THE EFFECT OF MANDATORY SNI ON FERTILIZER TO THE PRODUCTION OF PRIMARY CROP PLANTS

THESIS

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ABSTRACT

The Effect of Mandatory SNI on Fertilizer to
the Production of Primary Crop Plants

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Keywords : Mandatory SNI on fertilizer, primary crop plants, data panel, qualitative and descriptive statistics, national food self-sufficiency program.

Indonesia has enhanced many of its institution frameworks, regulations and laws in order to inline WTO *codes of good practice*, where standardization is one of the prerequisites to it. Since 2002, Government of Indonesia through Ministry of Industry of Trade has enacted Decree's No. 140/MPP/Kep/3/2002 in order to raise success of agribusiness that inline with sustainable environment and enhance customer protection. It is expected that with this Decree the success of agribusiness can be seen from the increase in the agriculture production, especially primary crop plants.

The research objectives for this thesis are to see if the implementation of mandatory SNI on fertilizer can increase the production of the primary crop plants, also to see any implementation effect to fertilizer's producer and all the import's stakeholders. Modified Cobb-Douglas production function with data panel regression is used to measure the impact of mandatory SNI on fertilizer to production of the primary crop plants quantitatively. Qualitative and descriptive statistics approaches are used to measure any implementation effect of that SNI.

First part of the conclusion shows that, although small, there is a positive effect on the primary crop plants production after the implementation of Mandatory SNI on fertilizer. This finding is enhanced

with the fact from qualitative findings, that it seems the implementation of Mandatory SNI on fertilizer has little/no effect to the fact that the use of minimum standards somehow restricts trade more than what tariff did, with many findings supports the fact that the possibility that this standard give negative effect as technical barrier to trade is small.

Secondly, from fertilizer's producer perspective, the implementation of the Mandatory SNI on fertilizer gives them many benefits compare with the relatively small cost of comply to that SNI. Although Indonesian Customs and law enforcement gain significance advantages with this SNI's implementation, importers have to bear additional cost in order to have the right using SNI Label.

Overall results conclude that although the implementation of Mandatory SNI on fertilizer appears to have positive effects in increasing production and productivity of the primary crop plants, Indonesia critically needs a large, significant increase in primary crop plants' production and productivity if the target of national food self-sufficiency program (Ketahanan Pangan Nasional) becomes reality.

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Last but not least, I believe that this research is still imperfect. Therefore, suggestions and critics are welcome to enhance this research.

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Bona Kusuma

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INTRODUCTION

I.1 Research Background

A fast, inevitable growth in regional economic cooperation among countries in the world such as ASEAN Free Trade Area (AFTA), Asia Pacific Economic Cooperation (APEC) and World Trade Organization (WTO) has created a multilateral trade system; ensuring principles of free, fair, non discrimination trade come to existence in the world of globalization. The international flow of goods and services transaction between countries will enhanced significantly with this system, so local market around the world also become more open with imported goods and services.

Since its establishment at 1994, WTO required member countries to improving their institutional frameworks along with regulations and laws so their national regulations can be inline with WTO's rules, requirements and standards. Indonesia as one of the member had applied many changes in its regulations, laws, and institutions so they can inline with WTO *codes of good practice*.

On of the changes that Indonesia had done, specifically at the standardization as the prerequisites for the WTO *codes of good practice* are the establishment of the National Standardization Agency of Indonesia with the Presidential Decree No. 13/1997 and its revision with the Presidential Decree No. 166/2000 with several amendments, last by the Presidential Decree No. 103/2001. One of this Agency mission is to protect consumers, labors, and society from the security, safety, health and environment perspectives, based on Government Regulation No. 102/2000 regarding with National Standardization.

This establishment of Standardization frameworks and regulations hopefully can support Indonesia's market and production at the globalization process, correcting information asymmetries between buyers and sellers and domestic market can enjoy imported goods with appropriate standards' level.

As one of the agricultural country in the world, Indonesia's Gross Domestic Product (at current market prices) for agricultural sector increasing from around 100 billion rupiahs at 1997 to almost 370 million rupiahs in 2005, with around 12% contribution to the national gross domestic product at 2005[1]. However, once a country that capable to provide it's main staple for its people, rice, at year 1984 all from local production, Indonesia has become one of the main importer of rice in the world today. The rate of growth for primary crop plants (consists of paddy and palawija crops: maize, soybeans, peanuts, mungbeans, cassava and sweet potatoes) in Indonesia was not sufficient enough to provide all Indonesian people with local, affordable staple food as the basic needs. Periods of 2000's gives bigger challenges for Indonesia to reducing import dependence of rice and secondary foods compare to the 80's, but nevertheless the tasks must be done in this WTO's era.

