

**IMPACTS OF WTO AGREEMENT ON AGRICULTURE ON
ECONOMIC, SOCIAL AND ENVIRONMENT IN INDONESIA:
THE RICE SECTOR CASE**



JOIN PROJECT



**BETWEEN JENDERAL SOEDIRMAN UNIVERSITY AND UNITED
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(ECONOMICS AND TRADE BRANCH DIVISION OF
TECHNOLOGY, INDUSTRY AND ECONOMICS)**

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I

BACKGROUND OF THE STUDY

1. Relevance of the Rice Sector on the National Economy

Indonesia is one of the most populated countries in the World after China, India, and the United States of America. Rice is the staple food of the people of Indonesia. Eventhough the area planted with rice and its production are ranked the fourth highest in Asia as well as in the world, the domestic rice production is not enough to feed the people and Indonesia is still has to import rice from other countries. This picture reflects that Indonesia rice consumption per capita is very high (130 kg/annum). This also indicates that the people is relatively still at the subsistence level of living. A high percentage (12%) of household budget is still shared by the staple food especially rice.

a. Indonesia's rice productions

Rice production is computed by multiplying the total hectarage of area harvested with the rice yield/Ha. Rice production has been increasing from the average of 50,074,233 tons between 1995 –1977 to 50,539,454 tons between 1998 – 2001 as a result of an increase in area harvested from the average of 11,383,022 Ha in 1975-1997 to 16,711,257 Ha in 1998-2001 accompanied by a decrease in rice yield from 4.40 Kg/Ha of dried husked rice in 1975-1997 to 4.31 Kg/Ha in 1998-2001. More detailed figures after the recession of 1977 show that the harvested area of rice crop increased by 5.3% from 11.4 million Ha in 1977 to 11.73 million Ha in 1998, while the production of unhusked rice decreased by 0.28% from 49.38 tons to 49.23 million tons for the same period of 1997 to 1998. In the following three years 1999 to 2001 the rice harvested area had been decreasing from 11.96 million Ha, 11.79 million Ha, and 11.5 million Ha respectively. The changes in hectarage was followed by the changes in rice production in the same direction, namely from 51.89 million tons in 1999, decreased to 51.9 million tons in 2000, and finally to 50.5 million tons in 2001.

The costs structure of rice production in Indonesia is shown at Table 1. This table indicates that the gross returns in operating one hectare of rice field by the end of 2002 was Rp 6.7 million rupiahs or equivalentents to US\$ 753 at Rp 8,850/US\$ exchange rate, but then will increase to Rp 7.5 million or US\$ 853. The costs of production per Ha of rice production was 79% of the gross returns in 2002, but it might increase to 86% in 2003 due to the rise in fossil fuels prices in early 2303.

The net income received by the farmers was actually low in 2002 and even much lower in 2003; i.e. 21% and 14% respectively.

Looking at the components of the costs of production, labor cost contributes 42-46% of the total costs of production, followed by rental cost (23 - 28%) and capital interest (7 - 11%) . So the other agricultural inputs together contributes only 29% of the total costs of rice production. The proportion for labor cost of about 42-46% of the total costs is reasonable as compared to other sectors' activities. Please be noted that the labor costs have included both the family and non family labors. Since most of farmers are small scale farmers with the average operated lands of approximately 0.5 Ha, they tend to use more family labors than the non family labors. This situation is exacerbated by the fact that the supply of agricultural laborers has been declining for the last decades due to the modernization improvement in education of the rural sector.

The high percentage of land rent relative to the total costs of rice production (23-28%) are probably caused by the scarcity of the agricultural land in relation to the total population of Java. Java is in fact only 7% of the total land area of Indonesia but it is densely populated with 54% out of 210 million people of Indonesia in 2002. The capital cost is also relatively high, because farmers usually have no access to the rural banks but are facilitated by private creditors who take high rate of interest (about 20% per season or approximately for 4 months).

Rental system is a sort of guaranteed income for the land owners without any risks of not receiving incomes from rice farming activities. For the tenants, the land rent becomes part of the production costs which in turn will demand a higher rice price in the rice market. This is one of the reasons why the Indonesian rice can not compete with the imported rice, although it is known that the rice productivity in Java (over 4 tons/Ha) is one of the highest among the Asian rice producers.

Among the cost components, the costs of agricultural inputs only contribute around 12 to 13% of the total costs of rice production. The abolition of government subsidies for pesticides and fertilizers will increase the price of these inputs should reduce the use of them which formerly were used over the recommended doses. In fact the use of chemical fertilizers is relatively constants, or by reducing a bit the chemical fertilizers and increase insignificantly the use of organic fertilizers. However, farmers attempt to maintain the constant doses of fertilizers to avoid the rice production from falling. Although fertilizers and pesticides only contribute about 13% of the total costs, farmers always consider them as the main costs that determine the total rice productivity. Farmers very seldom count the labor costs which mainly consists of the family labors. So in the discussion, farmers always demand the ratio of 2:1 for the price of rice compared to the price of fertilizers.

Under the situation of low rice price and high price of agricultural inputs such as for fertiizers and pesticieds, the Department of Agriculture still made an estimate that

the needs for fertilizers for the 2003 fiscal year is quite a lot (4,800,000 tons of urea, 900,000 tons of ZA, 400,000 tons NPK, and 1,400,000 tons SP36).

b. Pricing Policies

Since rice is known as one of the strategic commodities, as a staple food and also its price was a barometer for other prices in 1960s-1970s, the sufficient supply of rice for the Indonesian people is considered important. This is the reason why the government of Indonesia until now is maintaining a reasonably low price of rice to guarantee that all segments of the society could consume their basic staple food. and also a higher price of rice might encourage other prices to rise and creates a higher rate of inflation.

At present, the price policy does not encourage farmers to plant rice, since the relative rice prices were much lower than during the earlier periods. Farmers now have to produce rice with higher costs of production due to the abolition of inputs subsidies such as for pesticides and even for chemical fertilizers. This means farmers will not be able to sell rice at low prices to compete with the imported rice. In fact the IMF has advised the government to open the domestic rice market by abolishing the monopoly right to import held by the National Food Logistics Agency. Very recently the function of the National Food Logistic Agency was changed to a government enterprise that may search for profits.

During the last decade, the price of rice had been nearly constant but the costs of agricultural inputs kept on rising. The difference of rice price and fertilizer price has been becoming closer and closer. In 1980-82 the price of urea fertilizer was around Rp 100-Rp 125 per Kg, while the price of dried husked rice was Rp 320 per Kg (56% higher than the price of urea fertilizer). After four years (1986) the price of urea fertilizer increased to Rp 250 per Kg and the price of rice increased to Rp 600 per Kg, or 40% higher than the price of urea fertilizer. The price of fertilizer increased further in 1995-97 to Rp 1.100 per kg, while the price of rice also increased with a smaller percentage to Rp 1.200 for the same period. The price of rice was only 9% higher than the price of urea fertilizer. The figures indicate a worsening terms of trade between rice and urea fertilizer and also compared to other commodities prices. This year (2003), the Government increases the floor price of rice, but other commodities prices also increase due to inflation, which produce no changes in the agricultural welfare. The government has determined the formal retail price of fertilizers. The current price is Rp 1.150/kg of urea fertilizer, Rp 1,000/kg for ZA, and Rp 1,500/kg for SP36 and Rp 1,750/kg for NPK. With these prices, actually farmers are receiving price subsidies at Rp 250/kg for urea, Rp 146/kg for ZA, Rp 96/kg for SP36 and Rp 96/kg for NPK. The total expenditures for the fertilizers subsidies in the current 2003 budget is Rp 1,315,000,000,000 distributed into subsidy for producing urea fertilizer Rp 1,068,000,000, for SP36 Rp 96,000,000,000, for ZA Rp 104,000,000,000; and for NPK Rp 28,300,000,000.

c. Trade Policies

Although Indonesia is the third biggest rice producer after China and India, and was known that she could reach its food self sufficiency in 1984, it is found that Indonesia's rice import has been rising tremendously, especially after the reformation era following the economic crisis in 1997 and 1998. The average volume of rice imported in 1995-1997 was 1,503 thousand tons and increased to 3,268 thousand tons in 1998-2001. The peak of rice import reached more than 5 million tons in 1998. With a little decline in rice production, rice import also increased and caused the dependency ratio on rice import to be higher from 4.3% in 1975-1997 to 9.1% in 1998-2001. This year (2003) the import of rice is predicted to be 2.3 million tons (CDS-Bogor Agricultural University), while the USDA predicted the rice import of Indonesia will reach 3.25 million tons in 2003, which is the highest compared to other countries; followed by Nigeria (1.7 million tons), the Philippines (1.2 million tons), and Iraq (1.1 million tons).

