ECONOMIC ASPECTS OF SOYBEAN PRODUCTION AND MARKETING IN INDONESIA

BY

PIET PETRUS PAKASI

PLAN B PAPER

SUBMITTED TO

MICHIGAN STATE UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF SCIENCE

DEPARTMENT OF AGRICULTURAL ECONOMICS

1988

SUMMARY

1. Agricultural development in Indonesia has made good progress over the last fifteen years, particularly on the production side. In 1985 Indonesia reached a level of self-sufficiency in rice and a program for increasing production of secondary food crops (including soybeans) was established by the government in 1974. A policy objective of self-sufficiency in soybeans for direct consumption was announced by the government in 1986 and implemented through a special soybean development programme.

2. Soybean production increased from 498,000 tons in 1970 to 1,250,000 tons in 1987, as a result of both yield and area increases. Under favorable economic and weather conditions, Indonesia soybean production could reach 1,370,000 tons in 1988, based on a harvested area of 1.2 million hectares and an estimated yield of 1.24 tons per hectare.

Between the years 1970 and 1986, the rate of growth of production was 5.6 percent, while imports grew 16.8 percent per year. Between the years 1986 and 2000, the estimated average growth in soybean production is 2.37 percent, while area harvested and productivity are 1.1 percent and 1.34 percent per year. By the year 2000, the total production of soybeans is estimated to rise to 1.64 million tons.

3. Physical and economic constraints limit the yield increase and area expansion both in the established production zones (especially in Java) and the outer islands (off-Java).

   The relatively less fertile soil, the limited availability of production inputs, the thinness of soybean market, and the lack of market infrastructure have slowed the soybean development programs in the outer islands. A high price policy for soybeans would increase production but at the expense of other land-competitive secondary foodcrops; i.e., more land will be allocated to soybeans at the expense of other secondary foodcrops such as peanuts and corn.

4. The rising demand for soybeans and their products has made soybeans an important foodcrop. This has boosted production and increased soybean growers' income.

5. Historically, soybean production in Indonesia has been located in six major production areas, namely West Java, East Java, Central Java, Bali, West Nusa Tenggara, and Lumpung. The last three production areas are located outside of Java. However, production in the outer islands particularly Sumatera, Kalimantan, and Sulawesi is expanding rapidly, from 68,625 tons in 1970 up to 403,301 tons in 1986. Indonesia contributes only about 0.8 percent of total world production.

6. The average yield per hectare is 0.85 ton, which is much lower than Brazil (1.70 ton per hectare), Argentina (1.75 tons per hectare), and USA (2.0 tons per hectare).

7. The return and cost ratio (R/C ratio) of producing soybean was 1.43 in 1983, and the real income was Rp 5,265 per hectare in 1983.

8. Soybean prices in Indonesia follow a floor price scheme, although the price at the farmer level is higher than the floor price respectively. In the year 1988, the nominal retail prices ranging from Rp 550.00 to Rp 800.00 per kilogram. The nominal domestic price increased from Rp 49.00 per kilogram in 1970, to Rp 642.00 per kilogram in 1986, which increased at an average of 17.35 percent annually. The real domestic price increased from Rp 136.00 in 1970, to Rp 532.00 per kilogram in 1986, which increased at an average of 8.90 percent annually. Real price is based on a private consumption inflation index (1982 base).

   The selling price of imported soybeans act as a ceiling price in the soybean marketing. Usually imported soybeans have a higher price than domestic beans, because of quality differences and produce 25 percent more tempe compared to domestically produced soybeans.

9. The consumption of soybeans is concentrated in Java (more than 90 percent of total consumption). Java produces about 62 percent of total production. The gap has to be supplied by both soybeans produced outside of Java and imports. The total consumption of soybeans increased from 377,770 tons in 1970, to 1.3 million tons in 1986. Under the assumption that relative prices remain unchanged at 1985/86 levels; per capita consumption expenditures rise by one percent, and population growth increases at about 2.3 percent per year; the aggregate growth in soybean demand will increase at an average of 2.7 percent per year, between the years 1986 and 2000. In the year 2000, the total soybean demand is expected to be about 1.93 million tons. Per capita consumption increased from 2.80 kilogram per year up to 7.93 kilograms in 1986. In the year 2000, per capita consumption is expected to be about 8.73 kilogram.

10. Assuming that soybeans needed for processing will be fulfilled by imports, then an estimated 400,000 to 600,000 tons of soybeans should be imported by Indonesia to satisfy the soybean demand for human consumption, between the years 1986 and 2000. This amount of imports is to close the gap between supply and demand for soybeans in Indonesia.

11. Soybean producers can choose from a wide variety of marketing alternatives that best fit their financial and risk bearing situation. In general, farmers receive from 64.5 to 80.9 percent of the retail/consumer price. The profit margin for the soybean traders ranges from 10 to 30 percent, whereas the marketing costs is about 15 to 20 percent. Marketing channels utilized among provinces are relatively similar, but marketing problems differ substantially due to geographical, economic, and social conditions.

12. The local market for soybeans operates under conditions of perfect competition. The Jakarta and Surabia markets, which are located on the island of Java, play an important role in coordinating the marketing of both domestically produced and imported soybeans. They also act as a terminal market (for wholesalers) for soybeans originating from the outer islands. The distribution of imported soybeans faces high administrative costs; while the local soybeans face a relatively high overland transportation cost and retribution expenses.

13. Post harvest losses of soybeans at the farmers' level range from 5 to 10 percent. Losses in quality also reduces the price received by the farmers. The price differences between the low and high quality of local

soybeans is about Rp 35.00 per kilogram, or 9 percent from the procurement price. The price differences between imported soybeans and top quality local soybeans is about 15 to 20 percent of the selling price.

14. The understanding of quality control at the initial level marketing chain (i.e., farmers and village collectors) is poor. Low quality of marketed soybeans exists because of the inability of the marketing system to send price signals to the farmers and village collectors; i.e., differential prices for different levels of quality. A simple grading system should be introduced at the initial level of the marketing chain in order to improve the quality of soybeans at the farmers' level.

15. Development of improved soybean cultivars is also a strategy that should be continued in the Government's research program. This should be combined with a production testing program at regional and local levels. Research on the marketing system should be conducted intensively at the local level in order to gain a better understanding of regional differences in marketing costs.

16. Indonesia is a net importer of soybeans, soybean meal, and soybean oil. The demand for soybean meal and soybean oil is growing rapidly. Soybean meal imports were 1,197 tons in 1975 and increased to 313,102 tons in 1986,

with the average growth rate of about 65.9 percent per year. An estimated 334,000 tons of soybean meal will be required in 1990, which is equivalent to 445,000 tons of soybeans. By early 1988 it was expected that domestic demand for soybean meal would be supplied by the domestic extraction plant. This plant produces about 400,000 tons of soybean meal per year.

Soybean oil imports increased from 34 tons in 1973 up to 10,589 tons in 1984, and declined to 4,551 tons in 1986. The average growth rate of soybean oil imports is 45.7 percent per year between the years 1973 and 1986.

The declining use of soybean oil since 1985 has been due to increased use of coconut and palm oil.

17. Soybean oil comprises less than 30 percent of the world market share of all edible oil. It faces considerable competition from tropical oils, especially palm oil and coconut oil. Malaysia supplies over 75 percent of world palm oil exports, and Indonesia supplies 15 percent of the market.

ACKNOWLEDGMENT

I would like to express my sincere appreciation to Dr. Darrell F. Fienup, my major professor and advisor, for his warm and kind guidance to complete this research in particular, as well as my academic program.

I wish to extend my gratitude to the members of my committee, Dr. John Staatz and Dr. Russell Freed, for their valuable advice and support in my study.

Appreciation is also expressed to Dr. Rick Bernsten and Dr. Lester V. Manderscheid for their valuable advice, at the beginning of my academic activities in the Department of Agricultural Economics.

I am indebted to the Government of Indonesia, who provided financial support during my study at Michigan State University.

Thanks are due to my mother, brothers and sisters for their prayers.

Special thanks to my wife SIEN and children, Ellen, Ingrid and Chris, for their warm love and prayers during my stay in East Lansing.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

I INTRODUCTION

I.1. INDONESIA AND ITS AGRICULTURE

Indonesia is a great archipelago, consisting of five main islands and about 13,000 smaller ones. The five big islands are Java, Sumatera, Kalimantan, Sulawesi and Irian Jaya. The territory of the Republic of Indonesia extends from 8 degrees North Latitude to 11.15 South Latitutde, and from 94:15 West Latitude to 141:5 East Latitutde.

Topographical features and soil types can be classified into three major groupings, namely:

(1) Mountainous land area - mainly lithosols and andosols;

(2) Level or undulating to hilly land - mainly red-yellow podsolics, ferralsols, red-brown mediterranean soils, and regosols

(3) Low swampy lands - mainly organic-soils and alluvials.

Much of Sulawesi (69 percent of its total land area) and Kalimantan (41 percent of its total land area) fall within the first category, whereas Nusa Tenggara scores very high (59 percent) in the second category. The three types of terrain can be found in roughly equal proportion in Java (including Bali and Madura), and Sumatera. It is estimated that up to 80 percent of the level to hilly areas might

have agricultural potential, whereas 10 to 20 percent of the swampy and mountainous land could be used for cultivation. These estimates suggest that from a total land area of approximately 200 million hectares, approximately 60 million hectares are suitable for agricultural use. It is estimated that approximately 16 million hectares are already under cultivation and 24 million hectares are set aside for forestry reserves and concessions. The remaining 20 million hectares could be brought under agriculture cultivation, with most of this potential being confined to the islands of Sumatera, Kalimantan, Sulawesi and Irian Jaya (A.T. Birowo, G.E. Hansen, 1981).

Monsoons are a dominant meterological feature within this great archipelago. The level of precipitation declines gradually in moving towards the southern and eastern parts of the archipelago. There are many areas in Kalimantan, Sumatera and Sulawesi that receive higher rainfall than Java. Much drier conditions are found in the eastern Nusa Tenggara islands. These monsoon patterns are relatively stable throughout the year. The climate of Indonesia changes every six months. The dry season (June to September) is influenced by the Australian continental air masses and the rainy season (December to March) is influenced by Asian and Pacif Ocean air masses passing over oceans. The air becomes saturated and brings

rain to Indonesia. Average temperature is 27 degrees Celsius for coastal areas, 25 degrees for inland and lower mountain areas and about 22 degrees for higher mountain areas. Indonesia has relatively high humidity which varies between 70-90 percent. There are variations in rainfalls for different months and places. The maximum rainfall in 1964 was 640 mm.

Indonesia is the fifth most populous country in the world after China, India, Russia and United States of America. Based on the 1980 Population Census the projected total population in 1987 is 165 million. Since 1971 the growth rate of population has been about 2.3 percent. In 1980-1985 it was 2.2 percent and is expected to fall to 1.9 percent between 1995-2000 with a projected population of 222.7 million in the year 2000. Only 7 percent of the 13,667 islands are inhabited. The population is unevenly distributed throughout Indonesia. Java has only 6.9 percent of the total land area of Indonesia, but 61 percent of the total population in 1985.

Indonesia is still predominantly a rural society, as well as an agricultural country. According to the 1980 Census of Population, 77.6 percent of the people lived in rural areas. Currently it is estimated this proportion is less than two-thirds. In 1976, 61 percent of the total labor force were engaged in agriculture, while by 1985 it

had decreased to 54.6 percent (Statistical Yearbook of Indonesia, 1985). This indicates a transformation from an agriculture based society to more industry and services. The contribution of the agricultural sector to the Gross Domestic Product (GDP) was 40.1 percent in 1973 while in 1983 it decreased to 24.01 percent. While the percentage contribution of the agricultural sector to GDP decreased, agriculture was still the largest sector in the economy.

I.2. AGRICULTURAL DEVELOPMENT IN INDONESIA

Agricultural policy has emphasized intensification, extensification, diversification and rehabilitation. This policy has been supported by the development of better irrigation schemes, improved on-farm water management, implementation of special intensification packages and increased labor productivity (Merle L. Esmay, 1987).

In 1969, the Government of Indonesia launched the first five year plan with agriculture as the focal point to promote economic growth. In the second, the third, and the fourth five year plans, agriculture and irrigation still receive the highest investment expenditures (excluding projects aids). In the year 1984/85, the agriculture and irrigation sector received

18.75 percent of the total development expenditures. In the year 1981/82, 1982/83, 1983/84, it received 15.5 percent, 16.27 percent, 12.56 percent. All of these percentages represents the largest component compared to other sectors; except in 1983/84 when education received the highest percentage (16.64 percent).

Since 1950, there has been a concentrated effort to promote agricultural growth through increasing food production, mainly rice. This effort has been supported by the provision of essential production inputs including improved seed varieties, insecticides, fertilizer and credit to the farmers - along with attendant investment in irrigation and market infrastructure. The opening of new agricultural land in Sumatera, Kalimantan, Sulawesi and Irian Jaya through the transmigration programs, has focused mainly on food production. Rehabilitation programs have focused mainly on estate crops.

I.3. FOOD PRODUCTION IN INDONESIA

Food crops consist mainly of paddy rice, followed by maize, soybeans, sweet potatoes and cassave which are called second crops, of the "palawija" crops. Paddy is usually planted on irrigated land and rainfed land, while the second crops are planted on dry land.

According to the 1983 Agricultural Census, agricultural land, based on it's use, includes 69.5 million hectares, which consists of 7.9 million hectares wetland (sawah) and 61.6 million hectares dry land. Forty four percent of the westland is located on Java, whereas 56 percent in the outer islands (Sumatera, Kalimantan, and Sulawesi). About 1.3 million hectares of wetland with technical irrigation is located in Java, which is about 80 percent of the total area of technical irrigation in Indonesia. Only 9.6 percent of dry land is in Java, while 90.4 percent is located in the outer islands. It is estimated that dry land use is divided into 21.5 percent for dry land farming, 17.3 percent for estate crops, 15.5 percent for other uses such as home gardening, fresh water ponds, cattle grazing area, and 45.7 percent is not used. The data above shows that outer islands possess a potential for expansion of food production. The use of farm land in the outer islands is more extensive than Java because:

(1) average farm land per family is higher than in Java;
(2) agricultural land in the outer islands is generally less fertile;
(3) there is a shortage of labor force in the outer islands;
(4) shifting cultivation practices sti-l exist in the outer islands (F. Kasryno, 1986).

In Indonesia there are 18.4 million farm households

of which 85 percent engage in paddy or second crops, or both; 61 percent engage in estate crops; 39 percent engage in vegetables and fruits; 23 percent engage in animal husbandry, and 4 percent in fisheries. This proportion is represented in Table 1.

Since 1969, rice production has been the primary focus in increasing food production. Concentrated effort has been directed toward the fulfillment of a rising demand for rice. Major effort has been implemented through intensification and extensification programs throughout the country. This intensification program is called the Bimas Campaign (Mass Guidance Campaign). Before 1969 efforts to increase rice production had been established through the Kasimo Plan (1952) and Padi Centra Program (1959-1962), but both failed.

The intensification program has been implemented by adopting five activities (Panca Usaha), namely (1) the use of high yielding varieties, (2) the use of fertilizer, (3) the use of insecticides (4) the use of better cultivation methods, (5) better soil preparation and on-farm water management.

During the Bimas Campaign, Indonesia experienced an unsuccessful period in the 1970's: (1) there was a levelling-off of rice production, (2) rice imports increased, whereas during 1976/77 rice import had reached

Table 1. Percentage of Agricultural households engage in Farm activities, 1983.

Island	Number of Agr. Household	Rice and Second crops	Vegetable and Fruits	Estate crops	Fisheries (inland)	Fisherman (operator)	Animal husbandry
1. Sumatera	3.229.301	80,2	32,3	68,6	3,3	2,6	17,7
2. J a w a	10.880.206	86,4	50,8	63,4	4,5	0,9	22,4
3. Bali/NTB/NTT	1.156.977	85,5	52,3	65,4	1,2	3,6	41,8
4. Kalimantan	906.871	88,0	45,3	54,1	1,6	3,5	18,4
5. Sulawesi	1.387.918	82,2	44,9	66,2	1,7	8,5	27,4
6. Maluku + Irian	332.915	84,4	63,2	66,0	0,6	11,1	25,9
7. Timor Timur	114.049	96,3	62,3	79,6	0,9	1,8	28,6
Indonesia	18.426.891	85,3	43,3	61,2	3,6	2,3	23,3

Source : Agricultural Census 1983.

Central Bureau of Statistic, Indonesia, 1985.

1.5 million tons, compared to 1.2 million tons during 1972-1975. At the same time wheat imports also increased from over 500,000 tons in the early 1970's to approximately 1.0 million tons in 1976/77. (3) After 1976, the farmers involved in the Bimas Campaign showed a substantial decrease in numbers as well as the area they planted. Factors that have been attributed to declining rice production include: (a) the problem of credit repayment, (b) the pest problem, (c) the marketing problem, (d) the lack of irrigation facilities.

During 1970's the growth in irrigated land slowed, and in turn rice production declined (R. Barker, R. W. Herdt, B. Rose, 1985). Substantial growth in Indonesian rice production in the 1980's was due to increases in irrigated land and the increased use of fertilizer.

In order to expand rice production, substantial effort has been made by the Government to eliminate the problems that slowed rice production, such as delayed credit repayment for all farmers and continued building of new irrigation schemes as well as rehabilitation of old ones.

During 1982-1985, rice production has increased at a rate of 5.1 percent per year. In 1985 Indonesia harvested 26.3 million tons of rice, 8 percent larger than the 1984's

previous record. The nation's 1985 rice self-sufficiency was highlighted by estimated exports of 400,000 tons, against imports of only 34,000. In 1984 Indonesia imported 387,000 tons of rice, still sharply below its world-leading average of 1.9 million tons during 1978-1981.

The production of second crops such as maize, soybeans, groundnut and cassava was largely neglected in Government policy up to 1974. The declining rate of rice production during 1972-1974 encouraged Government to take into consideration for food policy these second crops, which in part act as a substitute for rice. So, after 1974, maize, soybean and groundnut were entered into the Bimas Campaign through new and specific package program. Before 1974, total production of maize was declining, but small gains had been made by soybeans and groundnuts. Recently, in the case of soybeans, the domestic production cannot meet the demand. To fulfill the unmet demand, soybeans have been imported, reaching a level of 401,024 tons in 1984. It is projected that imports of soybeans will increase in the future. Indonesia also imports soybean meal and soybean oil which increases in quantity year by year.

Based on the availability of production resources particularly land in the outer islands, the possibility exists to increase domestic production. In order to

improte the quality of soybeans, a post harvest processing project has been introduced in North Sumatera and Lampung (M. L. Esmay, 1987).

II OBJECTIVES OF THE STUDY

II.1. OBJECTIVES

The principal objectives of this study are:

1. To describe and analyze the economic potential and constraints in the development of soybeans in Indonesia.
2. To formulate policy recommendations regarding production, distribution, and consumption of soybeans.

