment on domestic maize production under nucleus-estate system, and (d) optimizing feed factories capacity through higher procurement of domestic maize production. Furthermore, the proposed eight development programs are: (a) rural feed industry development, (b) rural micro finance for maize grower, (c) contract farming, (d) farmers consolidation in corporate farming, (e) investment on maize nucleus estate system, (f) soft credit for maize growers (g) promotion on domestic maize use for feed industry, and (h) maize post harvest handling improvement (Table 6).

Table 6. Ultimate Goal, Strategy, Policy Option and Development Program of Feed Industry in Indonesia

No	Goal	Strategy	Policy Option	Program
1.	Resilient and domestic resource based feed industry.	SO	Increasing investment in feed industry closer to maize production areas (rural agro industry).	1. Rural Feed Industry Development. 2. Rural Micro Finance Development
		Maintaining industry vertical integration to meet domestic strong demand for feed.		
2.	Efficient and competitive feed industry	WO	Enhancing partnership between feed industry and maize growers to sustain supply of domestic raw materials.	1. Maize Grower Contract Farming. 2. Farmers Consolidation in Corporate Farming.
		Improving production capacity of feed factories to fulfill domestic strong demand for feed.		
		ST		
		Strengthening vertical integration to optimize use of domestic raw materials.		
		WT	Optimizing feed factories capacity through higher procurement of domestic maize production.	1. Promotion on Domestic Maize Use for Feed Industry. 2. Maize Post Harvest Handling Improvement.
	Improving production capacity of feed factories based on domestic resources.			

#### Performance of Maize Production and Feed Industry in Indonesia

Mapping of domestic maize production and feed industry in Indonesia is carried out based on net value of total weighted value (TNB) of each internal factors and external factors. For maize production, the value of TNB of internal factor is equal to – 1.36 (Table 7), indicated that internally maize production in Indonesia is weak as characterized by farmers capital constraint, poor post harvest handling and low price of maize grain. In other words, maize production in Indonesia faced more weaknesses rather than its strengths. However, in terms of external factors, the result is positive

(0.36). Such a condition indicates that maize production in Indonesia has slighter opportunity than threat and, therefore, indicating good opportunity to develop.

Mapping the results in Table 7 in a graph form is depicted in Figure 1, where horizontal axis represents internal factors, while vertical axis represents external factors. Figure 1 shows that maize production in Indonesia located at Quadrant II. This position indicates that maize production is in an alert situation. If an unfavorable change in external factors occurs, it will fall into quadrant III and will be collapsed.

The value of TNB of internal factors for feed industry is equal to 1.34, which indicates that internally feed industry in Indonesia is strong enough or strengths overvalued its weaknesses. This is mainly due to strong vertical integrated and well developed feed production technology. However, the opportunity and threat are almost in the same position. There are wide opportunities, but there are also serious external threats. The map shows that feed industry in Indonesia located at the lower part of Quadrant I. This situation indicates that industry must be in alert, because with very small external distortion, it will fall into Quadrant IV or become weak or almost bankrupt (Figure 1).

Table 7. Performance Mapping of Feed industry and Domestic Maize Production

No.	Industry	Internal Factor	External Factor
1.	Feed Industry	1.34	0.01
2.	Domestic maize production	-1.36	0.36