The high volume of rice import was mainly caused by the opening of free trade policy for rice. The government of Indonesia following the advice of IMF and the World Bank, besides the real needs for importing rice, has cut the import tariff for rice to 0% in 1998. Formerly rice import was not controlled by tariff at all, but by quota system. Only after the market liberalization following the proposition of WTO a tariff system was introduced. But in 2000, after realizing the impact of zero tariff, the Government imposed import tariff for rice equivalent to 30% of the FOB price. In 2002 the import tariff for rice was Rp 430/kg and it is planned to be increased to Rp 510/kg this year (2003). Actually the Farmer Organization (HKTI) proposed to have even higher import tariff of Rp 900 per kg in order to protect the domestic rice farmers from the imported rice.

2. Rice Farming and the Natural Environment

Indonesia is one among the developing countries whose concerns for the environment has been initiated relatively early. The government implementing agency is the State Ministry of the Environment which is responsible for policy formulation and environmental protection. The government has introduced some environmental laws and regulations, but its enforcement is still weak.

Rice farming in Indonesia, Java¹ especially, has been adopting high yielding rice varieties with high application of fertilizers and pesticides. Although it is understood that a continuous application of the modern chemical agricultural inputs has produced negative effects on human health both directly and indirectly, most

¹ Only 46% of rice area is found in Java, but more than 54% of rice production is found in Java. It is also true that most secondary foodcrops, vegetables and fruits are produced mostly in Java. The population of Java is about 52% of the total population of Indonesia, even though the land area of Java is only 7.0% of the total land area of Indonesia. So Java is very densely populated island.

farmers still use them for their rice crops. The direct impact falls on the farmers who operates the agricultural pest control. Farmers in Indonesia seldom wear proper mask and dress. Discussion with farmer respondents suggests that 57-60% of farmers did not have any experience of negative impact of the use of pesticides. The indirect impacts are found through water, soil and air. Although there is no published data, the long duration of fertilizer and pesticide use has reduced the soil fertility and lower the quality of drinking water. Out of 261 farmer respondents 32% said that the land and water quality remain the same, 14% had no ideas, and 54% mentioned the decrease in the quality of water and land. One study by Roche (BIES Vol. 30, No.1, 1994) found that in the irrigated area of Java, Sumatra and Sulawesi, the use of fertilizers had been overdosage. Nitrogen fertilizer use in Java had been 33-55% above the recommended dosage; 42-66% for Phosporus, 4-6% for Potassium. While in Sumatra island, the excess usage of chemical fertilizer a little bit lower: 6-22% for Nitrogen; 4-23% for Phosporus; and 1-5% for Potassium. Furthermore farmers in Sulawesi island have been applying 13-17% over dosage of Nitrogen, 10-25% of Phosporus, and 8-10% of Potass.

3. The WTO's AoA

Actually agriculture was under a soft discipline in GATT compared to the industrial products. The Uruguay Round Agreement on Agriculture brings this sector under tighter discipline. The main elements of the agreement are: 1) Market access, i.e. discipline on import restraint, 2) domestic support, i.e. government support to domestic producers, and 3) export subsidy, i.e. government support for export..²

- a). *Market access.* An important step in market access is the “tariffication” i.e. conversion of non-tariff measures such as total import ban, quantitative restriction on import, into tariff equivalents which added to the ordinary tariff make the totality of the market restraints except the BOP measures and safeguard measures. After the tariffication, all countries have to bind their tariffs on all agricultural items including rice. The level of tariffs starting from the initial bound levels in 1995 going down to the final reduced levels at the end of the implementation period, i.e. the year 2004 for the developing countries.
- b) *Domestic support.* The domestic subsidy for each country has been quantified, and the country has committed to limit the subsidy up to a particular level in 1995. There are some exemptions for developing countries from the disciplines of domestic support. The items of exemptions cover investment subsidies, input subsidies generally available to low income and resource-poor producers. Certain other types measures are also exempt from the commitment of reduction, e.g. general services, like research, pest and

² Bhagirath Lal Das, *The WTO Agreements, Deficiencies, Imbalances and Required Changes*, Third World Network, Penang, 1998, pp. 58-61.

disease control, etc. stock holding for food security, domestic food aid, relief against natural disasters, and assistance for curtailing production in various ways. For developing countries, the purchase and sale of government stock at administered prices and also the provision of food for the poor at subsidized and reasonable prices are exempt from the reduction commitment. The subsidy involved in the purchase of government stock is to be included in the calculation of the level of annual subsidy, which in turn is subject to annual ceiling.

- c) *Export subsidy*. Export subsidy by countries is on two items: a) the total budgetary outlays, and b) total quantity of export covered by the export subsidy. Developing countries are exempt from the disciplines on two types of export subsidy, i.e. payment to reduce the cost of marketing, including handling, upgrading, processing and institutional transport and freight. Provision of internal transport and freight for export shipment on terms more favourable than that for domestic shipment.

2. Project Approach and Process

Nowadays politicians are caught in the trap of short sighted orientation, especially because they are facing the coming general election in 2004. Although the recommendation of this study will be practical and implementable in promoting the sustainable management of the rice sector, these recommendation might not be immediately adopted or implemented by the government.

Stakeholders meeting

To anticipate this possibility, the study begins by inviting the stakeholder of the rice sector to attend the stakeholder meeting on November 22, 2002 to launch the project. The meeting was attended by approximately 30 participants from different institutions; namely the technical staffs of Ministry of Agriculture, Ministry of Industry and Trade, Ministry of Environment, and State Food Logistic Agency, the University of Jenderal Soedirman, the Farmer Organization, the Pesticides Analytical Network (PAN) Indonesia, the Land Research Institute, and the Research and Training Institute "WACANA MULIA". The discussion was focused on the roles of AoA of WTO in relation with the Indonesian rice sectors and the methodology in approaching the problems of the study, determining the sample villages and analytical methods to be adopted by this study. The meeting was also attended by Mr. Charles Arden Clarke as UNEP's senior staff.

Rational of the study

The study area is limited to Java due to the limitation of the budget besides the largest part of rice production in Indonesia is found in Java (54.90% in 1999 and 56.12% in 2000). Furthermore, most of the secondary foodcrops (corn, soybeans, peanuts, mungbeans, cassava and sweet potatoes) are also found in Java. Again a bigger portion of other agricultural products such as vegetables and fruits are also grown in Java. Vegetable and fruit crops were hypothesized to be the main substitutes for rice on the same rice land since their monetary values supposed to be higher than the monetary value of rice. However, after visiting the fields of the four selected villages in Central and West Java during the end of 2002 and early of 2003, most farmers actually have planted other crops long before the declined in the rice prices of 1998.

From the four possible impacts of trade liberalization for a commodity on the environment (*product effects, technology effects, scale effects, and structural effects*), it seems that for the case of rice production in Indonesia, only structural effects will be found. Farmers are expected to change their farming from rice to non-rice crops. But analyzing the function of rice and substitution crops in an economy will not be enough to analyze only its productivity, real prices and returns to family labor and to land resources; it is also important to link to other industries both rural and urban areas. For one of our sample villages it is related to tile industry.