II.2. PROBLEMS FORMULATION

1. Low productivity, In 1985 the average yield of soybeans in Indonesia was 0.85 ton per hectare. This compares to Brazil (1.8 tons per hectare); Taiwan (1.5 tons per hectare); Phillipines (1.6 tons per hectare); and the United States (2.0 tons per hectare). Efforts to increase yield and area planted have been promoted throughout the country, but there are physical and economic constraints to increase production.

2. The problem of effectiveness of floor-price. Government has established a floor price to protect soybean growers especially during harvest where the price is usually low. However, the market price has always been higher than the floor price. For example, in 1985 the floor price was RP 300.00 per kilogram; the Village Unit

Cooperative's Price was RP 315.00 and the average market price was RP 560.45 per kilogram. The selling price of imported soybeans acts as a ceiling price in the market-place.

The problem is that how far the high price set for imported soybeans will encourage domestic production to rise and improve the quality of domestically produced soybeans.

3. The rising demand for soybeans is primarily caused by the growth of population and income. The growth in domestic supply of soybeans cannot meet the increasing demand for soybeans and this will create a supply/demand gap. The problem is that this gap will widen in the near future, if the rate of growth of domestic soybeans production increases slower than the demand. Import of soybeans is one option which is available to close the supply/demand gap, but imports will depend on world price movement and the availability of foreign exchange.

4. Regional variation in the marketing of soybeans has substantial effects on the efficiency of the soybean distribution system both for imported and domestically produced soybeans. The problem of variations in market structure, marketing costs and practices of soybeans trade and the role of Jakarta and Surabaia markets as a

terminal market for soybeans (local and imports) has a strong influence on the efficiency of soybean marketing in Indonesia.

5. The problem of soybean development program in Indonesia, is that the soybean crop cannot be treated separately from the rice crop and other secondary food-crops such as corn and peanuts because of their interlinkage in the use of land. How far this interlinkage exists between rice and among other secondary foodcrops in relation to production, marketing, and price policy; has to be taken into consideration in order to get a better understanding about the potential and constraints on soybean development program in Indonesia.

III FACTORS AFFECTING SUPPLY

III.1. THE PRODUCTION OF SOYBEANS

III.1.1. DOMESTIC PRODUCTION

III.1.1.1. THE ROLE OF SOYBEANS

Soybeans are native to the Orient. The movement of soybeans to Japan, Southeast Asia and South Central Asia is thought to have occured between the first century and the 16th century A.D. (Hymowitz and Newell, 1981; cited by K. Hinson, Hartwig, H. C. Minor, 1982).

In Indonesia, soybeans are an important protein source for people, particularly in Java, Madura, Bali, Western Nusa Tenggara and Lampung. The food prepared from soybean are tempe (fermented soybean food); tofu/tahu (unfermented soybean food). Based on the food balance sheet released by the Central Bureau of Statistics of Indonesia in 1985; 40 calorie units (1.5 percent) of the total calories intake are derived from soybeans.

Soybeans act also as a source of income and employment in Indonesia. About 95 percent of the production is sold by the growers, whereas 1 percent is directly consumed and 4 percent is used for seed and losses during harvesting (Kasryno F. cs., 1985). During planting time 1982/83, in rural area of Java, 11 percent of the farm

households engaged in food crops production (11,588,221 families) planted soybeans on their farms (Kasryno F., 1985).

III.1.1.2. TECHNOLOGY OF PRODUCTION

Improved technology in soybean production has been promoted through the intensification programs (Bimas Campaign). Major emphasis has been directed to increasing yield, through the use of high yielding varieties, fertilizer, legin (to facilitate the nitrogen fixation process), lime, and insecticides, as well as better soil preparation and crop maintenance. It is expected that by using these inputs in the proper amount and with good weather and other requisites of production, the yield should increase substantially.

Since 1974, high yielding varieties of soybean have been released such as Orba, Galunggung, Lokon, Guntur, Wilis, Dempo, and Kerinci. The adoption of these high yielding varieties by the farmers is sometimes difficult because each variety needs special requirements to maximize its potential production. In Java the farmers usually prefer small seed and early maturing varieties. Local varieties are still used because of their adaptation to local conditions even though the yield is less. The use

of high yielding varieties is still small because seed is less available when it is needed.

Based on the Agricultural Census of 1983, 34.8 percent of 1,532,209 farm households engaged in planting soybeans did not use any fertilizer; however, 17.4 percent use chemical fertilizer; 29.0 percent use a combination of chemical fertilizer and manure and 18.8 percent use only manure. The use of Legin facilitates the nitrogen fixation process, particularly in the new production areas. Several experiments have been conducted to increase the use of these input factors. Experiments in South Sulawesi and Lampumg (off Java) revealed that the use of both fertilizer and lime raised the average yield up to 1.54 tons per hectare. Without the use of lime and fertilizer the yield was 0.70 ton per hectare, so there was an increase of 0.84 ton (Sihombing, D. A. 1985). In the 1981/82 season, fertilizer experiments on soybeans (Orba variety) were conducted in several provinces by the Directorate General of Food Crops and FAO. The result showed that the highest yield was 1.77 tons per hectare in Aceh and the lowest was 0.98 ton in West Java. The complete results are presented in Table 2. In the 1986/87 season, fertilizer trials on soybeans (Orba variety) were conducted at Garut (West Java). The result showed that the yield

response of the Orba variety ranged from 467 to 1175 kilograms per hectare. An adjusted yield has been proposed as a yield potential on farmers field; i.e., 821 kilograms per hectare. Furthermore, the result also revealed that the optimum (economic) treatment was 150 kilograms of nitrogen fertilizer per hectare, with the yield of 1022 kilograms per hectare (A. Rahim, 1987).

Most of these experiments have shown a yield above 1.0 ton. It seems that there is a possibility to exceed one ton per hectare on farmer's fields. Regarding the implementation of soybean intensification programs, field trials and testing is really needed, because each area which is potential for soybean production requires specific conditions.

Farmers who join the soybean intensification program receive an intensification package which has a value of Rp 171,100 per hectare (US $104.33) and includes fertilizer, insecticides, legin (Rhizobium sp), seeds, soil preparations. This intensification package took effect beginning 1988. How well this intensification package suits each area of production is difficult to predict. Experience has shown that the package needs flexibility in order to be adapted to different production conditions.

Table 2. Yield potential of ORBA variety of soybeans in selected Provinces, 1981/82.

Province	Fertilizer treatment (kg/ha)			Yield (ton/ha)
	N	P2O5	K2O	
West Nusa Tenggara	23	90	30	1.68
Lampung	46	45	30	1.03
West Java	23	90	30	0.98
South Sulawesi	23	30	30	1.33
Aceh	23	90	30	1.77

Source: Directorate General of Foodcrops, MOA. Jakarta, Indonesia, 1985.

III.1.1.3. PRODUCTION, IMPORT AND PRICE

In 1970, Java produced about 86 percent of the total soybean production in Indonesia while the outer islands produced 14 percent. By 1986 this proportion had changed to 64.5 percent in Java and 35.5 percent in the outer islands. Sumatera had 20.1 percent, Kalimantan 1.6 percent, Sulawesi 6.5 percent, Bali 1.8 percent, West Nusa Tenggara 5.5 percent and other islands 0.2 percent. The increased production in the outer islands came primarily from an increase in the area planted particularly in the transmigration areas.

Between 1970-1986, total production of soybeans has increased at a rate of about 5.6 percent annually. During that time production has been quite stable, except in 1976 when it fell about 11.5 percent compared to the previous year. In 1982 the total production also fell at about 26 percent compared to 1981. From 1985 to 1986 the total production had increased about 46 percent. The total production (domestic production) of soybeans is presented in Table 3.

Areas in the outer islands that have a potential for soybeans production are North Sumatera, Aceh, Lampung (Sumatera Islands); North, South and Southeast

Table 3. Domestic Production, Export, Import and Price of Soybeans, Indonesia, 1970-1986.

Year	Domestic Production (ton)	Total Import (ton)	World Price Nominal (Rp/ton)	World Price Real (Rp/ton)	Dom Price Nominal (Rp/ton)	Dom Price Real (Rp/ton)	World Price / Dom Price
	1	2	3	4	5	6	7
1970	497,883	0			49,600	136,036	
1971	515,644	0			60,010	157,042	
1972	518,219	0			72,550	179,496	
1973	541,038	0			108,500	241,618	
1974	589,239	0			131,490	255,667	
1975	589,831	0	91,989	172,678	157,360	295,392	0.58
1976	521,777	0	102,198	177,659	162,450	282,400	0.63
1977	522,821	89,101	117,985	197,220	179,680	300,346	0.66
1978	616,617	130,499	170,123	264,532	190,190	295,734	0.89
1979	679,825	160,904	191,777	260,822	272,390	370,459	0.70
1980	722,848	193,531	186,223	224,677	308,970	372,771	0.60
1981	703,811	351,523	185,452	191,687	347,410	359,091	0.53
1982	521,394	354,836	169,194	169,194	356,460	356,460	0.47
1983	536,103	391,702	279,977	260,426	414,653	385,698	0.68
1984	769,273	400,941	303,791	269,569	508,250	450,996	0.60
1985	817,494	301,957	249,199	223,298	508,350	455,513	0.49
1986	1,195,787	359,249	268,356	222,651	641,660	532,377	0.42
G.Rate	5.63%	16.76%	10.22%	2.34%	17.35%	8.90%	-3.00%

1. Source:
   - Domestic Production = Directorate General of Food Crops.
   - Total export & import = Bulog and CBS.
   - World Price = FAO.
   - Domestic Price = CBS.
2. Growth rate in column 1, 5 and 6 from 1970-1986.
   Growth rate in column 2 from 1977-1986.
   Growth rate in column 3, 4 and 7 from 1975-1986.
3. - Dom = Domestic.
   - Real Price based on a private consumption inflation index (1982, based).
   - World Price = Rotterdam CIF, US Origin.

Source : Tabor,S. et al, (1988),
Supply and Demand for Foodcrops in Indonesia,
Directorate General of Foodcrops, MOA, Jakarta.

Sulawesi (Sulawesi Island); Bali; West and East Nusa Tenggara. Potential for expansion of soybean areas is mostly in the outer islands, although the soil is generally less fertile than Java.

In 1988 a total production of about 1,370,000 tons is predicted, with a yield of about 1.3 tons per hectare. A total of 1,100,000 hectares will be harvested, which consists of 821,000 hectares on established areas and 279,000 hectares in new areas (Directorate General of Food Crops, MOA, 1988).

This projection or expectation is speculative, because in fact, (1) Government has already begun to phase-out production subsidies, and (2) a large investment is needed to open new areas in the outer islands.

Steven Tabor et al., (1988), projected a total production of about 1,144,000 tons in 1988, while in the year 2000 it will reach 1,540,000 tons (see Table 4).

Since 1975 Indonesia started to import soybeans and soybean products particularly soybean meal and soybean oil. Soybean imports constituted between 46 and 51 percent of the domestic supply, during 1975-1985. Soybean meal and soybean oil are all imported because there is no domestic production. Since 1975 imports of soybeans increased from 18,000 tons up to 401,000 tons in 1984

Table 4. Soybean Balance Sheet, Indonesia, 1988.

Year	Production	Waste	Seed	Import	Export	Export -Import	Available for Consumption	Susenas	Gap	Percapita Consumption
	('000 mt)									(Kg/year)
Actual										
1968	429	58	27		17	17	327			2.91
1969	398	54	23	0	1	1	320			2.80
1970	472	64	27		4	4	378			3.23
1971	512	69	27	0	1	0	415			3.48
1972	518	70	27	0	3	3	418			3.43
1973	536	72	31	0	36	36	397			3.18
1974	578	78	33	0	4	4	463			3.63
1975	590	80	32	18	0	-18	496			3.79
1976	538	73	30	23	1	-23	458			3.43
1977	523	71	30	32	0	-32	454			3.32
1978	594	80	31	35		-35	518			3.70
1979	665	90	34	107	0	-107	648			4.53
1980	713	96	33	194		-194	777			5.30
1981	710	96	34	361	0	-361	941			6.28
1982	573	77	34	361	0	-361	822			5.36
1983	534	72	34	391	0	-391	819			5.22
1984	718	97	37	401		-401	985			6.13
1985	806	109	38	302		-302	962			5.86
1986	1114	150	52	350		-350	1324	1324	0	7.93
Forecast										
1987	1122	151	53				918	1356	-438	7.95
1988	1144	154	54				936	1397	-461	8.02
1989	1172	158	55				959	1437	-478	8.08
1990	1202	162	56				983	1477	-494	8.13
1991	1233	167	58				1009	1518	-509	8.19
1992	1266	171	59				1035	1558	-522	8.24
1993	1298	175	61				1062	1598	-536	8.28
1994	1332	180	63				1089	1639	-549	8.32
1995	1365	184	64				1117	1679	-562	8.36
1996	1399	189	66				1145	1720	-575	8.40
1997	1434	194	67				1173	1760	-587	8.44
1998	1469	198	69				1202	1801	-599	8.47
1999	1504	203	71				1230	1842	-611	8.50
2000	1540	208	72				1260	1883	-623	8.53

Notes : Crop year production to 1985. 1986 values based on 3rd MOA calender year forecast. Seed values taken from CBS balance sheet and weighted by crop year adjustment factors. Pre-1977 import and export values from CBS. Post 1977 trade statistics from Bulog. Waste values based on Binus field surveys.

Source : Tabor,S. et al, (1988), Supply and Demand for Foodcrops in Indonesia, Directorate General of Foodcrops, MOA, Jakarta.

(Statistical Bulletin, BULOG, 1986). In Table 3, soybean imports increased from 89,101 tons in 1977 to 359,249 tons in 1986, an annual average growth rate of 16.76 percent (Tabor, S. 1988).

During 1975-1986, import of soybean meal increased from 1,197 to 313,102 tons, a growth rate of 65.9 percent; and soybean oil from 34 tons in 1973 to 4,551 tons in 1986, with growth rate of 45.7 percent (Tabor, S. 1988). Imports of soybean meal and oil are presented in Table 5.

Soybean meal is primarily used in making poultry feed and soybean oil in the ketchup (soy-sauce) industry. The poultry industry in particular is growing rapidly to meet the rising demand for eggs and meat as a result of increased income arising from national economic development. About 90 percent of the imported soybean meal is consumed by the poultry industry.

In 1987, Indonesia's first crushing plant for producing soybean meal was built in Southeast Sulawesi. In this province, a program for increasing soybean production has been established with a target of 100,000 harvested hectares in 1987/88 (Sihombing, D., 1985). In 1986, the total production of soybeans in Indonesia accounted for less than one percent (0.78%) of the world production. Soybeans are imported mainly from USA: about

Table 5. Quantity and value of soybean meal and soybean oil imports, Indonesia, 1970-1986.

Year	Quantity (Ton)	Value (Rp x 1000)
1970	0	0
1971	0	0
1972	0	0
1973	0	0
1974	0	0
1975	1,197	29,070
1976	8,117	256,539
1977	9,233	466,233
1978	20,672	1,416,522
1979	28,357	1,985,496
1980	26,640	4,434,217
1981	169,776	26,907,716
1982	71,769	13,029,306
1983	103,961	26,794,678
1984	205,077	56,561,954
1985	175,223	34,062,447
1986	313,102	83,516,651
Growth Rate	65.9%	106.3%

1. Source : CBS.
2. Growth Rate from 1975-1986.
3. Includes :
   - Soybean cake CCCN 23.04.20
   - Oil cake of soybean CCCN 23.04.200
   - Flour or meal of soybean CCCN 12.02.100

Year	Quantity (Ton)	Value (Rp x 1000)
1970	0	0
1971	0	0
1972	0	0
1973	34	5,880
1974	39	11,844
1975	14	6,387
1976	54	30,706
1977	15	6,108
1978	234	143,412
1979	120	80,729
1980	40	27,769
1981	1,670	832,731
1982	1,826	1,061,983
1983	1,942	1,886,984
1984	10,589	6,470,319
1985	2,363	2,413,787
1986	4,551	3,252,850
Growth Rate	45.7%	62.6%

1. Source : CBS.
2. Growth Rate from 1973-1986.
3. Includes :
   - Soybean oil CCCN 15.07.110
   - Soybean oil fatty acid CCCN 15.10.140
   - Modified soybean oil CCCN 15.08.123

Source : Tabor, S. et al, (1988), Supply and Demand for Foodcrops in Indonesia Directorate General of Foodcrops, MOA, Jakarta.

81.7 percent of the total imported in 1984. For soybean meal 31.6 percent came from USA and 30.2 percent from Brazil; for soybean oil 37.4 percent from USA, 36.7 percent from Netherlands (Statistical Bulletin, BULOG, 1986).

Based on the calculation by F. Kasryno et al (1982), the projected consumption of soybeans in Indonesia in 1988 will be 1,519,000 tons. Projected production is 1,137,000 tons, meaning that Indonesia will import 382,000 tons of soybeans in 1988. Imported soybeans would account for about 25.15 percent of the total consumption.

A forecast made by Tabor, S., et al (1988) indicates soybean demand will outpace production advances, with imports remaining at between four to six hundred thousand tons per year. The demand growth for soybeans will average 2.9 percent per year to the end of the century (see Table 4). Furthermore, it is expected that import demand for soybeans will also increase by approximately 500,000 to 700,000 tons, as soybean meal imports are replaced by domestic meal manufacture.

Between 1975 and 1986, the nominal world price of soybeans increased from Rp 91,989 to Rp 268,356 per ton; with a growth rate of 10.22 percent per year. During the same period, the real world price of soybeans

increased from Rp 172,678 to Rp 222,651 per ton; with a growth rate of 2.34 percent per year.

During 1970-1986, the nominal domestic price of soybeans had increased from Rp 49,600 to Rp 641,660 per ton; with a growth of 17.35 percent per year, whereas the real domestic price also increased from Rp 136,036 to Rp 532,377 per ton; with a growth rate of 8.9 percent per year.

Both the nominal and the real domestic price of soybeans was higher than the nominal and real world price, whereas the ratio of world price over domestic price showed a negative growth rate of 3.0 percent per year, between 1970 and 1986 (see Table 3).

III.1.1.4. COST OF PRODUCTION

During 1981-1984, the nominal average cost of production per hectare was Rp 78,644.25 (US $96.60) which was a nominal increase of about 9.15 percent annually. The cost of production is presented in Table 6.

A study conducted by Kasryno F. (1985), revealed that the return and cost ratio of soybean production was 1.42 in 1980; 1.41 in 1981; 1.46 in 1982; and 1.56 in 1983.

Table 6. Cost of production (nominal) of soybeans. Indonesia, 1981-1984.

Year	Yield (kg/ha)	Value (Rp)	Total variable cost		
			Value		Percent*
			(Rp)	(US$)	
1981	874	247,104	66,356	101.3	26.9
1982	860	279,002	71,914	103.3	25.8
1983	839	311,375	92,747	95.6	29.8
1984	897	355,560	83,560	86.2	23.5

Source: Data were calculated from the Statistical Yearbook of Indonesia, 1985 and 1986.
Central Bureau of Statistics, Jakarta, Indonesia.

* Percentage of cost of production to the value of yield.