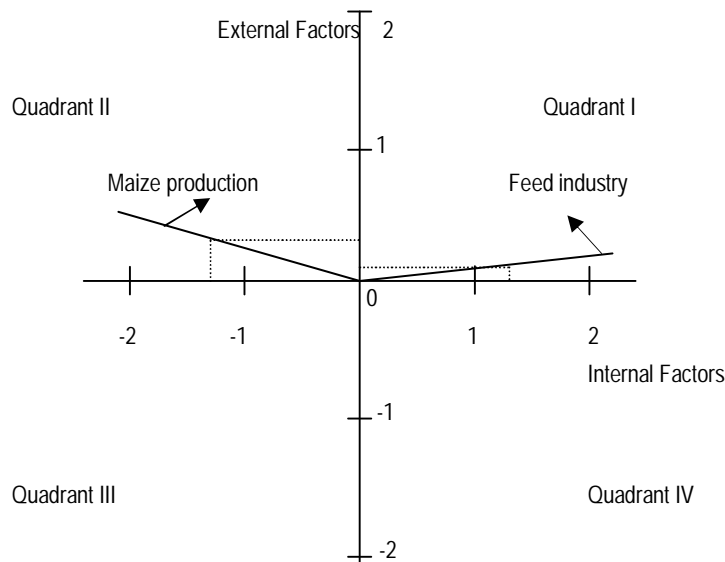


Figure 1. Performance map of feed industry and maize production in Indonesia.



## CONCLUSION AND POLICY RECOMMENDATION

Conclusion and recommendation of prior discussion are:

The results of SWOT analysis showed that the domestic maize production should be directed to various goals such as: (a) competitive domestic maize production in terms of production cost and grain quality, and (b) improved maize farmers' income. It implies that efficient maize production and followed by good quality of grain will improve maize farmers' on-farm income.

To accomplish such goals, the following four strategic policy options are recommended are: (a) promotion of hybrid seed application, (b) intensive application of appropriate maize post harvest technology, (c) expansion of area planted to hybrid maize, and (d) maize grain quality improvement.

Eight prioritized programs that are necessary to implement as action programs are: (a) maize intensification, (b) soft credit for maize production (subsidized interest rate), (c) farmers training on post harvest handling and processing, (d) provision of post harvest machineries through farm credit, (e) maize extensification, (f) partnership between farmers and feed as well as food industries, (g) post harvest handling field school, and (h) promotion of grain quality management.

The output of SWOT analysis on domestic feed industry indicated the goals of domestic feed industry as follows: (a) resilient and domestic resource based feed industry, and (b) efficient and competitive feed industry.

To reach the above goals, four strategies are proposed, namely: (a) increasing investment in feed industry closer to maize production areas, (b) promotes partnership between feed industry and maize growers to sustain supply of domestic raw materials, (c) promoting new investment on domestic maize production under nucleus-estate system, and (d) optimizing feed factories capacity through higher procurement of domestic maize production.

To support those strategies, eight development programs are recommended: (a) rural feed industry development, (b) rural micro finance for maize grower, (c) legal contract farming, (d) farmers consolidation in corporate farm management, (e) investment on maize nucleus estate system, (f) soft credit for maize growers, (g) promotion on domestic maize use for feed industry, and (g) maize post harvest handling improvement.

## REFERENCES

- Adnyana, M.O. 2004. Analisis Dampak dan Strategi Pengembangan Peningkatan Produktivitas Padi dan Ternak (P3T) ke Depan. Makalah disampaikan pada Seminar Puslitbangtan, 29 Januari 2004. Bogor.

- Kasryno, F., 2002. Perkembangan Produksi dan Konsumsi Jagung Dunia dan Implikasinya Bagi Indonesia (The World Maize Production and Consumption, and Its Implication to Indonesia). Paper presented at One Day Seminar on Maize Agribusiness in Bogor, 24 June 2002. AARD. Bogor.
- Sianipar, J.P.G and H.M. Entang. 2001. Teknik-Teknik Analisis Manajemen. Lembaga Administrasi Negara (LAN)-RI. Jakarta.
- Swastika, D.K.S. 2002. Corn Self Sufficiency in Indonesia: The Past 30 Years and Future Prospect. Indonesian Agricultural Research and Development Journal. Vol. 21 No. 3. AARD. Jakarta.
- Tangendjaja, B., Y. Yusdja, and Nyak Ilham. 2003. Analisis Ekonomi Permintaan Jagung untuk Pakan (Economic Analysis of Maize Demand for Feed) in Ekonomi Jagung Indonesia (Maize Economy of Indonesia). Agency for Agricultural Research and Development (AARD). Jakarta.