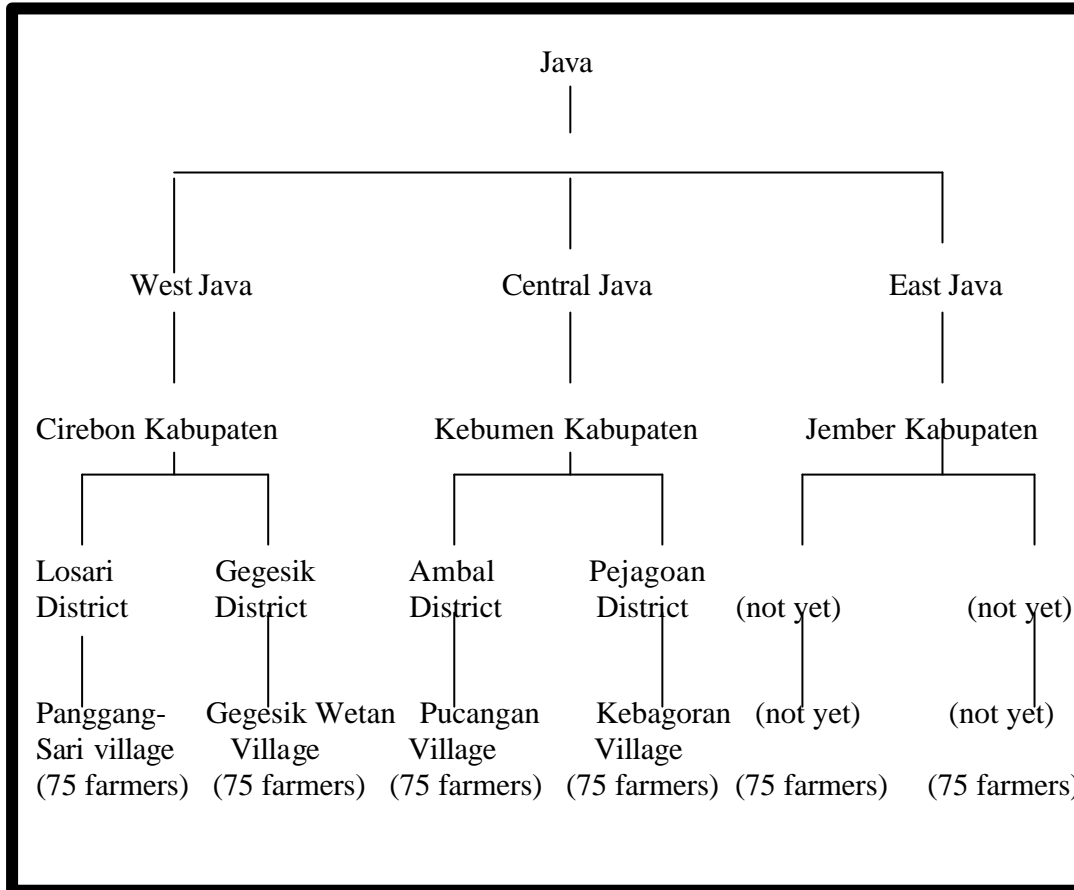
Analyzing the monthly trend of price (*nominal or real price*) at farm level (*farm gate prices*), wholesale price, and source of productivity growth for rice and rice import, the time period must be distinguished into three different periods: 1990-1994 (*strong support/subsidy*); 1995-1998 (*period of AoA*) and 1998-2001 (*period of radical liberalization*). Data on rice production, rice harvesting areas, and unskilled laborers and even cost structure from 1990-2001 were obtained from CBS (*Central Bureau of Statistics*) and the Ministry of Agriculture. Data on farm gate and wholesale prices of rice came from Government Food Logistic Agency (*BULOG*).

Location of the study

This study is very comprehensive and formerly was designed to take 6 (six) villages as sample villages involving 450 rice farmers. The six villages are located two in West Java, two in Central Java and another two in East Java as presented in Figure 1. See also Figure 2 Map of Java.

In fact there was a change in the *kabupaten* samples as stated in the MOU (Karawang Kabupaten of West Java, Klaten Kabupaten of Central Java, and Jember Kabupaten of East Java) to Cirebon Kabupaten of West Java, Kebumen Kabupaten of Central Java, and Jember Kabupaten of East Java). The reasons behind the change in the sample *kabupatens* among others was the existing condition that in Cirebon

Figure 1: Location of the Sample Kabupatens, Districts, and Villages



kabupaten and Kebumen Kabupaten a significant conversion of rice fields into fruit crops (mangoes and oranges) was observed. Besides that, Karawang Kabupaten and Klaten Kabupaten which were proposed to be two among three locations of the studied areas, are in fact they are rice producing areas with good technical irrigation systems. Therefore those two kabupatens might not have significant impacts in rice production resulted from the changes in rice prices or even fertilizers and pesticides prices..

Rural Rapid appraisal

To gather the needed data, this study apply a method called Rural Rapid Appraisal (RRA) besides the direct interviews to the farmer respondents. The RRA was implemented by the study team with several groups of stakeholders. First with the BAPPEDA staffs of Kebumen Kabupaten, with staffs of Pucangan village, with a

group of large farmers in Pucangan village and with a group of small farmers also in Pucangan village. The same RRA was also conducted with village staffs of Kebagoran village, with a group of farmers, and a group of agricultural inputs traders.

Similar RRA was done with the officials of Cirebon Kabupaten local government at the BAPPEDA office which consists of 22 people, followed with the staffs of Gegesik District, staffs of Gegesik Wetan village, a group of large farmers, a group of small farmers, and with distributors of agricultural inputs, all in Gegesik Wetan village. The same RRA was done to the group of village officials and a group of farmers in the village of Panggangsari, Cirebon Kabupaten of West Java.

Interviewing farmers respondents with questionnaires

It was planned to collect the primary data from the field by involving 450 farmer respondents in 6 villages (*desas*), in three different districts (*kecamatan*), in three regencies (*kabupatens*) in three provinces of Java, because Java is one of the main rice producing islands in Indonesia. The chosen *kabupatens*, are based on the suggestion given during the stakeholders meeting on the 22 November 2002; they were *kabupaten* Cirebon of West Java, and *kabupaten* Kebumen of Central Java, while *kabupaten* Jember in East Java was still maintained to be one of the sample *kabupatens*. The proposed *kabupatens* in the MOU and earlier proposal of this study (Kerawang *kabupaten* in West Java and Klaten in Central Java) were dropped as the sampled *kabupatens*. The selection of the villages in each *kabupaten* was based on the results of the consultation meeting between the study team and the Planning Board (*BAPPEDA*) of each *kabupaten*. First, the team together with the *BAPPEDA* staff determined two sample districts; one district where rice farmers are mainly located and another district where the farmers plant rice besides other crops such as vegetables and fruits crops. The second step, together with the district head and his staffs, the team determined purposively the sample village. Hence, there are two sample villages in two districts in each *kabupaten*; or totally there are four villages in four districts and in two *kabupatens* in Java were selected to be studied. The final step is then to choose farmers randomly to be interviewed.. So far the survey was done only in two *kabupatens* in Central and West Java and only involved 261 farmers.

Formerly sample farmers will be stratified into several groups of farmers respondents with different combination of crops or activities as:

1. rice farmers only
2. rice and fruit farmers,
3. rice and vegetable farmers,
4. rice farmers and non-agricultural activities
5. fruit farmers and non-agricultural activities,
6. vegetable farmers and non-agricultural activities.
7. rice and fruit and vegetable farmers,
8. rice and fruit and vegetable farmers and non-agricultural activities

After visited the fields and talked to village leaders and farmers groups it was found that to find famers who had combination in the agricultural croppings was not easy. Finally only rice farmers and some rice–vegetable farmers were the respondents of this study.

The interviews with the farmer respondents were done by 10 undergraduate students (6 students from Faculty of Economics and 4 students from Faculty of Agriculture of Jenderal Soedirman University). They were leaded by one Bachelor degree holder in economics and 3 (three) teaching staffs from Faculty of Economics and 1 (one) teaching staff from Faculty of Agriculture. The field data collection was conducted on the 13 – 14 of December 2002, 21-25 December of 2002, and 6 – 11 of January 2003.

Data processing was done since January 13 until January 25, 2003. In between meeting and discussions among the researchers were held and consultation with the Steering Committee was done individually.