A study of foodcrops in Indonesia by Tabor, S. (1988) released a data set concerning the cost of production of foodcrops including soybeans, which is presented in Table 7.

This table provides a summary of average values for factor prices, amount of factor use, yields, product prices and profits differentiated by commodities, regions and time-period.

Based on Table 7, the cost of production includes only the use of labor (family and hired); and fertilizer. The cost of labor and fertilizer for producing soybeans in Java was Rp 140,744 per hectare, whereas outside of Java Rp 135,008 per hectare. A research report by Agency for Agricultural Research and Development (AARD), revealed that the cost of production of soybeans in South Sulawesi (off-Java) in the season 1986/87 was Rp 189,107 per hectare, which includes labor (family and hired); fertilizer, seeds, insecticides, and land tax.

Furthermore, Tabor S. (1988) revealed that:

(see Table 7)

(1) The general level of factor use is highest for wetland rice; and factor use is also generally higher on average, on Java than outside of Java;

(2) Labor use per hectare is higher on Java than outside of Java, presumably that is the result of differences in

Table 7. Mean Factor Use and Costs,
(Per hectare, 1983-1985/1986 pooled values)

Commodity / Area	Observation n	Factor Use by Region — (Kg) — Urea	TSP	KCL	Family Labour man-days	Hired	Yield Kg/Ha	Price Rp/Kg	Profit Rp.	Factor Prices by Region — Rp/Kg — Urea	TSP	KCL	Family Labour Rp/day	Hired
DRYLAND RICE														
Java	76	191	76	1	59	116	3165	124	210694	92	92	94	919	966
Outside of Java	46	118	97	21	80	38	2556	152	205839	90	90	86	1286	1548
TOTAL	122	163	84	8	67	86	2935	134	208863	91	91	91	1057	1185
WETLAND RICE														
Java	206	268	105	8	39	159	5582	128	463503	92	92	94	1020	1132
Outside of Java	96	177	83	25	63	73	5107	138	457424	93	92	93	1474	1705
TOTAL	302	239	98	13	47	132	5431	131	462231	92	92	94	1164	1314
C O R N														
Java	54	175	90	0	53	87	2494	126	175500	91	92	102	823	979
Outdise of Java	17	159	84	14	52	42	3102	130	211497	97	96	99	1592	1699
TOTAL	71	171	98	3	52	76	2640	127	183928	93	93	101	1007	1151
CASSAVA														
Java	37	118	35	0	51	75	12671	40	363746	91	92	90	910	969
Outside of Java	22	30	27	0	65	35	12619	43	390620	88	88	90	1204	1204
TOTAL	59	85	32	0	56	60	12652	41	373767	90	90	90	1020	1057
SOYBEAN														
Java	40	29	59	3	53	77	948	426	262781	94	93	96	1083	972
Outside of Java	32	36	49	6	60	35	1152	350	263096	92	92	94	1322	1314
TOTAL	72	32	54	4	56	59	1039	392	265429	93	93	95	1189	1124
PEANUT														
Java	26	35	59	4	50	88	1619	445	548481	94	91	93	1017	1080
Outside of Java	40	52	53	7	118	57	1108	641	455327	95	93	93	1257	1318
TOTAL	66	45	55	6	91	69	1309	564	516313	94	92	93	1162	1224
MUNGBEAN														
Java	25	27	58	0	35	60	684	478	219266	89	90	90	1029	1061
Outside of Java	22	49	60	7	70	27	987	443	297952	91	91	90	1306	1392
TOTAL	47	37	59	3	51	44	826	462	257990	90	91	90	1159	1216

Note : Data based on Agriculture Department field survey questionnaires. Because of the sampling and data cleaning techniques used, these values may differ from those reported in the annual publication, Survey Pertanian (Agriculture Survey). Profit is defined as total revenue minus the cost of labor and fertilizer.

Source : Tabor,S. et al, (1988)
Supply and Demand for Foodcrops in Indonesia,
Directorate General of Foodcrops, MOA, Jakarta

labor availablity, which would lead to higher wages outside Java than on Java;

(3) Wage rates for hired labor range between Rp 823 per day for corn on Java, and Rp 1705 per day for rice outside of Java;

(4) Average sample fertilizer use is well below technical recommendations for soybeans, peanuts, mungbeans and cassava;

(5) Profitability is highest for wetland rice and is closely followed by peanuts, and the next most profitable group of crops are soybeans, mungbeans, dryland rice and corn;

(6) Apparent fertilizer prices are the same for all crops reflecting government policy of fixing fertilizer sales prices.

For the year 1988/89, the cost of production in the intensification package program is Rp 171,100 (US $104.30) per hectare. This package consists of seed component 24.55 percent, insecticides 27.73 percent, fertilizer 19.73 percent, lime 14.61 percent and other cost components 13.38 percent.

III.1.1.5. CROPPING AND HARVESTING PATTERNS

Cropping patterns for soybeans tend to vary from

district to district. The main producing areas of East Java tend to monocrop soybeans after rice. Sumatera appears to intercrop, while Central Java varies between the two main patterns. In the transmigration area, monocropping and intercropping are practiced together; in North Sulawesi mostly monocropping. Soybeans are mostly intercropped with corn and groundnuts and sometimes with vegetables.

Harvesting patterns for soybeans tend to vary from province to province. In East Java, the main producing area, the harvesting period is in April and July-August. There is a tendency for the harvesting period in Java to be concentrated from April to August. In the outer islands it is from January to February, and from August to December. It seems that the harvesting period for soybeans occurs throughout the year.

Soybean crops are harvested by cutting the mature plants with a sickle by hand. The cut plants are placed in bundles on the ground and sun-dried for about two to three days, then threshed with a wooden stick. This process separates the beans from the stalks and they are further cleaned by hand to remove the dirt and foreign matter. Sometimes the beans are sun-dried for the second time and then bagged for selling to the traders.

This traditional method of soybean harvesting usually produces a low quality of beans because the beans are unsorted and still not clean enough.

In Lampung, farmers generally harvest, thresh and dry the soybeans themselves. In South Sulawesi, contract harvesters also harvest, thresh, and dry soybeans for farmers. In Jember (East Java), besides harvesting, threshing and drying, they also sort the beans and sell one to two different quality grades to the traders.

Recently an improved method of soybean harvesting has become available to soybean farmers. A mechanized soybean thresher has been introduced in the soybean production zones in the outer islands, particularly in North Sumatera, South Sumatera and Lampung provinces. According to the field trials, the mechanical soybean thresher reduces the losses of traditional threshing from 6.5 percent to 0.5 percent and the time needed for threshing is reduced by 50 percent. One soybean thresher can cover an area of 50 hectares per harvest season (Purwadaria, H. K., 1987).

III.1.2. WORLD PRODUCTION

III.1.2.1. PRODUCTION AND TRADE

The world's major soybean producing countries

are the United States, Brazil, Argentina, and China. In 1985, these countries produced close to 95 percent of the world's total soybean output. Soybeans represent over 50 percent of total world oilseed production and close to 80 percent of the world trade in oilseeds. World soybean meal trade accounts for more than 70 percent of total protein meal trade, but the market share of soybean oil is less than 30 percent. This is due to the relatively low oil content of soybeans and the importance of tropical vegetable oils in world trade (Karl D. Meilke, 1984).

During the ten crop years ending 1981/82, world soybean production increased an average of 7.5 percent annually, while for the following two decades an expected average annual rate of growth is only 3 percent (S. Mielke, 1985). World production, consumption, export and import are presented in Table 8 and Table 9. The united States dominates the export market with a share of 80 percent, followed by Brazil and Argentina. China is a large producer of soybeans, but is a small net importer.

The European Community is a major soybean importer, amounting to 12.9 mmt in the year 1986/87, or about 45 percent of the total world imports. The largest single country importer is Japan, with imports ranging from 4.6 to 4.9 mmt during 1984/85 to 1986/87. Mexico, Taiwan, and USSR are smaller but significant importers.

Table 8. World production and trade of soybean, 1978/79 to 1983/84. ('000 mt)@

	78/79	79/80	80/81	81/82	82/83[b/]	83/84[c/]
Production						
United States	50859	61722	48772	54435	60677	43421
Brazil	10240	15156	15200	12835	14750	15200
China	7565	7460	7940	9325	9030	9760
Argentina	3700	3600	3500	4150	4000	6000
Other	5091	5771	5379	5552	5908	6136
Total	77455	93709	80791	86297	94365	80517
Exports						
United States	20117	23818	19712	25285	24634	20684
Brazil	638	1154	1798	858	1320	1300
Argentina	2791	2309	2700	1876	1417	2400
E.C.-10	352	270	171	224	149	116
Other	781	713	963	1080	1052	869
Total	24679	28264	25344	29323	28572	25369
Imports						
E.C.-10	12169	12895	10177	12355	11798	9950
Japan	4132	4165	4213	4486	4871	4700
Spain	2237	3100	2790	3196	3040	2800
USSR	1765	1470	1476	1485	992	1100
Other	5534	6596	7807	7760	7351	7113
Total	25837	28226	26463	29282	28052	25663

a/ For Northern hemisphere countries, marketing years begin in the first year shown, and Southern hemisphere countries begin in the second year. Argentina and Brazil are converted to an October-September basis.

b/ Preliminary.

c/ Estimated June 1984.

Source: K.D.Meilke; An economic profile of the Ontario soybean industry, University of Guelph,Canada,1984

Table 9. Soybeans and products: World production, consumption, and net exports.

Country	1984/85			1985/86 E			1986/87 P		
	Prod.	Cons.	N. exp.	Prod.	Cons.	N. exp.	Prod.	Cons.	N. exp.
	Million metric tons								
Soybeans									
Major exporters									
U.S.	50.64	28.03	16.28	57.11	28.66	20.14	54.68	29.39	20.68
Brazil	18.28	13.13	3.10	13.40	12.43	.85	16.50	12.80	1.65
Argentina	6.50	3.86	3.29	7.30	4.37	2.54	7.50	4.60	2.50
China	9.69	1.59	1.05	10.50	1.76	1.30	11.00	1.86	1.10
Major importers									
EC-12	.15	12.37	-12.84	.34	12.68	-12.78	.77	13.11	-12.83
Japan	.24	3.79	-4.61	.23	3.95	-4.75	.23	3.98	-4.85
Eastern Europe	.77	1.26	-.59	.53	1.31	-.85	.75	1.45	-.79
Mexico	.55	2.00	-1.43	.75	1.73	-1.00	.60	1.80	-1.20
Taiwan	.01	1.20	-1.47	.01	1.29	-1.57	.02	1.32	-1.56
USSR	.47	1.13	-.85	.46	2.24	-2.00	.50	2.28	-2.00
Residual	5.47	5.41	-1.93	5.67	5.92	-1.88	6.33	6.35	-2.70
World	92.77	73.77		96.30	76.34		98.88	78.94	
Soybean meal									
Major exporters									
U.S.	22.25	17.67	4.46	22.64	17.35	5.45	23.12	17.69	5.35
Brazil	10.17	1.99	8.44	9.66	2.42	7.38	9.89	2.60	7.50
Argentina	3.08	.27	2.88	3.49	.35	3.20	3.67	.35	3.30
Major importers									
EC-12	9.82	18.06	-8.28	10.13	18.04	-7.90	10.41	18.07	-7.63
Eastern Europe	1.02	4.57	-3.54	1.06	4.81	-3.80	1.16	5.00	-3.86
USSR	.86	1.41	-.55	1.75	2.35	-.60	1.78	2.38	-.60
Japan	2.92	3.12	-.09	3.05	3.18	-.22	3.07	3.29	-.13
Mexico	1.46	1.50	-.08	1.26	1.42	-.07	1.31	1.40	-.08
Residual	6.58	10.70	-3.24	7.19	11.45	-3.44	7.67	11.98	-3.85
World	58.16	59.29		60.23	61.37		62.08	62.76	
Soybean oil									
Major exporters									
U.S.	5.20	4.50	.75	5.27	4.57	.57	5.39	4.67	.54
Brazil	2.46	1.55	.82	2.35	1.87	.30	2.39	1.97	.45
Argentina	.64	.07	.50	.73	.11	.63	.76	.10	.66
EC-12	2.22	1.42	.78	2.27	1.43	.84	2.32	1.48	.87
Major importers									
India	.15	.57	-.40	.17	.49	-.22	.20	.50	-.30
Pakistan	0	.19	-.17	0	.22	-.28	0	.30	-.27
Eastern Europe	.19	.37	-.20	.21	.37	-.19	.23	.37	-.13
Iran	.02	.34	-.32	.02	.35	-.32	.02	.37	-.35
Morocco	0	.13	-.12	0	.13	-.13	0	.15	-.15
Residual	2.42	3.92	-1.64	2.69	3.86	-1.20	2.79	4.03	-1.34
World	13.30	13.06		13.71	13.40		14.10	13.94	

For soybeans, consumption refers to crush. Trade and consumption on marketing year except for Brazil and Argentina which are on an October-September year. E = estimated. P = projected.

Source: World Agriculture, "Situation and Outlook Report", USDA, WAS 46, Dec.1986.

Indonesia is a small importer; in 1984 imported soybeans accounted for only 1.7 percent of total imports and is not expected that imports exceeded 2 percent in recent years. James P. Houck (1985, pp. 34-35) proposed a list of special features of the international soybean market, namely:

(1) The international market for soybeans and products is not "thin" in relation to production. Depending on the measure and the product, between 25 and 50 percent of the volume produced enters into international trade.

(2) Production of soybeans is highly concentrated with 92 percent of world output coming from four nations. Consumption of soy products is widely dispersed around the globe.

(3) The major soybean products, meal and oil, are joint products of the crushing industry. Each contributes importantly to the total value of whole beans. In 1982-1983, the meal and oil components provided respectively, 64 percent and 36 percent of the average value of soybeans processed in the United States.

(4) The processing of soybeans into meal and oil is a highly mechanized, but relatively simple industrial process which, in principle, can be located

virtually anywhere in the world. However, efficient operation of individual, modern plants require sizable volumes of raw soybeans on a regular basis.

(5) The basic joint products, meal and oil, are intermediate goods, not final products. They must be further processed substantially in the case of crude soybean oil.

(6) Because of the valuable joint products involved, soybeans straddle the strong economics of the international feed/livestock economy and the weaker economics of the edible fats and oils complex. Both sets of forces have powerful effects on the production of soybeans.

(7) Compared with other, major agricultural commodities, soybeans and their products are relative newcomers to world trade. Soybean commodities were virtually unknown in international commerce before World War II.

The net effects of all these general characteristics has been to foster a relatively free and open international market for soybeans and soybean meal, especially on the import side.

The above significant features of the soybean economy have a substantially positive impact on the

countries which have a potential to increase soybean production and products, particularly Indonesia.

It is important to consider major soybean development and policy in the major producing countries, because they are expected to continue to dominate soybean production and trade in the 1990's.

The United States. The United States recently modified its policies and programs in an attempt to regain lost market share. The United States Food Security Act of 1985 is intended to make U. S. agriculture more competitive by reducing price-supporting loan rates. Also, a variety of export programs are authorized, including the Export Enhancement Program (EEP) which uses CCC stocks directly to counter subsidized European Community (EC) exports in specific markets (G. Vocke, 1988). US programs, particularly EEP are expected to contribute to lower vegetable oil export by EC, lower carry out stocks for the US, and increased US market share. The EEP is designed to allow US exporters to compete against subsidizing countries, and was applied to vegetable oils to signal disapproval of EC policies subsidizing vegetable oil production (USDA, OCS 17, 1988). The US soybean sector has also had to compete with palm oil from Malaysia and Indonesia. The low production costs of new, high-

yielding varieties that doubled yields have made the Asian palm oil industry very profitable (G. Vocke, 1988).

Brazil and Argentina. Brazilian soybean sector has grown more slowly in the 1980's than during the previous decade. Expansion will likely depend on international soybean prices and the availability of capital for rural transportation investments, but debt crisis limits the availability of investment. Currently international prices are low compared to the 1970's. The medium to long-term prospects for increased soybean output are favorable, but not as good as the early 1970's (G. Vocke, 1988).

The near term prospects for increases in Argentine soybean plantings through substitution for other crops will depend on soybean prices. In the longer run, expansion of soybean production into the drier areas of the country will be slowed because yield will likely be lower than in areas where soybeans are now grown. In Argentina and Brazil, soybean export was taxed at higher rates than soybean meal and soybean oil exports to generate revenue and to encourage soybean sales to the domestic crushing industry. Furthermore, the development of processing facilities has been aided by direct foreign investment by multi-national grain

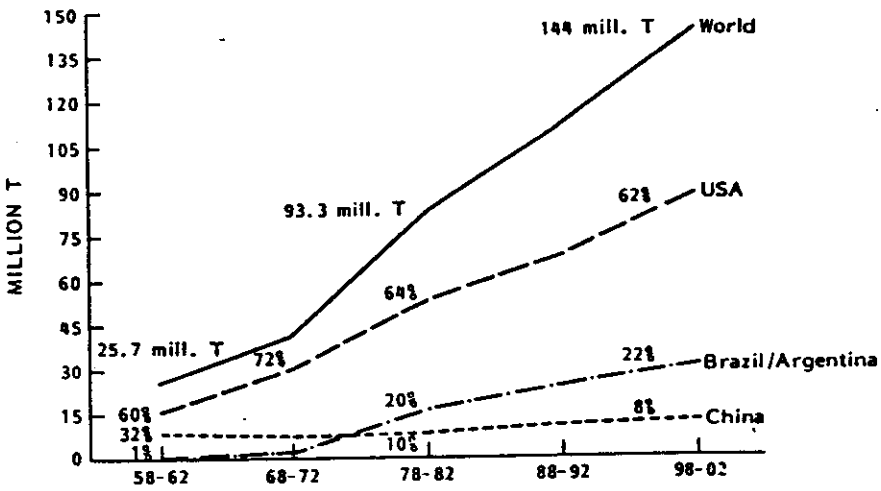
trading firm including some based in the United States (Davison, C. W. and J. W. Glauber, 1988).

III.1.2.2. THE PROSPECT OF SOYBEANS AND PRODUCTS

According to S. Mielke (1985, the growth of the world soybean industry is very likely to be slowed in the eighties and nineties by sharply increasing competition from palm oil and the slower increase in the meal demand. This trend is revealed in Figure 1, which shows the development of world soybean production and the shares of the four leading countries. It shows (as five-year averages), that the US share continues to increase sharply up to the beginning of the seventies when it reached a record of 72 percent. This was mainly at the expense of China whose share declined dramatically.

Since the first half of the seventies, however, Brazil and Argentine share has increased sharply at the expense of both China and the US. Most of the increase in soybean production expected for the eighties and nineties is likely to come from higher yield in US and from acreage expansion and yield increases in South America. In the nineties it is expected that the US will still contribute 62 percent of the world soybean production, while Brazil and Argentina will produce 22 percent.

Figure 1. Soybean production of the major countries and the world 5-year averages (T=metric tons).



Source: S.Mielke; World supply,demand and competitions for soybeans and products in the eighties and nineties. World Sorbean Research Conference III, Proceedings, ed. R.Shibles, Westview Press / Boulder and London, 1985.