The names of the Steering Committee members:

<u>Name</u>	<u>Institution</u>
Prof. Rubyanto Misman	Rector Jenderal Soedirman University
Mr. Dedi	Deputy Minister on Natural Resources and Environmental Management
Mr.Achmad Suryana	Director of Food Security Agency of Department of Agriculture.
Ms. Halida	Expert Staff of Department of Trade and Industry and Chairwoman on the Antidumping Committee of Indonesia
Mr Tito Pranolo	Deputy of the National Food Logistic Agency
Mr. Hutomo	Deputy Minister on Global Resource Management, Ministry of Environment
Mr. Triansyah Djani	Head of Trade and Environment Directorate, Department of Foreign Affairs.

II

RESEARCH METHODOLOGY

Primary data collection

As already mentioned above household level data were collected both by applying formal and informal methodologies. The formal form of questionnaires were constructed to collect data on the levels of pesticides, fertilizer, and other inputs used both in rice and vegetable crops, sources of household income and allocation of family laborers to the farm and non-farm activities, both before and after the trade liberalization. However, after the pilot tests, it was found that some questionnaires were not applicable and had to be deleted because they were very few farmers planting crops other than rice.

Rural Rapid Appraisal (RRA)

As mentioned earlier, RRA (*rapid rural appraisal*) was conducted in the four sample villages in two kabupatens, i.e. Kebumen Kabupaten of Central Java and Kabupaten Cirebon of West Java. RRA was applied for evaluating and assessing the effects of liberalization on the farmers' behaviors related to livelihoods and welfare, household food security, as well as changes of pesticides and fertilizer used on their farms as the results of the changes in rice and fertilizers prices.. This methodology was also be used to identify and assess the constraints of rice farmers at different farm sizes to change from rice crop to other high value crops, to identify changes of labor utilization in relation to new jobs in non-agricultural activities, either in rural or urban areas. RRA also was applied to assess farmers's perception on the impact to the environment. Another information which was explored is on how the small rice farmers (*as net rice consumers*), in a situation of high price of rice, maintain household food security, mainly rice.

Methods of Analysis

To analyze the important of rice industry including the rice mill industry, or other alternative crops such as vegetable and fruit crops in the Indonesian economy, it is planned to utilize the latest I/O of 1999 with 66 by 66 sectors published by Central Statistics Agency will be used. This methodology can be used to evaluate at macro level the inter industry linkages, both for upstream and downstream industries. Then,

one can estimate the employment multiplier and final demand for rice or other alternative crops. *This section has not been done yet.*

For the analysis of impacts, an econometric model will be employed. An agricultural production function of Cobb-Dougllass type will be formed based on the field data collected. From the production function the desirable outputs such as rice itself and the non-desirable outputs such as pollutants produced by fertilizer usage and pesticides application must be separated and computed and to be valued in terms of US\$ or Rupiah. The undesirable outputs can be assumed as another input in the production function. Actually, from the regression coefficient which is also the input elasticity coefficient, we may derive the value of the undesirable output. The valuation of the outputs may use market production approach with market prices, while the non-desirable outputs may be valued by productivity approach and opportunity costs approaches or by surrogate market prices.

The last step will be putting monetary values on the marginal contribution of the environmental input to the output derived in the first step. Benefit-Cost Analysis (BCA) will also be applied to the impacts of policy changes in the rice sector. *This section has not been done too*

3. Project Objectives

The main objectives of this study are:

- a. To explore the linkages between trade, the environment, and development.
- b. To develop policy packages to encourage beneficial effects of trade-related policies or trade agreements on the environment and development and also to mitigate any harmful effects of trade policy on the environment and on development.

4. Benefits of the study.

This study will have the following benefits:

- a. Enhance country's understanding of the implications of multilateral trade rules and trade liberalization on national sustainable development and the environment and enhance negotiating capacity.
- b. Enhance country's understanding of the environmental, as well as social and economic implications of implementing WTO AoA, with specific focus on the rice sector.
- c. Enhance and support national capacity in international trade policy research.
- d. Assess the positive and negative environmental impacts of trade liberalization policies and multilateral trade rule, especially the AoA, taking into account social and economic impacts.

- e. Elaborate countries- and sector-specific methodologies to assess these impacts.
- f. Enhance coordination between national entities and increase national expertise in the use of integrated assessment tools in order to identify and quantify both negative and positive environmental, social and economic impacts of trade liberalization in the agricultural sector.
- g. Establish a long-term policy development process in the rice sector to address future related environmental and social impacts of sectoral activity.

III

INTEGRATED ASSESSMENT OF TRADE LIBERALIZATION AND WTO AoA FOR THE RICE SECTOR

1. Identification of Policies Affecting the Rice Sector

Since the rice sector does not stand alone in the economy, all policies related to this sector will have influences on the rice sector. Among the policies recognized to have strong influences are:

- a. Rice price policy
- b. Trade policy
- c. Agricultural inputs subsidy policy
- d. Macro economic policy (energy price policy)
- e. Development policies (irrigation development, transmigration)

2. Identification of the Relevant Time Period to be Studied

In studying the role of rice and the related policies, the time period should be divided into three different period:

- a) 1990 – 1994 as a strong support/subsidy.
- b) 1995 - 1998 as a period of AoA
- c) 1998 – 2002 period of radical liberalization

This study concentrate on the period of 1988 – 2002.

3. Main Environmental, Social, and Economic Impacts of Trade Liberalization

This section will discuss the impact of changes in rice and pesticides prices on the economic, social, and environment, and will not assumed that the changes in rice and fertilizers and pesticides prices were caused by the AoA of the WTO.

a. Economic impacts of a decrease in rice price

When the price of rice fell especially in 1998 and after, only very few famers reduced the application of the chemical fertilizers, but most farmers maintained the use of chemical fertilizers to keep the high rice productivity. It means a reduction in the farmers's net incomes. This also happens when the price of chemical fertilizers

and pesticides increased to a higher level due to the abolition or reduction of government subsidies; most farmers did not reduce the application of them to the rice crops to maintain the high rice productivity. Again it means a decrease in the net income of the farmers. Why farmers prefer to do that? It is because the Indonesian farmers are subsistence farmers. The average size of land holding is less than 0.5 Ha. They do not have any alternatives to earn their incomes. To shift to other crops is very risky for the family's life because other crops such as vegetables and fruits although they are somewhat quick yielding, but they are perishable product and require good handling and marketing systems. Farmers do not have capability for that and marketing systems and handling in general are still poor in Indonesia. On the other hand rice or rice could be more durable than vegetables and fruit products.

Furthermore farmers in Java tend to place food security as the first priority for the family. Whatever happens to them, they must have their food stock in the storage. So during the harvest they will sell very little portion of the harvest, and keep a bigger part for their own family. In addition this rice stock is also very useful as a source of capital for the next planting season. This situation is quite true for the larger farmers with a size of operated land more than 1.0 Ha.

Some farmers because of their relatively poor group of society, their lives are actually determined by the capital owners (creditors) who provide funds to the farmers to operate the land. This fund is actually used to finance the tilling of the land, to pay the fertilizers and pesticides, and even to pay for the laborers' wages. When the harvest comes, farmers sell the harvest immediately to the creditor as payments of the debt and its interest. Of course the rice price is usually low but there is no choice for the farmers. To support the life of the family, farmers and members of the family usually have other sources of incomes whether as farm laborers, or workers in non agricultural sectors.

For the smaller farmers, their condition is worse since they certainly can not rely on their rice crops for the family. They must have additional source of income as raising cattles, or plant vegetables in the backyard, or even work outside the agricultural sectors.

In some villages, the rise in agricultural inputs prices especially for fertilizers has caused some farmers to reduce the application of the chemical fertilizers and supplement part of them with the organic fertilizers. With the application of organic agricultural inputs, the environmental quality is expected to be better off than before. Hence, it is good for the environment and of course will be good too for the health of the people and even for animals. However, there is a negative point since the application of organic fertilizer is not practical and more costly compared to the chemical inputs. The supply of organic fertilizer is also too little relative to its demand because the number of cattle has been declining in the last decades. Also there is a competition between the demand for feeds for the existing cattle and for

raw materials of organic fertilizer. A new technology is needed to produce organic fertilizers to be similar to the unorganic chemical fertilizers.

b. Social impact of a decrease in rice price

In one of the studied village (Gegesik Wetan) rice farming seems to be a way of life of the people. Since most of the people are rice farmers due to a good technical irrigation system, they will never plant other crops except rice. And there is a custom that before they plant rice for a certain season, they conduct a ceremony with a big fiesta of puppet show (*wayangan*). No one has the courage to plant their land with rice before the *wayangan*. So this is a culture which the society is willing to maintain.