According to Jim L. Matthews (1985), both meal and soybean prices are expected to show good gains in the late 1980's and the 1990's, as economic growth and livestock feed demand accelerates.

As stated previously, Indonesia's imported soybeans and products come mainly from the US and Brazil so the development of production in these countries, together with the international market situation should be taken into consideration in the developing soybean industry in Indonesia.

III.2. PROBLEMS OF SUPPLY

III.2.1. SOYBEAN INTENSIFICATION PROBLEMS

Constraints to increase soybean production in Indonesia include both physical and economic problems. Physical limitations include the need to develop higher yielding, early maturing, and more pest and disease resistant soybean varieties. It also involves the availability and distribution of improved seed, fertilizer, insecticides, and other production requisities suited for each production area.

Economic constraints include the extent of benefit to farmers who grow soybeans. In other words, do growers

perceive soybean production as the most profitable use of their resources as compared to other alternatives? It also involves the efficiency of the marketing system in enhancing farmers economic returns. Another factor that has a substantial effect is how well the extension program is able to prepare and assist farmers in the soybean intensification program.

(1) Physical problems. Since 1974, when soybeans were included in the intensification programs together with rice, there were three varieties that farmers usually cultivated. These are the local, selected local, and the improved cultivars. In case of local varieties, the availability and distribution of seeds face no serious problems because they are always available locally. The weakness of local varieties is their low yield and limited response to fertilizer.

Improved cultivars such as Orba, Galunggung, and Merapi (early maturing varieties), No. 27 and No. 29 (long maturing varieties), have a high yield if fertilizers and insecticides are available and applied at the farm. In Java the farmers prefer to grow early maturing and small seed varieties of soybeans (Sihombing, D., 1985). Although some of the improved cultivars possess these features, farmers in some areas did not receive the seeds at the proper time and the quality is low. One of the

reasons is that the multiplication of the improved seeds at the provincial level is not good. Furthermore, local testing and field trials are lacking.

Weather and soil fertility also influence the yield. Orba, Wilis, and Dempo varieties need fertile soil and a proper fertilizing. Lokon variety is more resistant to the dry season, but the yield is low compared to Orba.

Experience shows that the quality of seed, especially the improved cultivars, will decline if storage facilities are poor and are stored for more than two months. Low seed germination has also slowed the expansion of soybean production in the tropics. Seed quality is lowered if soybeans are subjected to a rainy period and high temperatures just before harvest. Soybean seed germination declines rapidly when stored unprotected in the warm, humid conditions of the tropics. The low and uncertain germination rate lower yields because farmers will have difficulty achieving optimum population, a key to getting high yields. Where there is no winter season, high germination is difficult without storage facilities to keep seeds dry and cool. High quality seed is needed if soybean production is to expand (Gary Vocke, 1988).

It is clear that the flow of improved seeds requires improved management in order to ensure availability

at the farm level at the proper time before planting. The availability and the distribution of fertilizer, insecticides legin (Nitrogen-fixation bacteria, in the pellet form), and lime are equally important.

Involvement of private enterprises can expedite the flow of these inputs. Lack of plant protection because of the low quality of insecticides and lack of sprayers on the farm causes farmers to choose local varieties.

The distribution of these inputs at the provincial level is sometimes worse because the infrastructure is lacking, especially in the outer islands (off-Java).

(2) Economic problems. Since 1979, a floor-price system has been operating as a policy to support the intensification programs of soybean production. A study of the profitability of soybean was conducted by F. Kasryno (1985). The study revealed some important issues as follows: (a) In 1983, the ratio of floor-price to the cost of production was 1.23, while the ratio of return to the cost of production was 1.56 (R/C ratio). (b) At the same time, the ratio of floor-price to the cost of production of rice was 1.81, while the R/C ratio was 1.64. For corn, the ratio was 1.14 and 1.44; for groundnuts the R/C ratio was 1.72; for green beans the ratio was 1.05 and the R/C ratio 1.45. These figures are represented in Table 10.

Table 10. Relationship between floor price and cost of production and the ratio between return and cost (R/C ratio, of some food crops.

Commodities	1980	1981	1982	1983
Rice (dry stalk paddy)	1.78 (1.88)	1.91 (1.89)	1.84 (1.54)	1.81 (1.64)
Corn	1.30 (1.26)	1.16 (1.33)	1.10 (1.15)	1.14 (1.44)
Soybean	1.09 (1.42)	1.19 (1.41)	1.11 (1.48)	1.23 (1.56)
Groundnut	1.54 (1.72)	1.59 (1.89)	1.92 (1.90)	- (1.72)
Green bean	0.91 (1.37)	1.40 (1.91)	1.25 (1.86)	1.05 (1.45)

Source: Directorate General Agric.Food Crops, MOA, Jakarta, Indonesia, 1984.

Figures in bracket are the R/C ratio.

This study revealed that rice farming is more profitable than second foodcrops farming. In case of second foodcrops farming, corn is less profitable than soybean, but groundnut is more profitable than soybean, in terms of R/C ratio, and also better than rice. Furthermore, it seems that the R/C ratio is not much different.

One of the important points to consider is that producing soybeans is still profitable in the second crops farming. Except for groundnuts, rice is more profitable. In Indonesia's food production policy, rice has been the central focus in which major effort has been directed toward the rice self-sufficiency program. Regarding the expansion of soybean areas, especially in the outer islands (off-Java) faces specific problems; namely the soil is less fertile compared to Java, and in some places the acidity of soil is rather high. This condition requires more liming, fertilizing, and other production inputs. In some places, especially in the transmigration areas, land reclamation including drainage canals are needed. All these require major investment. Furthermore in the outer islands there is little infrastructure and labor wages are high compared to Java. Two economic factors that slowed the expansion program include:

(1) The cost of production is much higher in the outer islands compared to Java, where the labor wage rate for manual labor in North Sumatera, Lampung was Rp 2,000 - Rp 3,000; in Java ranging from Rp 1,250 to Rp 1,500. Higher wage rate in Sumatera and Sulawesi, as compared to Java, was due to the availability of employment in non-food crop sectors of the economy; i.e., estate crops and non-agricultural sectors (F. Kasryno, 1987).

(2) Poor infrastructure needed to reach the internal market lowers the net-farm price of soybeans and raises the farm price of inputs.

Based on the differences in factor use by crops and regions, prices and profitability for secondary foodcrops (see Table 7), S. Tabor et al, (1988), calculated the short term area, yield and supply elasticities for soybeans (see Table 11), as follows:

(a) Soybeans exhibits an elastic supply response to own price movements.

(b) Soybeans is the most area-responsive, compared to corn, peanuts, dryland rice and mungbeans.

(c) Soybeans exhibits relatively low and inelastic short-term productivity elasticity with respect to output prices.

Table 11. Short term area, yield and supply elasticities for soybeans (1985)

With Respect to:	Java			Outside of Java			Indonesia		
	Area	Yield	Supply	Area	Yield	Supply	Area	Yield	Supply
Soybean price	1,45	0,28	1,73	0,58	0,05	0,63	1,10	0,19	1,30
Corn Price	-0,26		-0,26				-0,16		-0,16
Cassava Price	-0,20		-0,20	-0,07		-0,07	-0,15		-0,15
Peanut Price	-0,19		-0,19				-0,12		-0,12
Sugar Price				-0,15		-0,15	-0,05		-0,05
Labor Wages Family		f.f	f.f		f.f	f.f			
Hired		-0,23	-0,23		-0,03	-0,03		-0,15	-0,15
Fertilizer Prices	—	-0,04	-0,04		-0,02	-0,02		-0,03	-0,03
Repelita IV Targets on Area	0,37		0,37	1,29		1,29	0,86		0,86

Notes: Elasticity values derived from the area response model and the profit function model. Inflation has an effect on area allocation, since real prices are used. Yields are only effected by inflation if the cost relation is changed, such as via an increase of labour wages while fertilizer prices remain unchanged. ff means regarded as a fixed factor.

Source: Tabor, R.S. et al. ,1988. Supply and Demand for Foodcrops in Indonesia.

Directorate General of Foodcrops, Ministry of Agriculture Jakarta, Indonesia.

Furthermore, S. Tabor et al, revealed that soybeans are more price elastic on Java than outside of Java. Yield elasticity of soybean is significantly higher on Java than outside of Java. The short term output elasticity of soybeans with respect to variable input factor prices, can be explained as follows:

(a) In Java, a ten percent real rise in fertilizer price will cause a 8.5 percent in fertilizer demand for soybeans and also will cause a 0.7 percent decline in non-family labor, which in turn the yield declined by 0.4 percent.

(b) Outside of Java, a ten percent real rise in fertilizer price, will cause a 8.1 percent decline in fertilizer demand for soybeans and also will cause a 0.9 percent decline in non-family labor, which in turn the yield declined by 0.19 percent.

This study suggests that a positive price policy for soybeans will have a larger effect on area expansion. Targets of area harvested have been far more successful in stimulating area expansion in the outer islands than on Java. Based on Table 11, a ten percent increase in national soybean targets was estimated to lead to a 12.9 percent increase in area harvested in the outer islands.

III.2.2. MACROECONOMIC ASPECTS

One of the contributors to Indonesia's agricultural and general economic success in the 1970's was innovative macropolicy. One such element was a more sensible exchange-rate policy, which had widespread effect on the food sector (Falcon, Jones, and Pearson, 1984).

The oil boom of the 1970's and early 1980's proved a blessing and a curse for many oil-exporting countries. Oil revenues raised the standard of living, widened job opportunities, and increased the policy options available to governments. But they also altered the structures of incentives in the economy, raised expectations and produced rapid and often destabilizing changes. Agriculture, especially, was affected by these changes; and experienced declines in the rate of growth of the agricultural sector. Higher incomes led to an increase in the price of non-tradable goods at the expense of tradable goods such as crops. The ability to pay for larger imports of food and other agricultural products which were then sold at subsidized prices, lowered the relative profitability of Indonesian agriculture (World Development Report 1986).

During the oil boom, the real exchange rate appreciated by about 30 percent; thereafter, Indonesia kept

its real exchange rate steady, through tightening monetary and fiscal policy. Between November 1978 and March 1983, the Rupiah (Indonesia's currency) was devalued by more than 50 percent against the dollar (World Development Report, 1986).

To alleviate the pressure of inflation, the Government controlled prices by increasing its subsidy on a wide range of consumer goods, such as rice, wheat-flour, soybeans, fertilizer, pesticides, etc. (P.L.R. Pospos, 1987). The devaluation and other economic stabilization policies were made for reasons largely unrelated to food (Falcon, Jones, and Pearson, 1984); but the outcome of these policies had a positive impact on long run economic development.

In the case of Government's low-cost food policy, S. Tabor et al (1988), revealed that this policy would depress agricultural prices, while holding non-agricultural prices artificially high. This would have severe consequences for future agricultural growth, income generation and employment. This type of policy regime would imply turning the terms of trade against agriculture to finance rapid industrialization. Such a policy would result in higher rates of aggregate growth for the economy as a whole, but at the cost of rising food imports

and a deterioration in income distribution. The rapidity with which a low cost food policy could lead to agricultural sector depression implies that policy makers must carefully coordinate macro and sectorial policies to ensure that government policy promotes a sustainable pattern of balanced growth.

General agriculture sector policies such as the involvement of cooperatives and private traders are also important in increasing soybean production. Other agricultural programs had an opposite impact on soybeans such as the expanding of wetland areas (sawah) for the purpose of rice, but partly at the expense of acreage in upland crops including soybeans.

IV. FACTORS AFFECTING DEMAND

IV.1. CONSUMPTION OF SOYBEANS

During 1970-1982, soybean consumption per capita increased at about 2.1 percent annually. In 1970, the soybean consumption per capita was 3.92 kilograms, which increased up to 6.45 kilograms in 1982. The projected consumption of soybeans in 1988 is 8.58 kilograms per capita (F. Kasryno, 1985). The availability of nutrient consumption of soybean per capita based on the National Food Balance Sheet of Indonesia, was 4.45 kilograms in 1983, and increased up to 6.38 kilograms in 1984 (Statistical Yearbook of Indonesia, CBS, 1985).

Based on a study by S. Tabor et al, (1988) per capita consumption of soybeans has increased rapidly from 3.2 kilograms in 1970 to 5.8 kilograms in 1985. Based on the large increase in both production and imports in 1986, the 1986 domestic consumption was estimated at 7.9 kilograms per capita (see Table 4). Assuming the relative prices remain unchanged at 1985/86 levels, per capita consumption expenditures rise by one percent per year and that population growth increases at approximately 2.3 percent per year, a projection of soybean demand can be calculated.

The expenditure elasticity for soybeans is estimated to be 0.48 in 1987, but declining to 0.44 by the year 2000. Under these assumptions, aggregate growth in soybean demand will increase at an average of 2.7 percent pen annum in the period 1987 to 2000 (Tabor, S. and G. Gijsbers, 1987).

Total soybean demand is expected to increase from 1.37 million tons in 1987 to 1.5 million tons by the year 1990, and rising to 1.93 million tons by year 2000. Per capita consumption growth is forecast to increase from 8.0 kilograms per capita in 1987 to 8.7 kilograms per capita in the year 2000. This increase in consumption is relatively small because of the low assumed rates of growth in per capita consumption expenditures (see Table 12).

Demand for soybean meal as a protein source for poultry feed has been increasing rapidly through the 1980's (see Table 5). Soybean meal is wholly imported. An estimated 334,000 tons of soybean meal will be required in 1990, which is equivalent to 445,000 tons of soybeans (at a conversion rate of 75 percent for beans to meal). Beginning in early 1988, an Indonesian mill is expected to begin soybean operations in a solvent extraction plant with an installed annual capacity of between 350,000 and 500,000 tons of soybeans (Tabor, S. and G. Gijsbers, 1987).

According to the supply and demand forecasts

Table 12. Soybean consumption in Indonesia.

Year	Consumption ('000 tons)	Per capita consumption (kg/capita)
Actual		
1969	320.30	2.80
1970	377.77	3.23
1971	414.85	3.48
1972	417.91	3.43
1973	396.76	3.18
1974	463.03	3.63
1975	495.66	3.79
1976	457.95	3.43
1977	453.93	3.32
1978	518.48	3.70
1979	648.41	4.53
1980	777.35	5.30
1981	940.90	6.28
1982	822.16	5.36
1983	818.54	5.22
1984	984.58	6.13
1985	961.55	5.86
1986	1,323.97	7.93
Forecast		
1987	1,367.33	8.02
1988	1,410.53	8.10
1989	1,453.60	8.17
1990	1,496.58	8.24
1991	1,539.49	8.30
1992	1,582.37	8.37
1993	1,625.23	8.42
1994	1,668.10	8.47
1995	1,710.99	8.52
1996	1,753.93	8.57
1997	1,796.92	8.61
1998	1,839.98	8.65
1999	1,883.11	8.69
2000	1,926.34	8.73

Source: Directorate of Foodcrop Economics, Directorate General of Food Crops, 1987.

Notes: Consumption refers to Revised Food Balance Sheet Availability for Human Consumption values to 1986, 1987 values are based on a price-neutral demand forecast tuned to a 1986 base.

presented earlier, soybean demand for human consumption will grow at an average of 2.7 percent annually, while production is forecast to grow at 2.4 percent annually. This implies that the gap between domestic supply and demand will widen (see Table 4). It is assumed that soybean supplies for soybean meal production will be obtained through imports. At a medium term forecast price of US $205 per ton, the costs of soybean imports in the year 1990 are predicted to reach US $92.3 million. Together with meal imports, soybean import costs would total approximately US $190 million (Tabor, S. and G. Gijsbers, 1987).

It seems that the long-term trends in supply and demand of soybeans and products will not balance. If changes in the international market price no longer make imports attractive, or foreign exchange holdings do not permit soybean imports, then domestic supply for human consumption and supplies for soybean mill has to be produced domestically.

IV.2. PRICE AND INCOME ELASTICITIES

According to the economic theory of demand, the level of consumption of a good is influenced by its own

price, the price of complementary and substitute goods, the level of consumers' income, and consumers tastes and preferences. In practice, for the purpose of consumption analysis, there are four factors that determine the demand function. Namely, (1) population growth, (2) income growth, (3) income elasticity of demand, and (4) price elasticity of demand. These four factors can be used to predict the future demand for soybeans in Indonesia.

A study conducted by F. Kasryno (1985) concerning the future demand for soybeans in Indonesia, revealed some of the following results:

(1) A ten percent increase (decrease) in the price of soybeans results in a 7 to 8 percent decrease (increase) in consumption. Price elasticity of demand 0.73-0.83.

(2) Income elasticity of demand for soybeans is 0.92-0.98.

Statistically, the price elasticity of demand for soybeans (own price) is not significant, but the income elasticity of demand is significant. Furthermore, the study revealed that the price of rice and corn have no significant effect on the price of soybeans. From this study, it is clear that soybean consumption in Indonesia is more significantly influenced by income per capita rather than the price of soybeans. The implication

of this study is that the change in soybean consumption is highly responsive to the change in per capita income. Suppose that income per capita increases by 5 percent annually, with the income elasticity of demand 0.98, then the rate of growth of soybean consumption is 4.9 percent.

Furthermore, the income elasticity of demand was 0.94-0.98, meaning that a 10 percent increase/decrease in income per capita will lead to a 9.4 to 9.8 percent increase/decrease in quantity demanded. In other words, if income (Y) increases 1 percent, soybean consumption increases nearly 1 percent.

IV.3. PRICE POLICY AND DOMESTIC DEMAND

Price policy can be used to influence the quantity of soybeans demanded in the economy. As stated previously, in the forecasted supply/demand gap for soybeans in Indonesia, one alternative that is available to the Government is to allow the domestic price of soybeans to rise.

A study conducted by S. Tabor and G. Gijsbers (1987), used a set of demand parameters for soybeans to evaluate the effect of such a commodity price policy on domestic demand, which are based on a modified (AIDS)

(Almost Ideal Demand System) demand system approach. The result is presented in Table 13. The values in this table are the price and cross-price elasticities compensating for the income-effect of price changes. Some of the results are as follows:

(1) The own price elasticity for soybeans is estimated to be -0.26 in 1987, declining to -0.19 by the year 2000. This implies that soybean price policy, as a policy instrument unto itself, will have only a limited effect on controlling demand growth. Demand is relatively inelastic in relation to price.

(2) Demand for soybeans is more sensitive to changes in the price of rice than to changes in soybean prices. A 10 percent increase in 1987 rice prices would cause a 4.4 percent decline in soybean demand. Since consumers generally eat soybean foods such as tempe and tahu with rice, it is not surprising that a rise in real rice prices will cause a marginal decline in rice consumption and decline in soybean consumption.

(3) Soybeans are substitutes for peanuts in the diet. A rise of 10 percent in peanut prices will cause an increase in per capita soybean demand of 3 percent. This cross-commodity trade-off between soybeans and peanuts is important because of the danger that more emphasis on

Table 13. Compensated own-price and cross price elasticities, for soybeans (1985 base income).