Long before the economic crisis of 1997 and trade liberalization in 1998, great number of young workers left the agricultural sector moved to the non agricultural sectors. Furthermore with the growth of modernization and improvement in the education level which has increased the number of the educated people, although mostly are still at elementary to junior high school levels of education, it is learnt to be very difficult to find farm laborers in the villages. The youngest age of farmers now is 35 years old with an average age is about 45 years old. This data are found in the four sample villages for this study.

This condition is worsened by the pressures on the agricultural sector in the form of low incomes received in that sector because of the low price of rice. The younger age working groups (*less than 35 years old*) are preferred to work in the factories and motor vehicle drivers rather than in the agricultural sectors. This tendency helps to increase the costs of farm laborers in the rural areas. The labor scarcity has pushed the farm laborers to have even a bargaining power such as to determine the time schedule of the work and even the wage rates. However, since there is low earning of the farmers derived from the rice sector, their wage rate although is considered high for the agricultural sector, but still relatively low compared to the non agricultural ones.

Another consequence of the economic crisis of 1997, many families fell into the poor group. With the fall of rice price many rural family even become poorer. The government introduced a safety net program by giving subsidized low rice price to the poor group. The devise is to provide 20kg rice at the subsidised price (called *raskin*) to each poor family. The National Food Logistic Agency (BULOG) has been assigned to conduct the program. The floor price of BULOG is actually Rp 2,800 per kg of rice in January 2003 and the *raskin* price is Rp. 1,000 per kg. Unfortunately this program does not work well in practice. The recipients of the *raskin* practically sold back the rice to the market to gain the price differences. So it is not an effective way to help the poor. In addition, the devise was modified in the field since the real poor family received only 5 kg of rice instead of 20 kg, because the number of the

poor turned to be larger since many families claimed to be poor families in order to receive the *raskin*.

c. Environmental impacts of a decrease in rice price

Actually the challenges for good environmental quality has been responded positively by both the government and the people. The real problem for the environmental concern is in fact how to alleviate the poverty level of the people. In the short run people more concern with food and other basic necessities rather than the environmental quality, because the effect of lack of basic necessities is quickly felt; while the effect of poor natural environment is slowly felt by the victims. It is common that people will choose the basic necessities to be fulfilled first and then a good environmental quality will follow later. In other words, the poor people are willing to take the environmental risk relative to the basic necessities risks.

In the field of rice production, the government has encouraged the rice farmers to increase the rice production by adopting the modern technology, meanings the use of chemical fertilizer, chemical insecticides, great volume of water for the high yielding rice varieties. As has been mentioned that the impacts of long continuous application of chemical fertilizers had been the lower soil fertility, while a long and continuous application of chemical pesticides has resulted in poor health of people directly and indirectly. The direct impact of chemical pesticides is mainly suffered by farm laborers or farmers who are directly exposed to the pesticides while they are working in the farm; whereas the indirect impact accrues to those who consumes raw foods and drinks surface water contaminated by the pesticides and the fertilizers. In addition the air quality may also worsened because of the contamination due to the spread of the pesticides used in the rice farming.

The Department of Agriculture has estimated the needs for fertilizers for the 2003 fiscal year to be 4,800,000 tons of urea, 900,000 tons of ZA, 400,000 tons NPK, and 1,400,000 tons SP36. So in the long run these all are very potential for worsening the land quality and the environment in general, beside increasing the productivity in the short run..

Furthermore, in order to maintain adequate supply of water, an area called watershed has to be covered with good forest and well maintained. A good condition of watershed may guarantee a sufficient supply of water for the agricultural sector, including rice farming. Besides that, a good condition of forest cover in the watershed area will also facilitate the habitate of the biodiversities which in turn will provide good stock of natural medicine for the health of the people.

Since the introduction of the decentralization system in the government of Indonesia on the first of January 2001, the role of natural resources as the main source of revenue for many local governments becomes very important, because the central government has given a bigger share of the revenues derived from the natural

resources to the local governments. Local governments whose lands contained natural resources such as oil, gas, coal, forest and even fish, have proved to gain much higher income share from the central government. For instance, for fossil fuel, the share given to the local government is 15% and the rest 85% is still for the central government. Whereas for forest resources and coal mining, the local government earned 80% share and the central government earned 20%.

It seems the decentralization system has encouraged many local governments to find new sources of local income and tends to deplete more their natural resources in order to meet the need of local budget. In fact the central government has reduced the subsidies to the local governments and pushed the local government to find their own financial sources. So far the forest resources have suffered from a big harvest and very slow replantation; therefore it caused the water sources to suffer from shortages, especially during the dry season. In 2002, Java was experiencing a very long drought. Many rice fields especially the rainfed rice fields could not be supplied with enough water. The water level in most dams in Java has declined and was short to water the irrigated rice fields. As a result poor management of forest threatens the survival of the rice farming, because the rice crop demands a lot of water, especially for the high yielding rice varieties. In other words, the existence of rice farming is in a more difficult situation nowadays. In turn farmers will seek other sources of income from forests, the villages and local governments will earn less taxes and fees revenues which urges the local governments to seek other sources of revenues from the available natural resources.

UNEP has shown that in general there have been four broad categories of environmental impacts of trade liberalization:³

- a) *Product effects*. These effects are reflected in flows of products and or services between countries which may cause a hazardous to the environment or be environmentally friendly.
- b) *Technology effects*. These effects are in the form of changes of production techniques brought by the trade reforms. These technologies may be harmful or environmentally friendly.
- c) *Scale effects*. These effects are seen as a higher rate of use of natural and environmental resources due to a higher level of economic activities resulted from trade liberalization, and
- d) *Structural effects*. These effects are in the form of changes in the sectoral composition of a country's economy as it specializes in the production of goods and services where it has competitive advantages. Furthermore trade liberalization may result in the removal of subsidies, quotas, and other restrictive methods for efficiency in production. These changes may bring with it an environmentally hazardous effects or friendly effects.

³ UNEP, *Reference Manual for the Integrated Assessment of Trade-Related Policies*, United Nations, New York and Geneva, 2001, pp. 26-28.

However, from the above discussions it appears that the first two effects did not happen in the rice farming in Indonesia. The *scale effect* of a decrease in rice price is one of the effects that felt significantly because the local government has to find other sources of local government revenues. The *technology effect* which was expected to occur in the form of changes in technology due to changes in the use of chemical fertilizer to organic fertilizer, but in fact farmers even maintained the use of chemical fertilizers and very insignificantly supplementing them with the organic fertilizers. The *structural effects* occurred when farmers shift the use of agricultural lands to the non- agricultural uses such as selling the soil as raw materials for tiles making. In this case the land fertility declined and furthermore the growth of the tile industry demands more fire woods which may result in the rate of erosion and sedimentation in the canals resulted from the high rate of wood cutting.

An example is found in the village of Kebagoran, Central Java, where farmers dig their rice land for sale to tile factories. Although it has been practiced earlier in the neighboring villages, the decrease in the price of rice has encouraged farmers in the Kebagoran village to stop planting their lands with rice and sell the soil to the tile factories. The soil is dug for 1.00 metre deep and then the top 0.25 metre is left and poured back to the rice field and take the other 0.75 metre as raw material for tile production. The soil digging operation takes approximately six months and gives income as the rental cost of Rp 15,000,000 per Ha, which is 6 times higher than the net income when it were planted with rice. The farmers can not plant the rice for six months that is during the soil digging, but then they could plant back the field in the following seasons although at a lower productivity of rice. When they sell it this way, it is termed as *rental (sewa)*. When there is a land sold and dug for that purpose, the neighboring fields or lands will follow to be sold, otherwise the land will slide down. As a comparison, the price of a permanent sale of land for change in title is Rp 64,300,000 per Ha which is only about 5 times of the rental price. The cutting of trees as the sources of firewoods for the tile industries occurred in other villages of other kabupatens. So the negative impacts of the growing demands for firewoods is found in other regions. Very recently many places in Indonesia suffered from land sliding which caused many kills and other losses. The management of the upper region and forests have been very poor too.

In summary the *negative impacts* of the decrease in rice price together with the increase in fertilizers and pesticides prices can be listed as follows:

1. The incomes of rice farmers dropped down.
2. The terms of trade of rice especially to the non agricultural products become worse so it depress the standard of living of the rice farmers.
3. In the long run about 40 million people's lives are threatened by the decreasing activities of the rice farming. In the short run this effects do not appear very clearly yet. For how long the Indonesian rice farmers can stand?

4. Rice farmers will remain in the rice farming to maintain their minimum food security for their family.
5. Some farmers move out from the agricultural sector to obtain higher incomes by selling their lands to be converted to housing, roads, tiles raw materials, etc. It will decrease the land fertility and the environmental quality in general (*high rate of water run off*).
6. Some farmers move out from the agricultural sector to the non-agricultural sectors which tend to make more severe competition in the labor market.
7. The younger group of villagers prefer to work outside of the agricultural sector, besides the work is not attractive, so is the income from rice farming.
8. Since the Indonesian farmers are subsistence farmers they are forced to accept the low rice price and high input prices since they do not have any alternative skill and employment.

On the other sides, the *positive impacts* of the decrease in rice price together with the increase in fertilizers and pesticides prices can be listed as follows:

1. The price of rice as the main staple food of the Indonesian people becomes cheap and affordable by all segments of the society.
2. The poors are guaranteed to have low price of their staple foods.
3. The Government of Indonesia may reduce the deficit financing by reducing the government expenditures for fertilizers and pesticides subsidies.
4. The availability of rice in the market may contribute to the economic, social and political stability.
5. Some farmers attempt to substitute and supplement the chemical fertilizers with the organic fertilizers, so this will have positive impacts on the environment.

IV

VALUATION OF THE EFFECTS OF TRADE LIBERALIZATION

In this study so far it is still very difficult to disentangle the effects of AoA of WTO from the other policies' impacts on rice production in Indonesia. Before the application of AoA of WTO Indonesia has adopted policies to liberalized its rice trade and reducing subsidies for the agricultural inputs mainly (fertilizers and pesticides) so their prices increased. Therefore since it is assumed that the impact of trade liberalization will cause the price of rice to decline and the price of inputs also increase due to the removal of the subsidies, the impact of Aoa of the WTO will not different from the impacts of the decrease in rice price and the increase in fertilizers and pesticides prices.

1. Economic Costs of the Environmental Impacts

In the beginning of this study it was hypothesized that:

- a. The decrease in rice price together with the higher prices of fertilizers and pesticides will cause some farmers to reduce the use of their lands for rice production purposes that means reducing the use of fertilizers and pesticides. This hypothesis is rejected.
- b. With the low price of rice and high fertilizers and pesticides prices will cause farmers to use the same size of land, but reducing the use of chemical fertilizers and substitute them with organic fertilizers, so that it was expected that the environmental quality will be improved. This hypothesis is significantly rejected and therefore environment quality will remain the same.
- c. The decrease in rice price and the higher fertilizer and pesticides prices together will cause farmers to shift to other crops. This hypothesis is rejected too. Hence there is no effect on the environment.
- d. Farmers will move to other sectors employment due to the low rice price and high costs of fertilizers and pesticides. This hypothesis is not rejected. This will have significant effect on the environment.

Since the environmental impact is found only as the result of shifting in land use from agricultrue to non agriculture, then the valuation will involve the computation of costs and benefits of the deterioration in the land fertility. Productivity approach will be used to value the benefits and costs of the changes in land quality.

2. Economic Costs of the Social Impacts

With the decrease in rice price and the increase in fertilizers and pesticides prices together, the farmers incomes decline, more labors move out of the agricultural sector, and there is short of agricultural laborers in the rural sectors. Earning approach will be employed to value the social impacts of the decrease in rice price and the increase in fertilizers and pesticides prices.

(This section has not been completed and need more discussion. Hopefully the meeting in Geneva on the 19 – 20 of Febuary 2003 will be very helpful and enlightening.)

V

DEVELOPMENT OF POLICY RESPONSE

As we commonly understand the impact of a continuous application of the chemical fertilizers on rice lands to increase rice production is in the form of decreasing the land fertility in the long run; otherwise the rice production of Indonesia will be low at the present time whereas the demand for rice is very high. So there is a dilemma faced by the Indonesian government whether to keep high production of rice in the short run while sacrificing the land and environmental quality in the future or to achieve good environmental quality now and ever but lowering the production level of rice in the future.

Looking at the benefits and costs of the impacts of the decrease in rice price and the increase in fertilizer prices in the rice sector, the government of Indonesia should choose a policy that demands a big amount of subsidy to keep the price of rice low with the high importation of rice from abroad, and at the same time the subsistence rice sector should be supported or subsidized to adopt the organic fertilizers and not the modern chemical inputs for the sake of good environmental quality. The policy of course will require a strong government budget which at the current situation is still very weak due to the heavy foreign debt burden.

The result of the policy will be a cheap rice price for every individual in the country, and a good environmental quality due to the application of organic agricultural inputs, but followed with high level of subsidies coming from the government budget. Is it possible? The answer is yes, as long as the Government practices good taxation system which is efficient and just.

Hence Indonesia seems has to change her paradigm in meeting the food problems of the people. From the production side it looks so difficult to reach high level of rice production to meet the population demand. From the demand side, it appears that the per capita consumption of rice of the Indonesian people seems too high (120 kg/per capita). The Indonesian people should reduce their rice per capita consumption and substitutes it with other non-rice food stuffs such as cassava, corns, sweet potatoes, potatoes, wheats, sago, taro, banana, etc. Furthermore rice should become a luxury commodity, so people will appreciate it and reduce their rice consumption and waste. By so doing, the demand for rice will decrease and the importation of rice will decline too, and Indonesia can save the foreign exchange for further development and maintain the good environmental condition. This is the sustainable development.

It seems that the agricultural rice sector of Indonesia is dying even though rice farmers are struggling to survive in their own place. However, looking at the

experiences and the tendency found in the field, the impact of the WTO AoA on the rice farming in Indonesia will drive out farmers from rice production and push them out of the agricultural sector into other sectors which are promising to give them better lives. But they are not sure yet. Unless the government is determined to maintain the self sufficiency in food production, the government has to maintain a high price of rice but with high level of subsidies to agricultural sector.

It is necessary to mention that agricultural activities are mainly done in rural areas by small farmers. The average land ownership in Java is about 0.5 Ha per person. So the success of rural development will certainly create more equal income distribution, reduce the number of the poor, and will filter the uncontrolled urbanization. It is impossible to develop tidy and nice urban areas without giving intention for rural development. It is estimated that around 63% of total population live in rural areas with most of them work in agricultural sector. About 20 million households engage in rice production and most of them are small scale farmers.

Rice is labor intensive crop that absorbs significant number of laborers, and it has strong forward and backward linkages that encourage the development of other industries particularly in rural areas. It means that development of the rice sector has a great impact for agricultural development particularly and rural development generally.

Liberalization in rice sector could have both positive and negative welfare effects for the rural population and the poor. Liberalization means on the one hand as free trade and free import of rice which will mainly affect the price of rice, while on the other hand liberalization is meant as an abolition of import subsidies and other supports for agriculture that may cause a higher production costs for rice. If the price of rice declines and the cost of production increases, it will reduce farmer incentives for using new farm technologies, and will not give much attention to take care of the rice crops. Hence, as a result rice productivity per hectare and rice planting areas may decline. This should have impact to other industries, particularly to rice mill, rice trade and poultry industries as the consumers of bran as the side products produced by the rice mills. Some rice farmers might convert their wet land to dry land in order to be suitable for planting high value crops such as vegetables and fruits. However, to do the land conversion they need huge capital and of course they will need more farm credits. Unfortunately rural credit is one of the constraints for the farmers. Other difficulty is that a marketing channel of vegetables and fruits has not well developed yet as compared to rice. Probably the product market is closer to monopsony or oligopsony market form.