Year	Compensated own price elasticity	Compensated cross price elasticity		
		Rice	Corn	Peanut
1980	-0.34	-0.395	0.063	0.269
1981	-0.37	-0.382	0.060	0.255
1982	-0.18	-0.539	0.073	0.330
1983	-0.16	-0.531	0.077	0.336
1984	-0.35	-0.401	0.062	0.264
1985	-0.28	-0.437	0.065	0.291
Forecast				
1986	-0.27	-0.443	0.066	0.293
1987	-0.26	-0.455	0.066	0.297
1988	-0.26	-0.464	0.067	0.301
1989	-0.25	-0.473	0.067	0.304
1990	-0.24	-0.481	0.067	0.307
1991	-0.23	-0.488	0.068	0.309
1992	-0.23	-0.495	0.068	0.312
1993	-0.22	-0.502	0.068	0.314
1994	-0.22	-0.508	0.069	0.318
1995	-0.21	-0.514	0.069	0.319
2000	-0.19	-0.539	0.070	0.328

Source: Tabor,R.S. and G.Gijsbers, 1987. Soybean supply/Demand Prospects for Indonesia.
CGPRT NO.10. CGPRT Centre, Bogor, Indonesia.

soybean development will lead to a neglect of peanuts, causing peanut prices to rise. Higher peanut prices will cause consumers to substitute soybean-based foods for peanut-based foods, increasing demand for soybean products.

Self-sufficiency in soybeans can be achieved through a high price closed-door policy and a low price, open-door policy.

(1) A high price, closed-door policy. On the supply side, the likely effect of a closed-door, high price policy would be to stimulate farmers to shift lands from competing crops into soybeans. Consequently, self-sufficiency in soybeans might lead to shortages of other crops. Sharply rising prices would not lead to an immediate increase in soybean yields. Soybean yield may decrease if farmers put marginal lands under soybean cultivation.

(2) A low-price, open-door policy. Domestic prices could be reduced by lowering the release price on imported soybeans. A ten percent decrease in the domestic price of soybeans could be easily achieved in light of current differentials between domestic and world market price. A decrease in price would probably result in an additional 2.7 percent in domestic demand or an increase of 36,000 tons. It is more likely that a conscious policy of lowering domestic prices will result in an area-shift

effect that will lower domestic supply and raise import requirements (Tabor, S. and G. Gijsbers, 1987).

Furthermore, this study proposed: (1) If a low-price policy is adopted, research should focus on raising productivity in the established production zones, and (2) If a high-price policy is promoted, there will need to be research for newly developed areas outside Java and productivity-raising research for the established production zones.

V. MARKETING OF SOYBEANS

V.1. PRICING

Setting a floor price is primarily designed to benefit small farmers who are often forced to sell their marketable surplus immediately following the harvest when prices are the lowest (T. Mahoney, 1981).

Establishment of floor prices for soybeans began in 1979/80, with the Village Unit Cooperative ("Koperasi Unit Desa" - KUD) as the economic institution used to maintain the price. If the farm gate price falls below the floor price, then the Village Unit Cooperative buys soybeans from the farmers, where the price is set higher than the floor price. For example, in 1987 the floor price was Rp 325.00, whereas the Village Unit Cooperative price was Rp 340.00. If the farm gate price is above the floor price then farmers are free to choose to whom they will sell their soybeans. Determination of the floor price of soybeans was based on: (1) the relation between return and cost of production (R/C ratio); (2) the relation between floor price and the cost of production; (3) the relation between the price of soybeans at the Village Unit Cooperative level and the cost of production.

The floor price for second crops, particularly soybeans, is set in relation to the floor price of rice in order to balance the alocation of production resources between rice and soybeans (F. Kasryno, 1985). The floor price of soybeans is presented in Table 14. The floor price has increased from Rp 210.00 in 1980 up to Rp 325.00 per kilogram in 1987. This is a nominal increase. The increase of floor price and the cost of production are proportional, which has caused the R/C ratio to remain relatively constant (see Table 10). Furthermore, there exists a big difference between the floor price and the price at Village Unit Cooperative level, which might be used as an indicator of the effectiveness of soybean floor price scheme. In contrast, the difference that exists in rice is small compared to soybeans. Comparing the price at the farm level (farm gate price) to the floor price, is also an important indicator, which is represented in Table 15. The difference between the two prices is quite large and it seems that the market mechanism is effective in determining the relationship between return and cost of production. The advantages of this situation are: (1) farmers income will be higher; (2) during harvest the price did not decline drastically as one assumed; (3) government intervention to secure the floor price will be minimized.

Table 14. Floor price and Village Unit Cooperative price in Indonesia, 1980-1987.

Year	Floor price (Rp/kg)	Village Unit Cooperative price. (Rp/kg)
1980	210.00	217.00
1981	240.00	251.00
1982	270.00	283.00
1983	280.00	293.00
1984	280.00	293.00
1985	300.00	313.00
1986	300.00	313.00
1987	325.00	340.00

Source : Statistical Bulletin, BULOG, Jakarta, 1986.
Data for 1987, from Regional Logistic Agency, Manado, DOLOG, North Sulawesi, 1988.

Table 15. Relationship among R/C ratio, cost of production, floor price, and the price atVillage Unit Cooperative level, of soybeans and rice, year 1980-1983.

Year	R/C ratio	Cost of production (Rp/kg)	Floor price (Rp/kg)	Price at VUC	
				Rp/kg	Percent of floor price
Soybeans					
1980	1.42	194	210	284	135
1981	1.41	201	240	321	134
1982	1.48	242	270	344	127
1983	1.56	228	280	433	155
Rice					
1980	1.88	59	105	118	112
1981	1.89	63	120	132	110
1982	1.54	73	135	147	109
1983	1.64	80	145	173	119

Source: Kasryno, F. et al. Pemasaran Kedelai di Indonesia. Pusat Penelitian Agro-Ekonomi, Bogor, Indonesia, 1985.

Notes: VUC ; Village Unit Cooperative.

The relationship between the floor price alternatives and farmers real income, in the year 1984, is presented in Table 16. Table 16 shows that the farmers' real income per hectare will increase when the floor price of soybeans is increased; i.e., alternative 1 to 3.

The relationship of floor price to production is not clear. One important point to notice is that the setting of a floor price on soybeans is to guarantee that farmers will receive a minimum price, mainly to protect them from falling prices during harvest time.

The impact of floor price on soybean marketing is also an important issue to take into consideration. Government intervention; i.e., BULOG (Badan Urusan Logistik), national food logistic agency, as a sole importer of soybeans and soybean meal and oil, through market operation has two objectives. Namely: (1) to prevent prices at the farm level from falling below the floor price; (2) to prevent price from increaseing above the ceiling price.

Besides importing, BULOG also buys soybeans through the Village Unit Cooperative to maintain national stocks. Theoretically, BULOG will not buy soybeans if the market price is above the floor price. During 1979-1982, the national stock derived from domestic production was as follows:

Table 16. Relationship among several alternatives of soybean floor price in 1984 and farmer's real income.

Yield (Rp/kg)	Alternative floor price (Rp/kg)		Cost of production /deflated (Rp/kg)	Gross income /defl. (Rp/ha)	Cost of prod. /defl. (Rp/ha)	Real income /defl. (Rp/ha)	Increase in income (%)
	Nominal	Deflated					
1983							
876	280	45	39	39.245	33.980	5.265	0
1984							
950 I.	315	47	39	44.584	33.980	10.603	101
II.	325	48	39	46.009	33.980	12.028	128
III.	335	50	39	47.424	33.980	13.444	155

Source: Directorate General Agric.Food Crops, MOA, Jakarta, 1983.

Yield increase per hectare : 8.45%(compared to 1983).

Inflation rate: 10.23% per year.

Price index of nine essential goods in rural area (Java and Madura), with base year 1971.

In the year 1979, a total of 87 tons;
1980, a total of 5,476 tons;
1981, a total of 3,595 tons; and
1982, a total of 1,749 tons (Statistical Bulletin, BULOG, 1986).

These figures indicate that the involvement of BULOG to maintain the floor price is minimal, because the percentage bought by BULOG was very small compared to total domestic production. This indicates that the floor price scheme for soybeans is effective.

In 1983, the selling price of imported soybeans (ex BULOG), was Rp 306.71 per kilogram, while the selling price of soybeans derived from national stock (ex domestic production), was Rp 367.23 per kilogram. Based on these two prices, it is more profitable or less costly to rely on imports, than to buy domestic production. However, government policy is to increase domestic production, for both political and economic stability reasons. The interest of farmers ia a major consideration even though the government has to spend more money for subsidies.

Price differences exist among provinces in Indonesia at the farm gate and at retail. In 1987, the average price of soybeans sold to village traders in North Sumatera was Rp 600.00 per kilogram, in South Sumatera was Rp 500.00 per kilogram, and in Lampung Rp 525.00 per

kilogram (H. K. Purwadaria, 1987). In 1987, the retail price in Java; i.e., in Surabaia, Rp 830.00 per kilogram, in Surakarta Rp 610.00 per kilogram, for local soybeans while for imported soybeans the retail price in Surabaia Rp 910.0 per kilogram, in Surakarta Rp 620.00 per kilogram, and in Jakarta Rp 850.00 per kilogram.

At present, sales of imported soybeans serve to provide a price ceiling in the marketplace (Soegianto, Soepani and S. Tabor, 1987). The Jakarta market plays an important role as a price leader, terminal market, agro-industrial processing center and inter-regional and international commodity transfer point for the secondary foodcrops (Tabor, S et al 1988). The vast majority of soybeans that enter the Jakarta market are imported. The price of domestically produced soybeans is dependent on the release price of imported soybeans. When imported soybeans are in short supply, the Jakarta price of local soybeans tends to rise. On the other hand, when large shipments of imported soybeans are released on the Jakarta market, the domestic price tends to fall. In 1986, domestic soybeans were selling at 42 percent of the world market price for US soybeans. Since 1975, world market soybean prices have consistently been below domestic soybean prices (Tabor, S. et al, 1988).

The world price of soybean was still declining up to January and February 1987, but from March to December 1987 was increasing as presented in Table 17.

International market forecasters are divided on the prospects for a recovery in international commodity prices, but generally all agree that the present depression in world market prices is largely the result of food policy interventions in the developed market economies. The World Bank forecasts are the brightest for future primary commodity prospects. According to the third quarter-1987 IBRD commodity price forecasts, by 1990, real (nominal prices deflated by a manufactured goods unit-value index of manufactured good imports) world market prices for rice will increase by 17 percent, corn by 26 percent, wheat by 1 percent, and soybeans by 17 percent.

Trade policy experts from the US Department of Agriculture and the FAO, forecast a continued depression in international commodity prices. They note that unless strong coordinated policy initiatives are undertaken to bring developed market economy supply and demand more into balance, international prices will continue to fall. The optimistic forecasts (e.g. World Bank) expect foodgrain and oilseed prices to rise about 20 percent in real terms between 1987 and 1990. The more

Table 17. International Commodity Prices.

ear	Wheat				Corn		Soybeans	Soyoil	Soymeal 44%	
	U.S. 1/	Arg. 2/	Can. 3/	Aust. 4/	U.S. 5/	Arg. 2/	U.S. 5/	U.S. 6/	U.S. 6/	Ham.7/
	Dollars per metric ton									
980	176	203	192	175	129	159	272	522	217	271
981	176	190	194	175	135	139	272	464	223	269
982	161	166	165	160	110	109	233	404	197	233
983	158	138	167	161	137	133	269	518	222	255
984	153	135	166	153	138	132	271	678	184	210
985	137	106	173	141	114	103	214	596	140	171
986	117	88	161	120	89	83	200	361	174	197
987	114	89	134	115	77	80	204	349	194	215
Jan.	110	82	136	110	70	66	188	341	163	197
Feb.	114	92	138	112	69	66	187	335	169	197
Mar.	116	90	139	115	73	70	189	331	162	194
Apr.	115	88	134	115	76	73	195	331	175	203
May	120	88	136	119	82	82	210	351	194	210
June	110	86	130	111	82	83	214	343	206	224
July	106	84	126	107	77	90	211	332	198	210
Aug.	108	84	124	109	72	88	202	329	186	204
Sept.	114	89	130	115	74	84	203	336	197	214
Oct.	116	95	134	118	80	84	204	370	205	223
Nov.	116	95	134	118	83	84	216	378	231	246
Dec.	126	95	142	126	84	86	226	414	236	257

1/ No. 2 hard winter, ordinary protein, f.o.b. Gulf ports. 2/ F.o.b. Buenos Aires. 3/ No. 1 western ed spring, 13.5% protein, in store Thunder Bay. 4/ July-June crop year, standard white, f.o.b. selling rice. 5/ U.S. No. 3 yellow, f.o.b. Gulf ports. 6/ Decatur. 7/ Hamburg, f.o.b. ex-mill.

Source: World Agriculture, Situation and Outlook Report.
WAS-51, March 1988.
Economic Research Service,
U.S.D.A.

pessimistic forecasters (Iowa State, FAO and USDA) foresee continued declines in real prices on the order again about 20 percent in the medium term. A foreign exchange squeeze, corrected by devaluation, could inadvertently place Indonesia into a highly price competitive position in certain foodcrop markets (Tabor, S., 1988). It is clear that the pricing of soybeans in Indonesia, there exists two prices in the soybean market. That is: (1) domestic market price for domestically produced soybeans, with a floor-price scheme, and (2) domestic market price for imported soybeans, which acts as a ceiling price for soybeans. The pricing mechanism, therefore, will depend on the soybean marketing both for domestically produced and imported soybeans.

V.2. MARKETING MARGIN

Soybean marketing in Indonesia involves both domestically produced and imported soybeans. According to Soegianto, Soepani and Steven Tabor (1987), it would be misleading to talk about a typical marketing system for soybeans in Indonesia. The nature of import marketing differs drastically from the marketing of domestically produced soybeans. Furthermore, they stated that

prounced regional differences in the marketing of both imported and domestically produced soybeans exist because:

(1) Unlike rice, farm level marketing is not specialized for soybeans. Marketing institutions serve a mix of crops to be marketed. The importance of soybeans depends on the scale of production around a particular market center. The structure and organization of food crop marketing institutions for a given region, and the importance of soybeans within the trade-basket of that region, are the prime determinants of regional marketing differences.

(2) A large part of the soybean crop is produced under rain-fed and dryland conditions where the marketing infrastructure is relatively poor compared to the irrigation areas. Both marketing practices and production cycles are influenced by variability in rainfall patterns.

(3) In Java, a large share of domestically produced soybeans goes to village "tempe and tahu" factories. The relative importance of short-distance marketing contributes to a proliferation of local informal grading and standardization systems.

(4) The role of government in direct marketing of domestically produced soybeans is insignificant. Imports

serve to set a price ceiling in the market but there is no active government intervention to stabilize producer prices or to set market practice standards for quality determination. This contributes to a relatively low degree of integration between regional and national markets.

(5) The distribution of imports is dependent on the quota of imports allocated for different provinces. A primary difference in the marketing of imports is the extent to which terminal demand is served by the cooperatives (KOPTI, the cooperative of tempe and tahu manufacturer), or through private trade. Secondary differences in import marketing are due to variations in cooperative pricing and distribution practices between areas.

(6) Consumption of soybeans is concentrated in Java. Consumption is more highly concentrated than production.

To get a better understanding of the regional differences in soybean marketing and the interaction between the marketing of domestic and imported soybeans, it is important to know the role of Jakarta and Surabaia (all are located in the Java Island) because Jakarta and Surabaia markets play an important role as a price leader and terminal market for soybeans (Tabor, S. 1988). Most of the imported soybeans enter Jakarta and Surabaia markets. Imported soybeans are preferred by the tempe

manufacturers, because the quality is better and the tempe extraction rate is higher (one kilogram of imported soybeans yield about 25 percent higher than local soybeans) compared to domestically produced soybeans. On the other hand, the tahu (tofu) manufacturers generally prefer domestically produced soybeans because of the higher carbohydrate rate in the local soybeans.

In 1985, an estimated 165,000 tons of soybeans were used by the tempe and tahu industries in Jakarta, where about 141,000 tons were imported and the remainder about 24,000 tons originated from domestic production; i.e., from domestic suppliers in Lampung, Aceh and East Java. BULOG, the Food Logistics Agency, allocates 62 percent of the imported beans to KOPTI-Jakarta for direct distribution to the registered tempe and tahu manufacturers, whereas 38 percent was supplied to the Soybean Association, a large scale wholesaler, for the non-KOPTI manufacturers at a marginally higher price. About 50 percent of the KOPTI members' processing needs were met through purchases of imported soybeans from private wholesalers. In Jakarta, the tahu manufacturers rely heavily on imported soybeans.

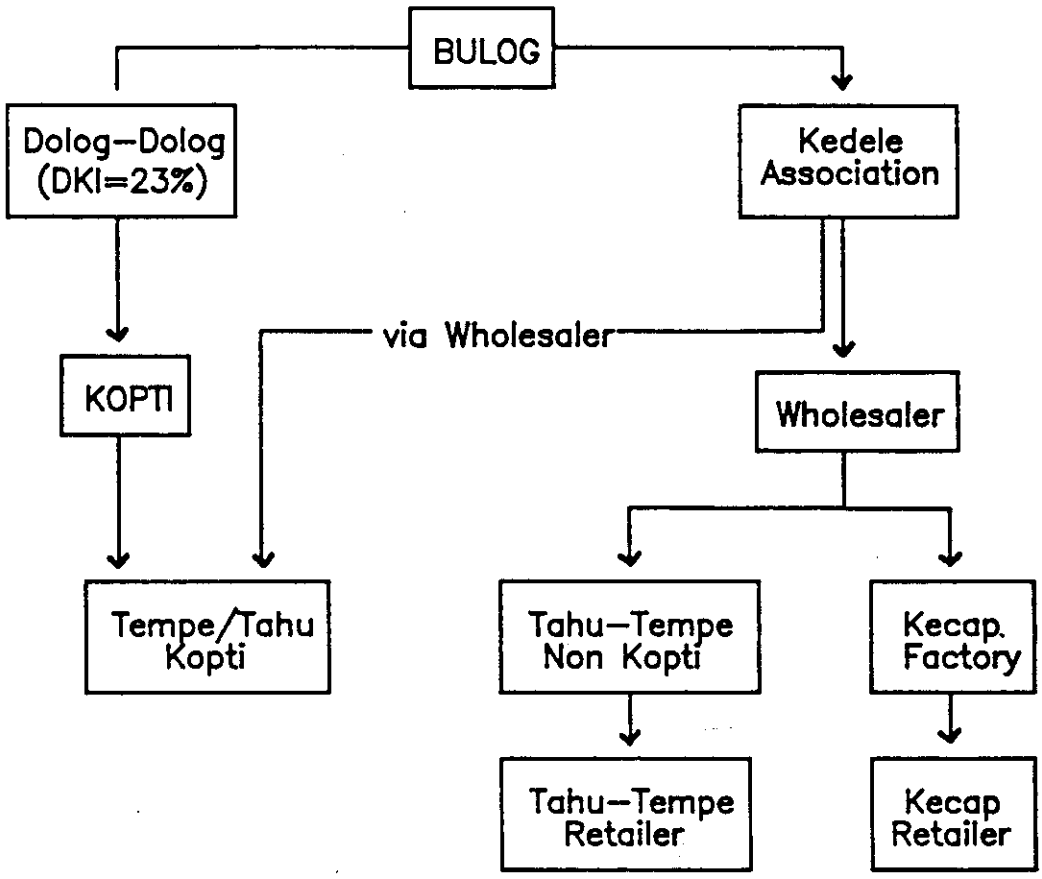
In 1985, an estimated 37,700 tons of soybeans were distributed by private distributors. This amount of

imported soybeans were purchased by the Aurabaia private traders from the Jakarta-based Soybean Association. The price of imported soybeans in Surabaia is approximately Rp 25 per kilogram higher than in Jakarta, mainly a reflection of differences in transport costs. In Surabaia, imported soybeans were sold at a 3 to 5 percent price premium (as of December 1986) over top standard domestically produced soybeans.

The market structure for imported soybeans are presented in Figure 2. BULOG, the Food Logistics Agency, as a sole importer of soybeans distributed the imported soybeans through DOLOG (the Food Logistics Agency, at the provincial level) and through the Soybean Association/ Kedele Association. The Food Logistics Agency at the provincial level distribute further to KOPTI and then to the tempe and tahu manufacturers (registered members of KOPTI). On the other hand, the Soybean Association distribute further to wholesalers (private) and then to the non-KOPTI tempe and tahu manufacturers, and also to ketchup (soy-sauce) factory. In the Jakarta case, the KOPTI tempe and tahu manufacturers also buy soybeans from the wholesalers to fulfill their processing needs.

The market structure of soybeans of Jakarta and Surabaia markets are presented in Figure 3. The Jakara market is the same as stated previously, in addition that

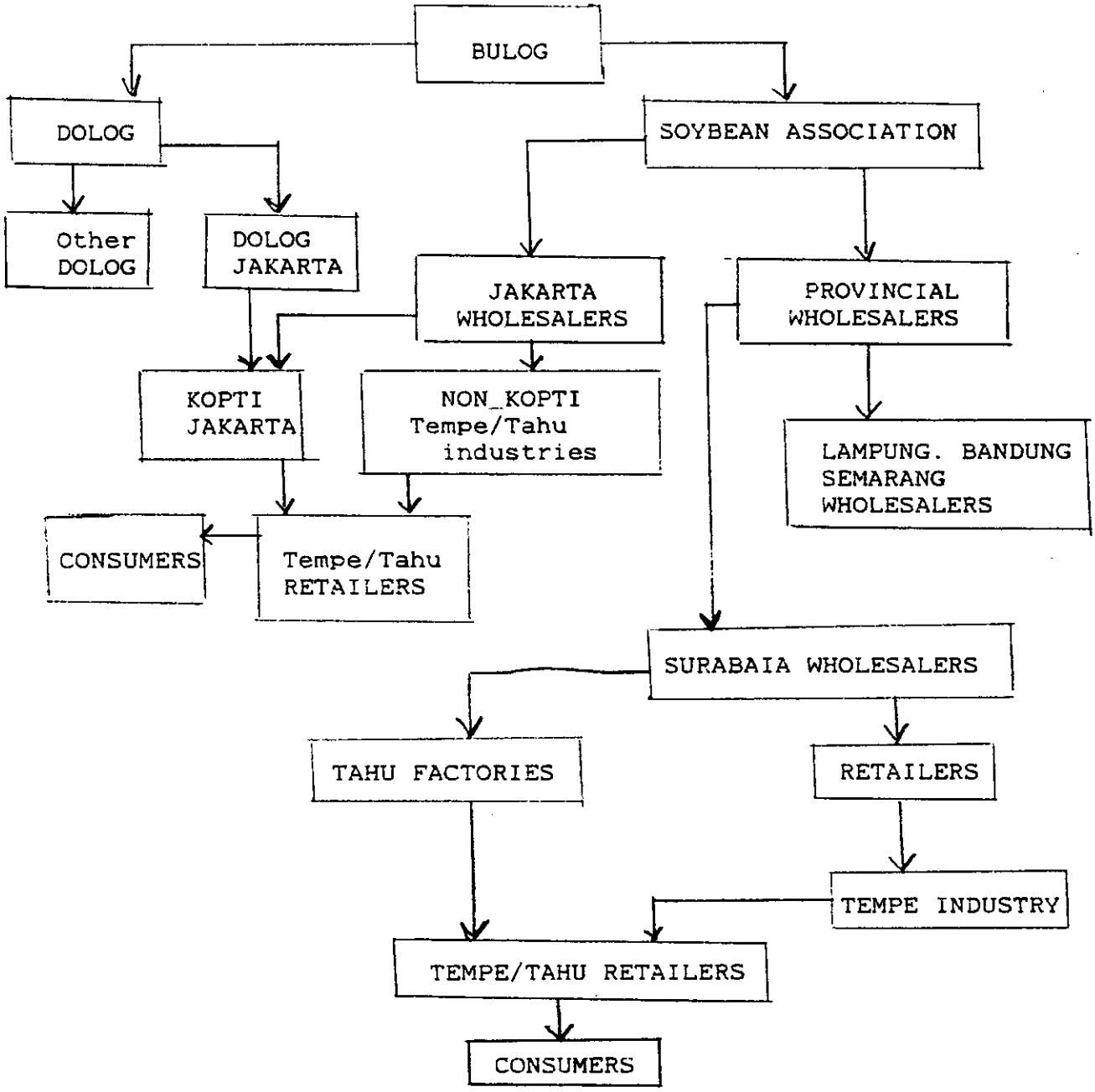
Figure 2. Market structure for imported soybeans.



Note: Percentages for the Tempe/Tahu producers in Kopti refer to the percentage recived by the industry from the government and private trade.

Source: Tabor,S., et al. 1988. Supply and Demand for Foodcrops in Indonesia.
Directorate General of Foodcrops,
Ministry of Agriculture, Jakarta, Indonesia.

Figure 3. Soybean import marketing structure: Jakarta and Surabaia.



Source: Soegianto, Soepani, and Tabor,S.,1987. Soybean marketing in Indonesia.
CGPRT NO.10. CGPRT Centre, Bogor, Indonesia.

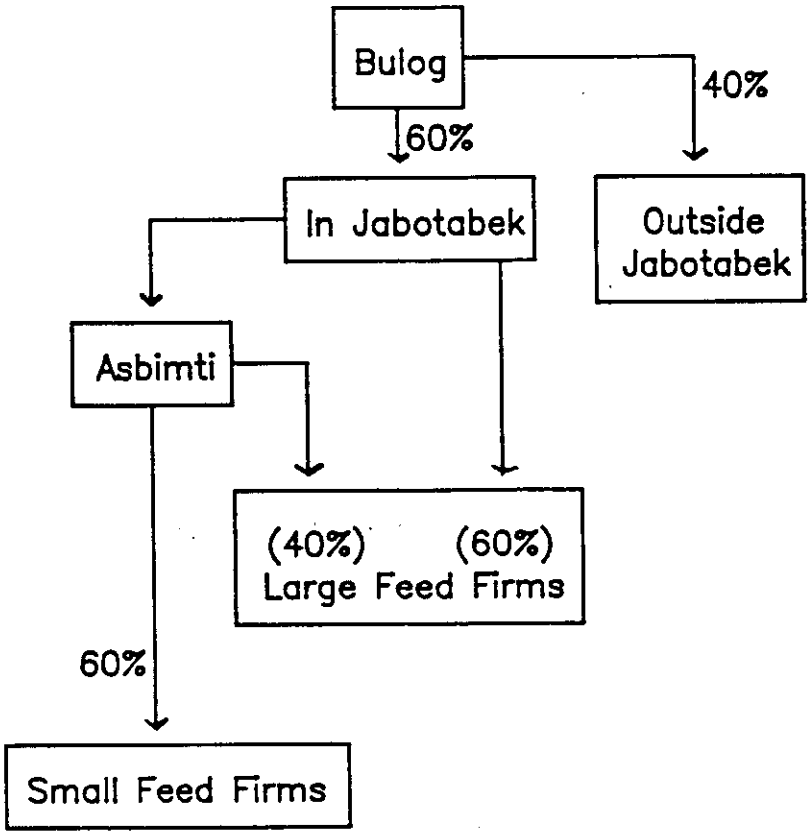
the provincial wholesalers at the Jakarta market sold soybeans to wholesalers in Lampung, Bandung, Semarang and Surabaia. The Surabaia market received all the imported soybeans from the Jakarta wholesalers and distribute through retailers and tahu manufacturers in Surabaia.

The market structure for soybean meal is presented in Figure 4. The distribution of soybean meal for domestic use is as follows: (1) BULOG, as a sole importer of soybean meal, distributed directly the imported soybean meal to large scale feed manufacturers; (2) for the needs of small scale feed manufacturers, soybean meal were distributed through Asbimti, the association which represents the smaller feed firms.

In 1985, 117,000 tons of soybean meal were utilized by the Jakarta feed firms (60 percent of total imports). Forty percent were sent to feed manufacturers in East Java and other provinces. Because BULOG supplies do not meet the large feed firms needs, these firms buy up to 40 percent of their own requirements from Asbimti. This causes the price of Asbimti soybean meal to rise and may result in shortages of meal for the smaller feed firms (Tabor, S., 1988).

The price of imported soybeans differs by region. The marketing for imported soybeans from Jakarta to Bandar

Figure 4. Market structure for soybean meal.



Note: Figures in brackets refer to the percentage recieved by the industri directly from Bulog and through Asbimti.

Source: Tabor,S. et al. 1988. Supply and Demand for Foodcrops in Indonesia.
Directorate General of Foodcrops,
Ministry of Agriculture, Jakarata, Indonesia.

Lampung are presented in Table 18. It is important to note that the sale price by BULOG, the DOLOG transfer price, the DOLOG overhead costs and the KOPTI overhead costs can vary by location. The result is differential pricing of imported soybeans by location, reflecting administrative allocation decisions, rather than spatial arbitrage or differences in supply and demand balances (Soegianto, Soepani, and Steven Tabor, 1987).

The marketing of imported soybeans is very different from the domestically produced soybeans, although the commodities compete for the similar markets. Domestic marketing of local soybeans differ depending on the proximity of terminal markets to the production region.

Soybean marketing in Lampung is classified as a long distance oriented marketing system. Lampung serves as a major supplier of domestically produced soybeans to the tahu industries in Java and South Sumatera. Production of soybeans in Lampung was about 84,000 tons in 1985. Approximately 80 to 90 percent of Lampung soybean production is sent to Java or South Sumatera.

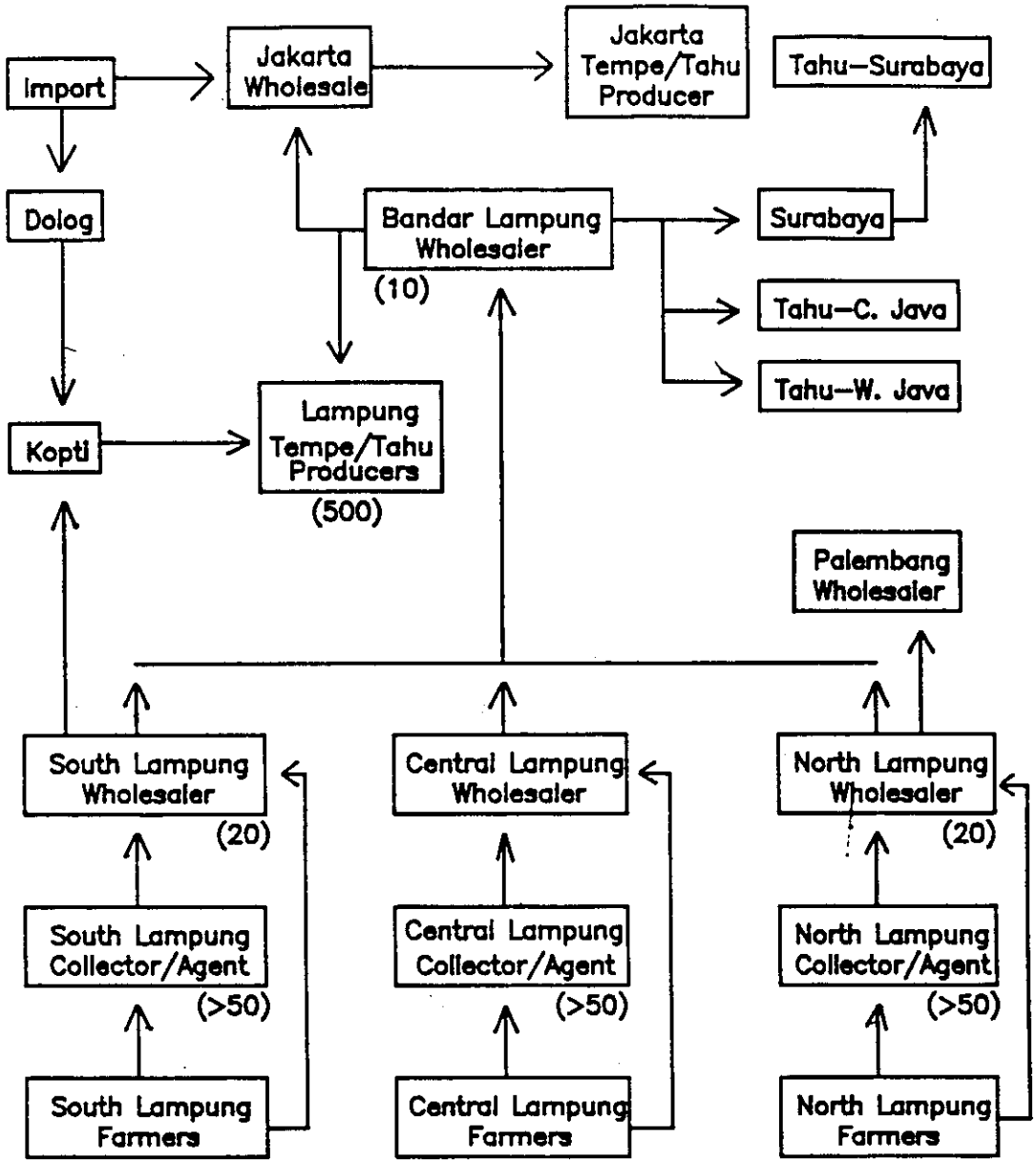
The market structure of soybean in Lampung is presented in Figure 5. At the farm level, soybeans are harvested, threshed, field dried and then sold to village collectors. These collectors also work as purchasing

Table 18. Marketing costs for imported soybeans from Jakarta to Bandar Lampung, August 1986.

Cost item	Cost (Rp/kg)	Percent
BULOG purchase price (c.i.f. Jakarta)	245*	39
BULOG sales price (c.i.f. Lampung)	425.50	67
DOLOG operational costs	8.50	
KOPTI (Lampung) purchase price from DOLOG	485.50	77
PRIMKOPTI (Bandar Lampung) expenses:		
- operational costs	7.50	
- overhead costs	137	
Purchase price at the tahu/tempe factories in Gunung Sulu, Lampung.	630	100

Source: Soegianto, Soepani and Tabor,R.S. ,1987. Soybean marketing in Indonesia: A Regional Comparison. CGPRT NO.10. CGPRT Centre, Bogor Indonesia.

Figure 5. Market structure of soybean in Lampung.



Source: Tabor,S. et al. 1988. Supply and Demand for Foodcrops in Indonesia.
Directorate General of Foodcrops,
Ministry of Agriculture, Jakarta, Indonesia.

agents for Kabupaten wholesalers who give them credit for production inputs and working capital for commodity procurement. From the Kabupaten wholesalers the soybeans may be sold to a wholesaler in Bandar Lampung or may be shipped directly to a wholesaler in West, Central or even East Java. From the wholesalers in Bandar Lampung, the soybeans are generally sold to a Jakarta wholesaler, and distributed further to the tempe and tahu producer. Because of the relatively high number of village and wholesale merchants in the soybean industry, there is relatively high degree of competition for supplies. The marketing costs and marketing margin of soybean in Lampung in the year 1983, is presented in Table 19. The calculation was made at Tanjung Karang/Bandar Lampung, the province's capital city. The price at the farmers level was Rp 375.00 per kilogram, or 83.3 percent of the retail price, of Rp 450.00. The marketing cost from the producer to the consumer was Rp 75.00 per kilogram. The share of the retail price received by farmers/producers was relatively high. The profit of the retailer was the highest (Rp 27.00 per kilogram), compared to wholesaler (Rp 10.75 per kilogram) and the collector/village trader (Rp 13.50 per kilogram).

During the month of December, 1986, the total marketing costs for soybeans averaged Rp 50.00 to

Table 19. Marketing cost of soybean, from producer to consumer, at Tanjung Karang, Lampung, 1983.

Cost components	Cost (Rp/kg)	Price (Rp/kg)	Percentage from retail price (%)
Price at farmer level		375	83.3
Packaging	1.00		
Loading/unloading	8.50		
Depreciation	2.00		
Profit of collector	13.50		
	25.00		
Price ex Collector		400	88.9
Unloading and weighting	1.50		
Market retribution	2.75		
Profit of Grossir	10.75		
	15.00		
Price ex Grossir		415	92.2
Transport	2.00		
Weighting	0.50		
Depreciation	1.50		
Packaging	1.00		
Market retribution	3.00		
Profit of retailer	27.00		
	35.00		
Total marketing cost	75.00		16.7
Retail Price		450	100.0

Source: F.Kasryno cs, Marketing of soybean in Indonesia, Agro-Economic Research Center, Bogor, Indonesia, 1985.

Rp 65.00 per kilogram. Of this, approximately 70 percent of total trade costs were for transport (see Table 20). The cost of transporting soybeans from a major production zone in Central Lampung is approximately Rp 15.00, approximately the same cost as the transport charge from a production zone in East Java to Jakarta.

The distributional costs of imported soybeans for use in the local tempe and tahu industries are considerably higher than that of the domestically produced soybeans. The margin between the DOLOG Tanjung Karang/ Bandar Lampung release price and the KOPTI sale price is Rp 205.00 per kilogram. This margin includes various administrative overheads, payments into welfare funds and savings schemes. Imported soybeans sold through private wholesalers cost Rp 60.00 more than that distributed through KOPTI because of the much higher procurement costs of the private wholesalers (see Table 21).

South Sulawesi produces approximately 1500 tons of soybeans per month, whereas about 300 tons were used for local consumption by the tempe and tahu industries, and the remainder is shipped to Java, mainly via Surabaia.

In Soppeng, one of the production zones in South Sulawesi, farmers practice the contract-harvest system where the product is sold to a collector while it is

Table 20. Marketing cost of local soybeans from South Lampung, Lampung Province, Indonesia, December, 1986.

Item	Price (Rp/kg)	Margin (Rp/kg)	Percent of margin
Transport and handling cost to South Lampung wholesaler		10	28
South Lampung wholesaler selling price	537		
Transport cost to Bandar Lampung		5	13
Transport cost to Jakarta		22.50	60
Bandar Lampung wholesaler purchase price	605		
KOPTI Bandar Lampung purchase price	625		
Jakarta wholesaler purchase price	625		
Total margin		37.50	100

Source : Tabor, R.S. et al. 1988. Supply and Demand for Foodcrops in Indonesia. Directorate General of Foodcrops, Ministry of Agriculture, Jakarta, Indonesia.