Another point to be considered is that the Government of Indonesia has invested a lot of the budget to build dams to manage water distribution during both the rainy season and the dry season. The dams are commonly used as multipurpose dams besides to be used for irrigating the rice fields, they are used as the source of drinking water and source of hydropower. A conversion from their use for rice production means a waste in the investment of them.

From the employment point of view, vegetable crops may need less labor as compared to rice crop, and may not have strong backward and forward linkages for rural development. Other rice farmers perhaps prefer to leave rural areas for a job in urban areas, that in turn may have impact to urban congestion. However, another group of rice farmers may still engage in rice cropping but with low incentives and incomes that in turn they should have impacts on their family welfare, household saving and investment; particularly the human investment.

VI

MAIN CONCLUSION AND WAY FORWARD

1. Rice is the main staple foods of Indonesian people
2. Rice still consume about 20% of the family budget
3. Rice production provides employment for 40 million people of Indonesia
4. Rice price has to be maintained stable.
5. Number of agricultural laborers is very limited relative to the demand for labor in agriculture, but still agriculture is not attractive sectors
6. Most farmers are in the old age group, the yougest farmer is about 35 years old
7. The government has to protect both sectors, the rice producers and the rice consumers
8. High rice price is needed to keep the rice sector remain exist for safety purposes
9. The government has to provide enough agricultural subsidy, credits, handling and marketing systems
10. Rice farmers think only for the short run because of their poverty conditon. What happen tomorrow will be faced and solved tomorrow.
11. To shift to other crops is very risky due to lack of knowledge and experience and safety of the farmers.
12. Fruit tree crops need a long gestation period and farmers can not afford it
13. Vegetable crops require good handling and marketing, but farmers can not have guarantee for the main food security
14. Rice farmers will always struggle to produce rice whatever happen to the rice sector, since they do not have any alternative opportunity.
15. Decrease in rice price does not change the practice of rice cultivation (constant rice area, constant use of fertilizers, constant use of pest control)
16. Increase in agricultural inputs prices will not change the application of those inputs in order to maintain the rice yield.
17. Decrease in rice price together with increase in agricultural input prices, will not decrease the applicaton of chemical fertilizer significantly, so the impacts on land fertility is also not significant.
18. The significant impacts seem to be on the application of pesticides. This is in fact has been influenced by the introduction of Integrated Pest Management system. The impact on the environment can be seen from the reappearance of birds, frogs, snails, fireflies, etc.

Table 1 The Structure of Farm Budget Before and After the Rise in Oil Prices as January 2nd 2003 (Rp/Ha)

No.	Items	Before Oil Price Rises (2002)		After Oil Price Rises (2003)	
		Rp 000	% *)	Rp 000	% *)
1	Gross Returns	6,663	100	7,551	100
2	Expenditures	5,292	79 (100)	6,476	86 (100)
-	Seeds	207	4	207	3
-	Urea fertilizer	259	5	259	4
-	SP-36 fertilizer	131	3	132	2
-	KCL fertilizer	65	1	65	1
-	Pestisides	160	3	210	3
-	Farm laborers	2,220	42	2,960	46
-	Tractors	281	5	350	5
-	Land rents	1,450	28	1,450	23
-	Taxes, Water fees, etc.	150	3	150	2
-	Interests for farm credits	369	7	694	11
3	Net income	1,371	21	1,075	14

Source: HKTI cited in *Kompas*, Saturday, 18 Januari, 2003, p. 23

Note: *) Blocked figures are percentage to the total gross income, while the light figures are percentage to the total costs of production.

**CHARACTERISTICS
OF
FARMER RESPONDENTS**

Distribution of respondents

This study involves 261 farmers distributed in 4 villages of 4 regencies (*kabupatens*) in Central Java and West Java. The names of the villages can be seen in Table A-1. Formerly it was planned to include one more village in *kabupaten* Jember, East Java., but due to a limited time the last kabupaten has not been visited and surveyed.

Table A-1 Distribution of Farmer Respondents according to the Selected Villages of Java, December 2002/January 2003

No.	Province/village	Respondents	
		Persons	%
	<u>Central Java province:</u>		
1	Pucangan village	68	26.1
2	Kebagoran village	42	16.1
	West Java province:		
3	Gegesik Wetan village	101	38.7
4	Panggangsari village	50	19.1
	Total	261	100.0

From Table A-1 it is seen that the number of respondents is the largest in the Gegesik Wetan village, because it was aimed by the researchers that the sampled farmers have to be rice or paddy farmers and it was found that most of farmers in the Gegesik Wetan village were really rice farmers. In contrast to other villages, some farmers were actually

planted other crops and not only planted paddy crop. However most of the respondents were paddy farmers and only a few planting other crops besides the paddy crops.

Table A-2 presented the average size of the operated lands by the farmer respondents, where more than 57% of the 261 farmers operated only less than 0.5 Ha of lands, and only about 12% of the farmers operated lands for more than 1.0 Ha. These figures indicate that most of the farmers are smallscale or poor farmers, because according to them the minimum size of land in order to be sufficient to support the subsistence family life is 1.5 Ha.

The above statement is supported by the irrigation types for the farmers' lands as appears in TableA-3, where only two out of 261 farmers' (1%) claimed that their lands were technically irrigated, whereas the rest 158 farmers' (61%) stated that their lands were semi technically irrigated and 101 farmers' (38%) mentioned that lands were rainfed. Since water is very dominant in determining the rice yield and cropping, therefore it will have certain effects on the total production of rice in the sample villages. Commonly the rainfed type of land can only be planted with paddy once a year during the rainy and with another secondary food crops such as sweet potatoes, cassava, soybeans, etc., during the dry season, while the semi irrigated lands can be planted with paddy for two times in a year and followed with fallow land or the secondary foodcrops. However, when lands were not given opportunity to rest as a fallow land, the threats of pests such as rats and hoppers are very high.

The life conditions of the farmers are agravated by the facts that most of them has more than 4 dependents in one family (57%) and only 47% out of 261 farmer respondents with three dependent or less. (See Table A-4). This high average number of dependents demands a larger size of lands to be operated by the farmers.

Actually the paddy farmers are matured enough in their field of work so that there is a guarantee of high level of paddy productivity for them. But due to a very small size of the land holdings or the operated lands, the income which comes from paddy crops only will not be sufficient to support the family life. Among the 261 farmers, 194 persons or 74% of them were over six years involved in paddy farming, 20% involved for 4 to 5 years, and the rest 6% involved only less than three years. (See Table A-5). These figures show that there are now very few young farmers because most of the farmers were already involved for more than 5 years. This fact is related to the results during the RRA where the youngest age of farmers in the village is 35 years old.

From the education point of view, Table A-6a presents figures that 227 out of the 261 farmer respondents (87%) received only elementary school educations, while the rest 5% received junior high school education, 7% received senior high school education, and only 1% received higher school education. The picture of education in the four village samples caused them to have very limited views on the alternative source of living. These education levels perhaps also the reason why farmers preferred to remain in the same paddy cropping rather than shifted to other crops.

Among the 261 farmers, 159 farmers or 61% of the total number of farmer respondents did never plant other crops except paddy, whereas the rest 17% of the total farmer respondents have ever changed crops for less than one year, 20% for less than two years but more than one year, and 2% for more than two years. This information may lead to a wrong conclusion because the change to other crops were not permanent, but only temporary, and finally many of them mixed their planting some areas for paddy and some others for non-paddy. (Table A-6b)

Reactions of Farmers to Changes in Rice Price and Agricultural Inputs

In relation to the decrease in rice price, only 2 or 0.7% of farmer respondents replied that they will reduce the size of land paddy crop, 5% of respondents will maintain the paddy area remains constant, but most of the respondents (90%) maintained the same size of paddy area and the same volumes of inputs. Only very small number of farmer respondents shifted to other crops, but then returned to paddy again. (See Table A-7).