Table 21. Marketing costs for imported soybeans in Lampung, 1986.

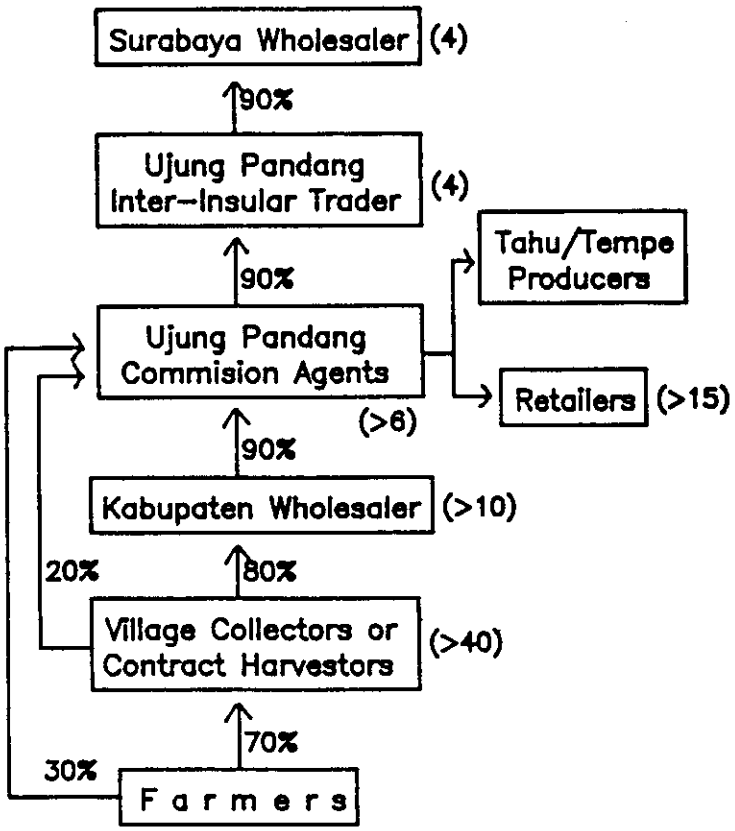
Item	Price (Rp/kg)
1. KOPTI	
BULOG sale price	425.50
Payment by KOPTI to DOLOG	485.50
Purchase price at the Tahu/Tempe Factories in Gunung Sulu	630.00
2. Wholesaler in Bandar Lampung	
Purchase price, from Jakarta wholesaler	650.00
Purchase price at the wholesaler in Bandar Lampung	690.00

Source: Tabor,R.S., 1988. Supply and Demand for Foodcrops in Indonesia.
Directorate General of Foodcrops, Ministry of Agriculture Jakarta, Indonesia.

still on the fields. Farmers generally borrow fertilizer from the contract-harvesters during the paddy/rice season. This accounts for the close ties between these contract-harvesters and the farmers. The contract-harvesters perform the harvesting, threshing, drying and cleaning functions. The contract-harvesters obtain their capital from Kabupaten wholesalers and act as procurement agents for wholesalers at the Kabupaten level. The dried beans are sold through Kabupaten wholesalers to Ujung Pandang (the capital city of South Sulawesi province). From Ujung Pandang via the provincial wholesalers/inter-insular trader, the soybeans were sent to Surabaia.

Unlike Soppeng, in Bone farmers harvest, dry, thresh and clean the soybeans before selling to either village collectors or to Kabupaten wholesalers. The market structure for soybeans in South Sulawesi is presented in Figure 6. Marketing costs from producer areas to Surabaia range from Rp 110.00 to Rp 266.00 per kilogram. The high costs in Soppeng reflect the additional services provided by the trader at the farm level. In Soppeng, the contract-harvester absorbs 42 percent of the total marketing cost, largely because of these additional services rendered and because of the capital repayment requirements to Kabupaten wholesalers. In Wajo, the

Figure 6. Market structure for soybeans in South Sulawesi.



Source: Tabor,S. et al. 1988. Supply and Demand for Foodcrops in Indonesia.
Directorate General of Foodcrops,
Ministry of Agriculture, Jakarta, Indonesia.

the largest marketing cost requirement is for transport and retribution (30 percent). The marketing costs for soybeans in South Sulawesi, are presented in Table 22.

Soybean markets in Surabaia serve as a major supply point for terminal markets in Central Java and Jogyakarta. Between March and November, soybeans from the outer islands enter Surabaia to supply tahu and tempe factories. Imported soybeans are consumed primarily by the tempe industry and are shipped directly to main processing centers (e.g. Malang) and to Surabaia, and are available in local markets year round.

Farmers in East Java generally harvest, thresh and dry the soybeans at the farm level, and they are sold to either a village collector or directly to the wholesaler at the Kecamatan level. The wholesaler at the Kecamatan level can sell to a wholesaler in another province, to a wholesaler at the Kabupaten level, directly to local tahu and tempe factories or to wholesalers at the provincial capital. Kabupaten based wholesalers primarily sell soybeans to locally based tahu and tempe factories within the Kabupaten. At the provincial wholesaler level, traders supplement supplies of East Java soybeans with soybeans from Eastern Indonesia and with imports. These supplies are sold primarily to the tahu, tempe and ketchup

Table 22. Marketing cost for soybeans in South Sulawesi, Indonesia, February, 1987.

Item	WAJO			SOPPENG		
	Price Rp/Kg	Margin Rp/Kg	% Margin	Price Rp/Kg	Margin Rp/Kg	% Margin
Purchase price from farmers	560.0					
Farmer sale price (tebesan)				426.2		
Harvest cost					8.5	3.2
Hulling and cleaning cost					31.3	11.7
Transport (horse cart)					6.3	2.3
margin collector					112.7	42.3
Kabupaten wholesale price						
Quality I				600.0		
Quality II				570.0		
Transport cost		14.0	12.7		12.5	4.7
village retribution post		4.8	4.4			
kabupaten retribution charge		7.5	6.8		6.5	2.4
weight bridge retribution		1.6	1.5		1.6	0.6
Other retribution		2.1	1.9		0.5	0.2
Loading, packing and weighing		2.0	1.8		2.0	0.8
Wholesaler margin (kabupaten)		28.0	25.5		21.9	8.2
Provincial Wholesale Price				630.0		
Quality I	640.0					
Quality II	600.0					
Provincial margin- wholes.		12.5	11.4			
					25.0	9.4
Inter-insular trader price						
Super quality	655.0			655.0		
Quality I	610.0			610.0		
Freight cost to Surabaya		13.7	12.5		13.7	5.1
port charges		0.3	0.3		0.3	0.1
port retribution costs		2.0	1.8		2.0	0.8
insurance		0.3	0.3		0.3	0.1
inter-insular trade margin		21.2	19.3		21.2	8.0
Purchase price at the Surabaya Wholesale Level	670.0			670.0		
TOTAL MARGIN		110.0	100.		266.3	100.

*)note that 1 liter of soybeans = 799,8 grams of soybeans

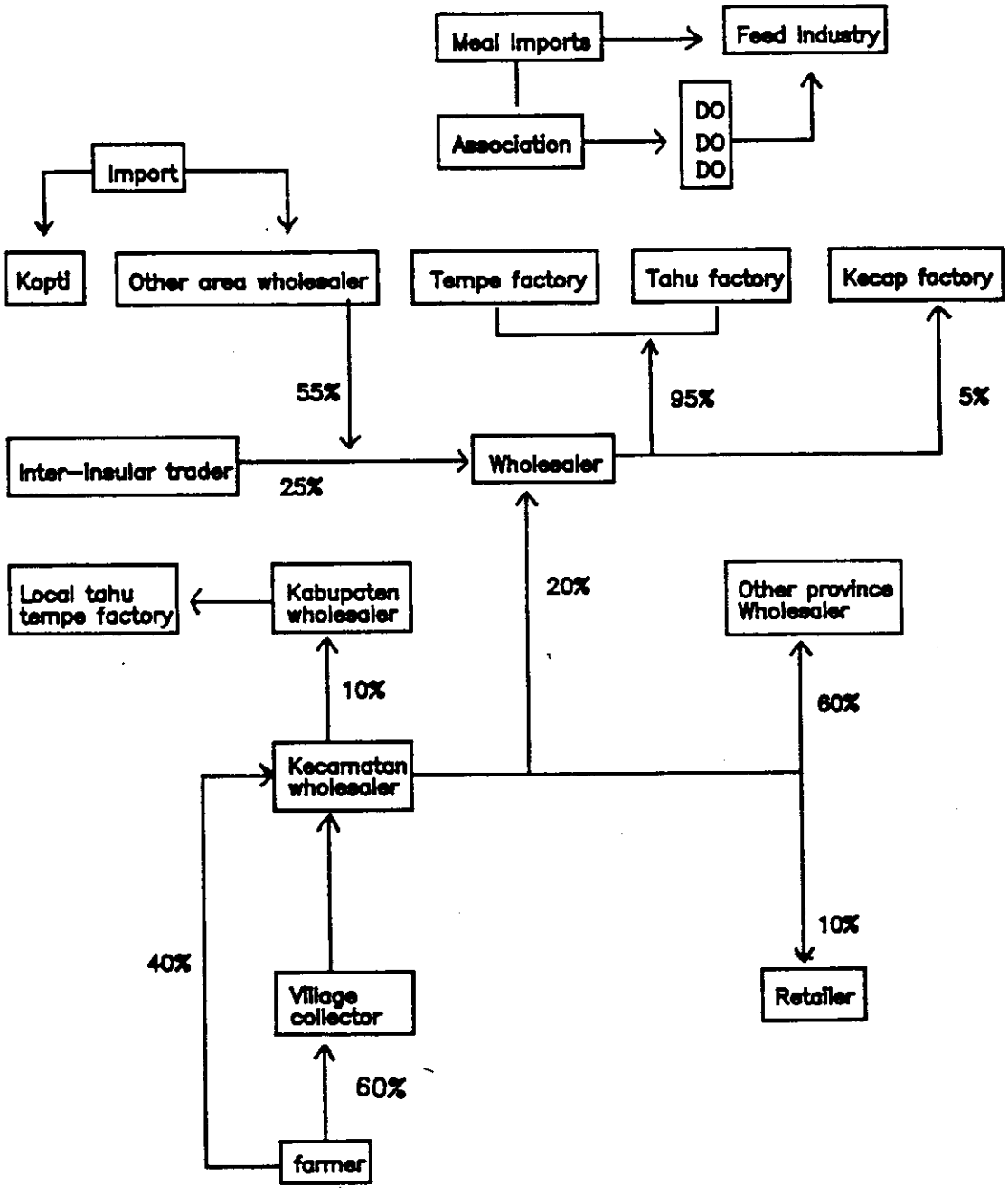
Source: Tabor,R.S. et al. 1988. Supply and Demand for Foodcrops in Indonesia. Directorate General of Foodcrops, Ministry of Agriculture, Jakarta, Indonesia.

(soy-sauce) factories. Imported soybeans are preferred by the tempe industry and these are marketed through Surabaia level wholesalers to Kabupaten level retailers. The soybean marketing structure in East Java is presented in Figure 7.

The margin between the farm gate price and the Kecamatan wholesale price was (in August 1986) an average of Rp 50.00 per kilogram. Of this, 10 percent of the margin covered the cost of transport from the farm to the warehouse. Nearly a third of the margin was absorbed by the cost of handling, sorting and bagging the soybeans. Relatively high net margins appear to be realized at the Kecamatan wholesaler level although this may be related to difficulties in comparing sorted with unsorted commodities to derive average prices. From the Kecamatan wholesale level up to the higher trade levels, the principle marketing cost is for transport. After capital, transport and labor costs are deducted, net margins are below 10 percent. Imported soybeans sell at a 4 to 5 percent price premium over top quality locally produced varieties (Tabor, S. et al, 1988). The soybeans cost structure is presented in Table 23.

A survey was conducted by CGPRT in West Java on local marketing and processing of agricultural products

Figure 7. Soybean marketing structure in East Java.



Source: Tabor,S. et al. 1988. Supply and Demand for Foodcrops in Indonesia.
Directorate General of Foodcrops,
Ministry of Agriculture, Jakarta, Indonesia.

Table 23. Soybeans costs structure in Jember (East Java), August 1986.

Farmer price	Rp 430-Rp 450 per kg
Transport to warehouse	Rp 4 per kg
Wholesaler price	Rp 470 per kg (quality c)
	RP 490 per kg (quality b)
	Rp 505 per kg (quality a)
Transport to Malang	Rp 7 per kg
Malang wholesaler price	Rp 515 per kg
Transport to Solo/Jogya	Rp 14 per kg
Wholesaler price Solo/Jogya	Rp 520 per kg (quality a)
Wholesaler price Surabaia	Rp 530 per kg (quality a)
Import varieties price in Jakarta	Rp 515 per kg
Imported varieties price in Surabaia	Rp 550 per kg

Source : Tabor,R.S., 1988. Supply and Demand for Foodcrops in Indonesia.
Directorate General of Foodcrops, Ministry of Agriculture, Jakarta, Indonesia.

exemplified by soybeans in Indonesia was found to approximate perfect competition. Small middlemen and large traders as well are not involved in hoarding and speculation of soybeans because seasonal price variations are reduced through extensive soybean trade among regions with different cropping seasons. Local marketing and processing industries are characterized by the intensive use of labor relative to capital.

In general, the market structure of soybean marketing follows a similar pattern at the provincial level. The marketing channel for soybeans at the provincial level is as follows:

Farmers --- Village Traders --- Subdistrict Traders --- District Traders --- Provincial Traders --- Retailers.

For West Java, East Java, and Lampung, the market structure also includes the distribution of imported soybeans.

A comparable market structure pattern in domestic soybean marketing does not ensure that farmers will receive the same proportion of the retail price in each province. The variation in marketing margin indicates to some extent the high cost of transportation. At the village level, farmers can sell their soybeans to a

variety of buyers, but the price varies, because of the difficulties in meeting quality standards and because of low volume of production and sales.

V. 3. POST HARVEST HANDLING

Post harvest handling is a major determinant of quality of marketed soybeans. Poor post harvest handling will lower quality and increase production losses. Estimated maximum losses for soybean harvested at low moisture content (17 - 20 percent wet basis) is 10 percent quantitatively and 3.5 percent qualitatively. Soybeans harvested with high moisture content (30 - 40 percent wet basis) is 15.5 percent quantitatively and 8 percent qualitatively (Purwadaria, H. K., 1987).

The government has established quality standards for soybeans purchased at the Village Unit Cooperative, since 1986. Quality standards required for soybeans are presented in Table 24. There is a maximum level established for moisture content, impurities, split kernels, damaged kernels, shrinkage kernels, and discolored kernels. Based on these quality requirements, the floor price for soybeans for storage is Rp 300.00 per kilogram, while for marketing Rp 280.00 per kilogram, and for threshing Rp 260.00 per kilogram.

Table 24. Quality Standard required by Government for the Secondary Food Crops procurement at the Village Unit Cooperatives, since 1986.

Yellow soybeans Characteristics	Maximum level allowed (percentage)		
	Storage	Marketing	Threshing
Moisture content	14	16	18
Impurities	3	5	7
Split kernels	3	4	6
Damaged kernels	3	3	3
Shrinkage kernels	5	5	5
Discolored kernels	5	5	5
Floor price (RP/kg)	300	280	260

Source: Purwadaria, H.K., 1987. Grain post- harvest technology system in Indonesia: Maize, Soybean, and Groundnut in North Sumatera, South Sumatera and Lampung. Consultancy Report. MOA, Indonesia - FAO, The UNDP, DP/FAO/INS/85/004 Project, 1987.

These quality requirements generally are not met by the farmers. The farmers in Lampung usually sell soybeans without cleaning and sorting; i.e., they sell all quality at the same price to the collectors. Wholesalers tend to buy two to three grades from the village collectors and then sell using three to four quality levels to inter-provincial wholesalers. Profits are made by buying at one grade and then reselling more specific grades, charging higher prices for particular qualities. Farmers and village collectors have little incentive to sell high quality produce because the production area is far from the main consumption area. Soybeans originated from Lampung are classified as low quality (mix with dirt), which is why they receive a price discount in the terminal markets. Unlike Lampung, the farmers in Jember (East Java), sell one to two different quality grades to village collectors. At the farm gate, the unit price difference between low and high quality soybeans can be as much as Rp 35.00 per kilogram or 9 percent of the pro-curement price. Farmers and village collectors are aware of these quality differences and try to take advantage of the differentials. There is a higher degree of quality awareness at all states of the marketing chain in Jember, compared to Lampung (Soegianto, Soepani, and Tabor, S. , 1987). In Ponorogo (East Java), at the farm

level, only one quality of soybeans is purchased. Because farmers sell only one quality, there is relatively little incentive for the farmer to adopt improved threshing and drying practices. Furthermore, it can be argued that there exists an inability of the marketing system to send price signals to the farmers to improve product quality.

Major problems in soybean marketing in Indonesia can be summarized as follows:

(1) High distribution costs. This is a reflection of a high over-land transport costs. In some provinces, high retribution costs such as passage fees and crop movement fees.

(2) Low quality of domestically produced soybeans. This is because of lack of post harvest practice of threshing and drying.

(3) Some provinces in the outer islands compete for access to the Jakarta and Surabaia commodity markets at the key period of the year. This inter-regional competition exists because of the relative thinness of soybean markets outside of Java.

(4) Rationing of soybeans and soybean meal imports, raises the distribution costs, because of the high administrative cost and the lack of information about import timing.

(5) The lack of marketing infrastructure in the outer islands, made the inputs costly.

VI THE ROLE OF GOVERNMENT

The policy to increase the production of secondary food crops has been established since the mid-1970's. The growth of the production of secondary food crops has been slow because this program faces physical as well as economic constraints. To eliminate these constraints, government effort is really needed. Since reaching self-sufficiency in rice in the mid-1980's, Indonesian food policy makers have turned their attention to the development of the secondary food crops. Soybeans have received special attention because of their importance as a staple food and the growh of soybean imports. In 1986, the Government of Indonesia proclaimed a policy objective of self-sufficiency in soybeans for direct consumption. To achieve this, a special soybean development program was implemented in 1986 (Tabor, S. and G. Gijsbers, 1987).

The progress of soybean production has been slow, in part because the yield is still below 1.0 ton per hectare and the expansion in area planted is also slow. The research bas on soybeans has been strengthened to overcome these problems.

The CGPRT (coarse grains, pulses, roots and tubers) Center in Bogor has conducted research on soybeans and is also conducting field trials in major

soybean producing areas. Decentralized field experiments, demonstration plots for local farmers, improving fertilizer and variety recommendations for soybeans are important activities in determining regional strategies and selecting the proper areas in which the production potential of soybeans can be achieved more readily.

Research on marketing systems that will better fit farmers financial and risk bearing situation is also important to encourage farmers to expand soybean production.

Market surveys in Jakarta and Surabaia show that these two cities play an active role in coordinating the flow of non-rice foodstuffs between the outer islands and Java. Since future government production policy is geared to expanding non-rice crop development outside of Java (including soybeans), the marketing practices in these two urban areas will exert a significant influence on outer islands crop development options (Tabor, S., et al 1988). Greater attention to infrastructure development in the outer islands, particularly in the soybeans major producing areas, could reduce the higher distributive costs.

Post harvest handling also plays an important role in determining the quality of soybeans. Low quality

will result in a lower price received by the farmers. A simple grading system should be introduced to the farmers and village collectors. Other supporting activities are strengthening the extension service to support the dissemination of soybean's technology of production. Further improvement of economic and physical infrastructure will guarantee the continuous availability of production inputs so that farmers have access to these production facilities.

The intervention of government; i.e., BULOG, as the sole importer of soybean and products should be minimized, just in case the soybean price exists below the floor price.

In general, the role of government is to provide conditions to make soybean production more profitable and more efficient so that soybeans become a significant force of farmers' income, which in turn would enhance farmers to further adopt new technology.

VII FUTURE PROSPECT OF SOYBEANS

Production of soybeans in Indonesia is expected to increase in the future as a result of both yield and area expansion. Improving the soybean research base together with continuous and intensive regional and local testing and demonstration should increase the average yield to more than 1.5 tons per hectare in the near future, as a result of primarily better soybean cultivars and other improved inputs.

In line with future government production policy in expanding non-rice crop development, including soybeans outside of Java (Tabor, S., et al 1988), the trend for increases in areas planted will be confined to the outer islands, mainly in the islands Sumatera, Kalimantan and Sulawesi.

The use of soybeans domestically for food will continue to increase in the future in response to the growing demand from increasing population and the growth of per capita income.

The building of a soybean meal plant in Indonesia which is located in Southeast Sulawesi in 1987, will increase the demand for soybeans particularly in areas near the plant. This solvent extraction plant has an

an installed annual capacity of between 350,000 and 500,000 tons of soybeans (Tabor, S. R. and G. Gijsbers, 1987), which is equivalent to 262,500 to 375,000 tons of soybean meal. An estimated 334,000 tons of soybean meal will be required in 1990, which is equivalent to 445,000 tons of soybeans. It is likely that the supply of soybeans for the extraction plant will be fulfilled by imports, unless domestically produced soybeans can meet the needs of the plant.

According to Steven Tabor, et al (1988), this extraction plant would provide Indonesia with enough soybean meal to satisfy growing demand in the poultry industry through the early 1990's. Hence, future imports of soybean meal will be conditioned by the extent to which imported soybeans are substituted for meal to satisfy industry demand. Suppose the self-sufficiency programs in soybean development cannot be reached in the near future, then the fulfillment of the demand for soybeans will still rely on imports. As forecasted by Steven Tabor et al (1988), by the year 2000, Indonesia will have to import between 400,000 and 600,000 tons of soybeans.

Before 1984, more than 80 percent of all soybean imports were provided by the United States. Starting in 1985 and 1986, the United States was replaced in the

Indonesian market by the People's Republic of China which held an average of 86 percent of Indonesian market share in 1985 and 1986. On the other hand, in 1986, the United States replaced the People's Republic of China as the leading exporter with 62 percent of total meal imports to Indonesia (Tabor, S., et al 1988).

For Indonesia, it is important to notice the medium-term outlook for the world market of soybeans, because the future movements in commodity prices (including soybeans) will have a substantial effect for policy makers to decide future soybean development programs. According to IBRD commodity price forecasters that by 1990, the real world market price for soybeans will increase by 17 percent. On the other hand, the more pessimistic forecasters (Iowa State, FAO and USA) stated that real prices for foodgrains and oilseeds will continue to decline to 20 percent in the medium term (Tabor, S. et al, 1988).

The future prospects for soybeans in Indonesia is challenged by the fulfillment of the rising demand for soybeans both for human consumption and animal feed. A consistent price policy in line with predicted future world market price movements is needed to support the soybean development programs in Indonesia.

VIII CONCLUSIONS AND RECOMMENDATIONS

Soybean production in Indonesia is concentrated mainly in Java, and is produced largely by small holders as a monocrop, as well as an intercrop. Soybean cultivation is only one of several farm enterprises providing a source of income.

During the last fifteen years soybean production has increased 5.6 percent annually. Between the years 1986 and 2000, the estimated average annual growth in production will be 2.37 percent, including area harvested by 1.1 percent and productivity 1.34 percent per year. By the year 2000, the total production of soybeans is estimated to rise to 1.64 million tons.

Physical and economic constraints limit both yield increase and area expansion. Efforts to increase production have to rely mainly on yield increases rather than area expansion in the near future. Potential production areas in the outer islands (outside Java) are less fertile compared to Java, and soil acidity is also high in many places. A high price policy for soybeans would encourage area expansion in the outer islands, as well as productivity increases in the established production zones. If a low price policy for soybeans is followed the focus should be on technology to raise productivity in the established production zones.

The government's floor price scheme in some instances has given a positive result in preventing the fall of price at harvest time below the floor price. Farmer's real income has increased slightly overall, whereas in some years it has decreased. The mechanism of floor price scheme and its impact needs further research and evaluation. Price results are also closely related to the efficiency of the marketing system, and availability of production inputs, as well as credit.

The consumption of soybeans is concentrated in Java (more than 90 percent of total consumption), while Java produced about 62 percent of total production in Indonesia. The balance has to be supplied both from the islands outside of Java and imports.

The marketing system for soybeans in Indonesia includes domestically produced and imported soybeans. Unlike imported soybeans, the marketing of domestically produced soybeans is operating under competitive conditions. The Jakarta and Surabaia markets play an important role in coordinating the marketing of both domestically produced soybeans and imports, and also area expansion in the outer islands, as well as productivity increases in the established production zones. If a low

faces high administrative costs, while the local soybeans

face relatively high overland transportation costs.

Quality control at the initial levels of the marketing chain (i.e., farmers and village collectors) is poorly understood. In some cases the market system is sending a price signal to farmers for higher quality, but farmers do not all respond. Lack of better harvesting technology or poor understanding of the pricing system may be responsible. At the farm gate, the unit price difference between low and high quality soybeans can be as much as Rp 35.00 per kilogram in East Java or about 9 percent of the procurement price.

Soybeans are not a basic food in Indonesia compared to rice. As income rises, the demand for soybeans increases relative to rice. The growth of income resulting from economic development will increase the demand for soybeans consumed directly, as well as from increased demand for animal protein. Soybean meal is an important protein feed for animals; meaning that the demand for soybean meal will increase. So, the prospect for increasing soybean production for food as well as for crushing will further benefit soybean growers, assuming a limited increase in reliance on imports.

The Government of Indonesia has promoted the production of secondary foodcrops since 1974. However,

achievement of self-sufficiency in rice production has been the major concern up to 1985 when there was a small surplus of rice produced. As a result, the domestic production of soybeans has not increased enough to meet the rising demand, which has caused soybean imports to grow rapidly in recent years. In order to boost domestic soybean production, the government introduced a self-sufficiency program as a policy objective in 1988. Farmers were provided with a subsidized package of modern inputs. This program focuses mainly on increasing productivity in the established production zones. While area expansion in the islands outside of Java ia also a concern, the projected areas are smaller than that of the intensification areas in the established production zones.

A major way to increase soybean production is to increase productivity; i.e., the yield. This requires major efforts to coordinate the timely availability of inputs such as improved seeds, fertilizer, insecticides and sprayers at the farmer level. Although all of these inputs are included in the intensification package, experience has shown that their availability at the farm level is still a problem. Also, the quality of inputs is often lacking, such as seeds with low rates of germination. The flow of inputs is a problem. Involvement

of private traders should be encouraged, in addition to improving the capability of the Village Unit Cooperatives in supplying the inputs needed in soybean production. Private traders will make the marketing of inputs more competitive and increase the availability of inputs to farmers at the local level.

To increase domestic production, a high price policy is recommended. The highest price for soybeans should be maintained close to the selling price of imported soybeans to the tempe and tofu producers. If the world price of soybeans is not attractive and foreign exchange is not available to import soybeans, then the domestic supply must come wholly from domestic production. This situation will cause the domestic price to rise. To prevent the uncontrolled increase of soybean prices, a stabilization price scheme is needed to fix a ceiling price together with the floor price which is already established. This will need careful judgment because a high price policy for soybeans will tend to decrease production of other secondary foodcrops.

A soybean production program cannot be planned and implemented in isolation, but must relate to rice policy as well as other secondary foodcrops such as corn and peanuts. There is a market interlinkage between

these foodcrops and farmers usually produce at least two secondary foodcrops during the same planting period.

Several studies have shown that the transportation costs contribute a high percentage of marketing costs. Several factors are responsible for high transportation costs, including administrative and retribution costs, especially in the outer islands. Eliminating these kinds of costs must be considered together with the improvement of physical infrastructure and transportation facilities. Because improvement requires high investments the priority should be given to the established production zones in Java and the potential soybean production zones in outer islands which already have marketing connections with Jakarta and Surabaia as terminal wholesale markets for soybeans.

Grading of soybeans at the farmer level is also important. The government should promote a simple grading system, so that farmers will improve their soybean quality to get a higher price. The extension service should be strengthened to help farmers improve their production management and quality at the farm level.

Research activities to produce new cultivars at the government research centers should be encouraged through (a) increasing scientific expertise in soybean

production, and (b) continuous funding for soybean research. Release of new soybean cultivars is the cheapest way to improve the yield at the farm level. Lower production costs should be a priority in producing new cultivars by the research centers. A comprehensive farm level testing program is needed at regional and local levels to determine which varieties are most adapted to different environments.

REFERENCES

Barker, R.; Herdt, R. W.; Rose, B., 1985. The Rice Economy of Asia, Resource for the Future, Washington, D.C.

Biro Pusat Statistik, 1986. Sensus Pertanian Tahun 1983, Jakarta, Indonesia.

Birowo, A. T.; G. E. Hansen, 1981. Agricultural and Rural Development An Overview, in Agricultural and Rural Development in Indonesia, ed. Hansen, G. E., Westview Press/Boulder, Colorado.

BULOG, 1986. Bulletin Statistik, Bandan Urusan Logistik, Jakarta, Indonesia.

Central Bureau of Statistics, 1986. Statistical Yearbook of Indonesia. Jakarta, Indonesia.

Davison, C. W.; J. W. Glauber, 1988. U. S. Soybean Exports: Competitors and Markets. World Agriculture, Situation and Outlook Report, WAS-51, March 1988. U.S.D.A.

Esmay, M. E., 1987. Agricultural Engineering Technology Development and Utilization in Indonesia with Emphasis on Post Harvest Mechanization. UND/FAO/INS/85/004, and Directorate of Foodcrops, Center for the Development of Appropriate Agricultural Engineering Technology. Ministry of Agriculture, Jakarta, Indonesia.

Falcon, W. P.; Jones, W. O.; S. R. Pearson, 1984. The Cassava Economy of Java. Stanford University Press.

Hayami Yuyiro, et al, 1987. Soybean and the Local Marketing System in West Java, Indonesia. Soybean Research and Development in Indonesia, ed. Bottema, J. W. T., Dauphin, F., G. Gijsbers. CGPRT No. 10, CGPRT Centre, Bogor, Indonesia.

Hinson, K.; Hartwig, E. E.; H. C. Minor, 1982. Soybean Production in the Tropics. F.A.O., Rome.

Houck, J. P., 1985. Trade Policy Issues in the Soybean Sector. World Soybean Research Conference III: Proceedings, ed. Shibles, R. Westview Press/ Boulder, Colorado.

Kasryno, F., et al., 1985. Pemasaran Kedelai di Indonesia. Pusat Penelitian dan Pengembangan Tanaman Pangan, Bogor, Indonesia.

Kasryno, F. et al., 1986. Pola Usaha Pertanian dan Polar Tanam. Buku 3. Aplikasi Teknologi Pertanian, Intensifikasi Tanaman Pagan, dan Pola Usaha Tani. Sensus Pertanian 1983. Biro Pusat Statistik, Jakarta, Indonesia.

Kasryno, F., 1987. Socio-Economic Aspects of Post-Harvest Mechanization of Palawija Crops. Center for Agro-Economic Research, Bogor, Indonesia.

Kawagoe, T., 1987. Necessity for Marketing Studies on CGPRT Crops. Palawija News, The CGPRT Centre Newsletter. Bogor, Indonesia.

Mahoney, T., 1981. Local Political and Economic Structures. Agricultural and Rural Development in Indonesia ed. Hansen, G. Westview Press, Bolder/Colorado.

Matthews, J. L., 1985. Supply, Use and Price Prospects for Soybeans and Other Oilseeds. World Soybean Research Conference III: Proceedings, ed. Shibles, R., Westview Press, Boulder/Colorado.

Meilke, K. D., 1984. An Economic Profile of the Ontario Soybean Industry, University of Guelph, Canada.

Mielke, S., 1985. World Supply, Demand and Competition for Soybeans and Products in the Eighties and Nineties. World Soybean Research Conference III: Proceedings, ed. Shibles, R., Westview Press, Boulder/Colorado.

Purwadaria, K. H., 1987. Grain Post-Harvest Technology System in Indonesia: Maize, Soybean, and Groundnut in North Sumatera, South Sumatera and Lampung. MOA, Indonesia-FAO-UNDP. DP/FAO/INS/85/004 Project.

Pospos, P. L. R., 1987. Economic Stabilization Policies in Indonesia. Economic Stabilization Policies in Asean Countries, ed. Rana, P. B. and F. A. Alburo. Institute of Southeast Asian Studies, Singapore.

Rahim, A., 1987. Economic Evaluation of N-Fertilizer Trial on Soybean at Garut, Ngawuku Season, 1986/87. Palawija News, The CGPRT Newsletter, Bogor- Indonesia.

Sihombing, D., 1985. Prospek dan Kendala Pengembangan Kedelai di Indonesia, Pusat Penelitian dan Pengembangan Tanaman Pangan, Bogor, Indonesia.

Soegianto, Soepani, and R. S. Tabor, 1987. Soybean Marketing in Indonesia: A Regional Comparison. Soybean Research and Development in Indonesia, ed. Bottema, J. W. T., Dauphin, F. and G. Gijsbers. CGPRT, No. 10, CGPRT Centre, Bogor, Indonesia.

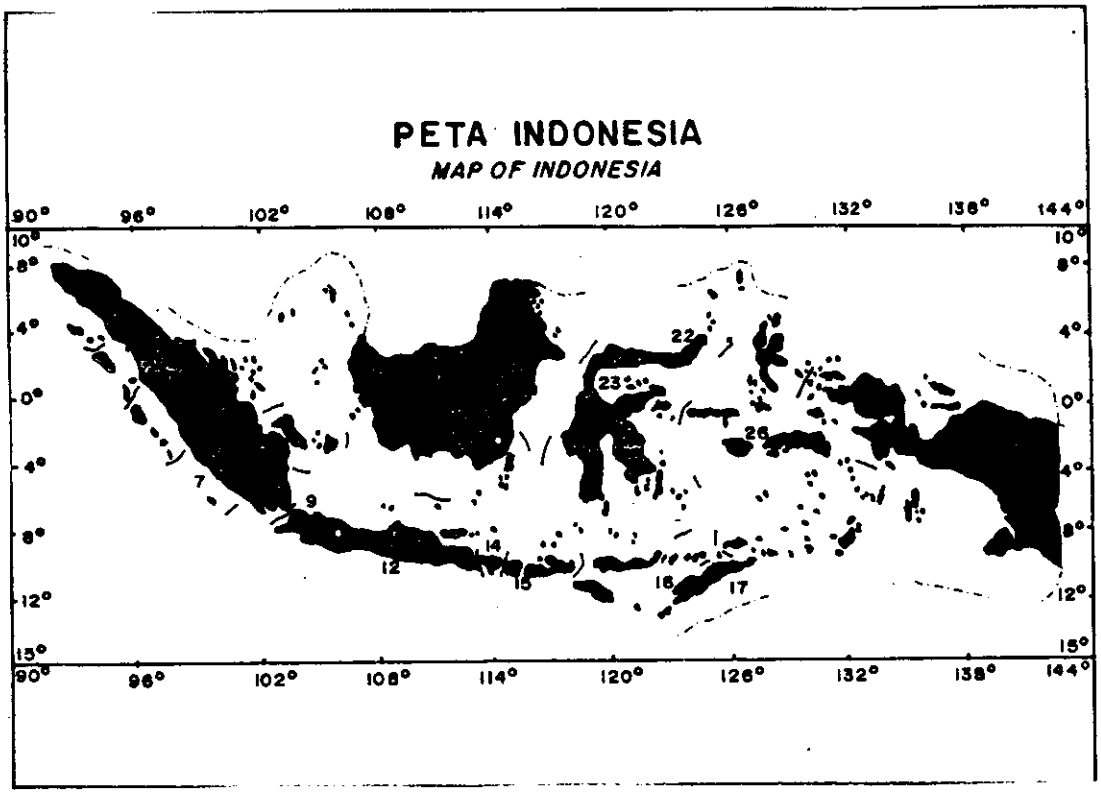
Tabor, R. Steven, et al., 1988. Supply and Demand for Foodcrops in Indonesia. Directorate General of Foodcrops, Ministry of Agriculture, Jakarta, Indonesia.

Tabor, R. S. and G. Gijsbers, 1987. Soybean Supply/ Demand Prospects for Indonesia. Soybean Research and Development in Indonesia, ed. Bottema, J. W. T. Dauphin, F., and G. Gijsbers. CGPRT, No. 10, CGPRT Centre, Bogor, Indonesia.

Vocke, G., 1988. Research and Development Affects US and Third World Soybean Trade. World Agriculture, Situation and Outlook Report, May 1988. U.S.D.A.

World Bank, 1986. World Development Report 1986. Oxford University Press, New York.

APPENDICE 1.



Provinces in Indonesia.

1. Aceh
2. North Sumatera
3. West Sumatera
4. Riau
5. Jambi
6. South Sumatera
7. Bengkulu
8. Lampung
9. DKI. Jakarta
10. West Java
11. Central Java
12. Yogyakarta
13. East Java
14. Bali
15. West Nusa Tenggara
16. East Nusa Tenggara
17. East Timor
18. West Kalimantan
19. Central Kalimantan
20. South Kalimantan
21. East Kalimantan
22. North Sulawesi
23. Central Sulawesi
24. South Sulawesi
25. Southeast Sulawesi
26. Maluku
27. Irian Jaya

GLOSSARY

BULOG: Food Logistic Agency, at the National level.

DOLOG: Food Logistic Agency, at the Provincial level.

KOPTI: Cooperative of Tempe/Tahu producers.

ASBIMTI: The association of small scale animal feed producers.

KUD: Village Unit Cooperative. Farmers' Cooperative Organization at the Village level.

SOYBEAN ASSOCIATION: The association of private soybean traders, the members are usually wholesalers.

PRIMKOPTI: Cooperative of Tempe/Tahu producers at the village level, members of the cooperative are small scale producers.