The reactions of farmer respondents to changes in fertilizers and pesticides prices give almost the picture as their reaction to changes in rice prices. No farmer respondents would change their size areas for paddy, and only 4% of the farmer respondents shifted to other crops, but 48 out of 251 respondents (18%) maintained the same size of lands for the paddy crops although they reduced the application of the chemical fertilizers. From the total 261 farmer respondents, 204 farmers (78%) maintained both the same size of lands for paddy crop and the same volume of chemical inputs as well. (See Table A-8).

Concerning the understanding of the farmer respondents about the environmental quality, 38 out of the 261 farmers (14%) stated that they did not have any ideas whether the continuous application of chemical fertilizers on their lands had caused the land fertility declined in the long run; whereas 140 farmers (54%) stated that their land quality declined and the rest 83 farmers (32%) said that their land quality remained constant. (Table A-9)

Comparing the situation of before and after 1998, Table A10 presents data on the experience of farmers in relation to the negative impacts of pesticides used in the four sample villages. The number of farmer respondents who did not have negative impacts of the pesticides used increased from 148 farmers (57%) before 1998 to 163 farmers (63%) after 1998. This means that the application of pesticides perhaps decreased due to the application of Integrated Pest Management together with the higher prices of the pesticides. But the number of farmers that suffered from the negative impacts and spent for curing the sickness between Rp 20,000 to Rp 50,000 has increased in number from 58 farmers (8%) before 1998 to 58 farmers (22%) after 1998; and for the costs less than Rp 20,000 the number of farmers decreased from 91 farmers (35%) before 1998 to only 40 farmers (15%) after 1998. The changes figures for the last two groups perhaps also caused by the inflation rates in Indonesia.

Related to the reaction of farmer respondents to the environment quality, 56% of total farmer respondents are actually willing to pay for more agricultural input pices as long as they do not harm them; and the rest of the respondents, 41% were not willing and 3% did not have any ideas. (See Table A-11)

An indication that a quality of the environment in the agricultural sector is getting better compared with the situation before the trade liberalization (1998), is that 182 of the respondents (70%) said the flora and fauna condition is better now than before, 26% remains the same, and 4% did not have any ideas. (Table A-12)

Table A.2. Size of operated lands by farmers in selected villages of Java, December 2002/January 2003 (in Ha)

<u>Villages</u>	< 0.5	0.51 - 1.0	1.1 - 1.5	>1.6	Total
<u>Central Java</u>					
Pucangan	60	6	1	1	68
Kebagoran	40	-	1	1	42
<u>West Java</u>					
Gegesik Wetan	20	57	12	12	101
Panggung Sari	28	19	1	2	50
Total	148	82	15	16	261
	(57%)	(31%)	(6%)	(6%)	(100%)

Source: Primary data

Table A.3. Types of Irrigation of Agricultural Land in the Selected Villages of Java, December 2002/January 2003

Villages	Technical	Semi Technical	Rainfed	Total
Central Java				
Pucangan	2	9	57	68
Kebagoran	-	24	18	42
West Java				
Gegesik Wetan	-	86	15	101
Panggang Sari	-	39	11	50
Total	2	158	101	261
	1%	61%	38%	100%

Source: primary data

Table A.8. Action Taken by Farmers When Price of Agricultural Input Increase in the Selected Villages in Java December 2002/January 2003

Villages	Reduce Paddy Areal	Fixed Areas out Reduce Agricultural Inputs	Same Areas and Agricultural Inputs	Change to other Crops	Total
Central Java					
Pucangan	0	26	40	2	68
Kebagoran	0	3	39	0	42
West Java					
Gegesik Wetan	0	5	94	2	101
Panggang Sari	0	14	31	5	50
Total	0	48	204	9	261
	0	(18%)	(78 %)	(4 %)	(100 %)

Source: primary data

**Table A.9. Changes in Soil Quality due to Fertilizer used
in the Selected Village in Java December 2002/ January 2003**

Village	Constant	Decrease	No Idea	Total
<u>Central Java</u>				
Pucangan	22	36	10	68
Kebagoran	11	21	10	42
<u>West Java</u>				
Gegesik Wetan	36	53	12	101
Panggang Sari	14	30	6	50
Total	83	140	38	261
	(32%)	(54%)	(14%)	(100%)

Source : primary data

Table A.10. Medical Cost to cure the Pesticide Impact before 1998

Village	< 20.000		20.000 - 50.000		No		Total n
	Before	After	Before	After	Before	After	
Central Java							
Pucangan	13	10	3	5	52	53	68
Kebagoran	4	2	-	-	38	40	42
West Java							
Gegesik Wetan	57	16	14	40	30	45	101
Panggung Sari	17	12	5	13	28	25	50
Total	91	40	22	58	148	163	261
	(35%)	(15%)	(8%)	(22%)	(57%)	(31%)	(100%)

Source : primary data

Table A.11. Willingness to pay more the price of fertilizer, pesticides in order to avoid the negative impacts in using its

Villages	Yes	No	No idea	Total
Central Java				
Pucangan	45	23	-	68
Kebagoran	15	27	-	42
West Java				
Gegesik Wetan	56	43	2	101
Panggung Sari	30	14	6	50
Total	146	107	8	261
	56%	41%	3%	100%

Source: primary data

**Table A.12. Changes in Flora & Fauna to better of
in the latest five years**

Villages	Yes	No	No idea	Total
<u>Central Java</u>				
Pucangan	51	8	9	68
Kebagoran	33	9	-	42
<u>West Java</u>				
Gegesik Wetan	96	3	2	101
Panggang Sari	2	48	-	50
Total	182	68	11	261
	70%	26%	4%	100%

Source: primary data

**Table A.13. Average Cost of Agricultural Inputs in 4 Selected Village of Java
December 2002/January 2003
(Rp 1000/Ha)**

Villages	n	Total Land Size (Ha)	Average Land Size (Ha)	Seed	Chemical Fertilizer	Organic Fertilizer	Pesticides	Labor	Tractor	Average Total
<u>Central Java</u>										
Pucangan	68	19.6	0.29	122	416	82	37	944	144	1,745
Kebagoran	42	9.12	0.22	191	363	140	74	1,333	236	2,337
<u>West Java</u>										
Gegesik Wetan	101	97.29	0.96	91	501	0	140	1,154	217	2,104
Panggung Sari	50	34	0.68	117	576	0	243	1,520	350	2,456
Total	261	160.01	0.62	106	499	18	145	1,216	240	2,224
				(4,7%)	(23%)	(1%)	(6,5%)	(54,7%)	(10,7%)	(100%)

Source: primary data

Table A.14. Average Land Size and Use of Fertilizer per Ha in the Selected Villages of Java, December 2002/January 2003

Villages	n	Total Land Size	Average Land Size	Urea (Kg/Ha)	TSP (Kg/Ha)	NPK (Kg/Ha)	SP36 (Kg/Ha)	ZA (Kg/Ha)	KCL (Kg/Ha)
Central Java									
Pucangan	68	19.6	0.29	227.45	47	1.28	7.62	20.28	4.1
Kebagoran	42	9.12	0.22	200	42.3	0	22.73	0.54	10.5
West Java									
Gegesik Wetan	101	97.29	0.96	239	30.48	4.63	67	4.32	37.5
Panggang Sari	50	34	0.68	231.6	1.5	8	72.8	94.85	32.35
Total	261	160.01	0.62	233.8	26.97	4.67	58.45	25.3	30.78

Source: primary data

**Table A.7. Action Taken by Farmers When Rice Price Declines
in the Selected Villages in Java December 2002/January 2003**

Villages	Reduce Paddy Areal	Fixed Areas out Reduce Agricultural Inputs	Same Areas and Agricultural Inputs	Change to other Crops	Total
<u>Central Java</u>					
Pucangan	1	5	55	7	68
Kebagoran	0	3	39	0	42
<u>West Java</u>					
Gegesik Wetan	1	3	96	1	101
Panggung Sari	0	3	46	1	50
Total	2	14	236	9	261
	(0,7%)	(5%)	(90%)	(3%)	(100%)

Source: primary data