One of the main variables that contribute to the primary foods production is the use of fertilizers. Until 1979, almost all of the fertilizer consumption for agriculture sector was still imported. Government of Indonesia (GOI) at New Era with the first five year development plan (1956-1961) was determined to build the first urea plant as one of the important elements for increasing primary crop plants production. PT PUSRI (urea plant), was inaugurated on 4th July 1964 with a capacity of 100.000 metric ton/year of urea and 59.400 metric ton/year of ammonia[2]. Since that time GOI has build fertilizer plants throughout the country to fulfill the fertilizer demand.

As an important part of developing agriculture sector in Indonesia, local fertilizer consumption increased five-fold from 1975 to 1990 but increased only slightly in the following years when the Government reduced fertilizer subsidies, resulting in increased prices. In 1999, fertilizer consumption dropped after farmers balked at the higher prices of fertilizers caused by the complete lifting of fertilizer subsidies beginning in December 1998. Fertilizer consumption began to recover in 2000, and has since increased when the Government reestablished fertilizer subsidies in March 2001.

With a total of 33.5 million hectares of land under cultivation, Indonesia requires at least eight million tons of fertilizer of various types

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[1] Agricultural statistics 2005, Ministry of Agriculture
[2] Indonesian fertilizer industry, part II

every year. Urea has been the main fertilizer used by farmers in Indonesia, although compound fertilizer (NPK) has been shown to improve rice productivity by 1.5 to 3 tons per hectare. Farmer's fanaticism to urea fertilizers are natural due to the significant increase in primary crop plants production from 70's to 90's. The country's urea production in 2002 reached 6.3 million tons per year, while demand from the agricultural sector reached only four million tons the same year. Currently, installed annual capacity of Indonesian urea factories has reached seven million tons, while capacity for SP-36 and ammonium sulfate (ZA) totals 1.6 million tons per year. This capacity is more than enough to fulfill domestic demand, which is around 4.5 - 5 million tons a year.

The country's production of compound fertilizer solid Nitrogen-Phosphate-Potassium (NPK) was estimated at 150,000 tons per year in 2002, far below the domestic capacity of 300,000 tons per year. Domestic demand is estimated at around 400,000 tons per year.

To meet domestic demand for compound fertilizer, Indonesia has imported NPK and other mineral or chemical fertilizer containing two fertilizer elements. According to the Central Bureau of Statistics (BPS, by its Indonesian acronym) data, import of NPK in 2002 reached 200,742 tons, worth $32.9 million, while imports of other mineral or chemical fertilizer containing two fertilizer elements were recorded at 242,728 tons, worth $30.9 million.

In addition to that, in 1998, right after all single-chemical nutrient fertilizer subsidize was lifted, there were emerged cheaper, local product of compound fertilizer, such as SP27, SP 30, SP Banteng, Doupos, Agro 88, NPK Jempol, NPK cap Tawon, NPK cap Kuda, NPK Tano, Pupuk Tablet Coklat, Agro casio, Kascing, etc. Initially, farmers gave positive response to these new products, mainly because lower prize, but after using those for one harvested period they didn't want to use those new fertilizers anymore since they didn't make the productivity increase.

From the import side, the increasing use of compound fertilizers had led to the falsification of data on the contents of the imported fertilizer products, which seriously harmed farmers and fertilizer producers. In addition to that, not only compound fertilizer package that has been imported with substandard quality, but also other fertilizers, such as Potassium Chloride (KCl), that is types of fertilizer that until now Indonesia unable to produce it, and also Superphospates-36 (SP-36), since it's appearance almost the same with plain phosphates fertilizer, so the customs officers at the border cannot distinguished it without proper examination at the laboratory. To protect the farmers and the producers, especially farmers so that they can get high quality fertilizer and at the end can increase their production of primary crop plants, the Ministry of Industry and Trade issued Decree No. 140/MPP/Kep/3/2002 that requires 15 types of fertilizer products to meet the quality and standard specified in the Indonesian National Standard (SNI) as a mandatory. The 15 compound fertilizers include Ammonium Sulfate (ZA), Super Phosphate 36 (SP-36), Potassium Chloride (KCl) and solid NPK products.

It is a necessary step after 5 years to see the impact of fertilizer standardization in increasing farmer's production of primary crop plants. Also, monitoring how the impact of fertilizer standards from the fertilizer's industry perspectives, agriculture industry, farmer's behavior in proper using of the chemical fertilizer and decreasing the illegal/under quality import of fertilizer is imperative as tools for enhance the Indonesia's fertilizer standards in the future.

I.2 Research Objectives:

Main objectives of this thesis research are to analyze the impact of standardization for several types of fertilizer with the Ministry of Industry and Trade Decree's No. 140/MPP/Kep/3/2002, from several perspectives, which are:

1. Whether the implementation of mandatory SNI on fertilizer can increase the production of primary crop plants as mandated by that SNI; therefore gives positive effect to the farmers of those commodities.
2. To measure the implementation effect of mandatory SNI on fertilizer to the producer side and import side.

I.3 Research Hypothesis

Through quantitative analysis method mentions in the later part of this chapter, this research tries to prove the hypothesis that after the implementation of the mandatory SNI on fertilizer in 2002, there is positive effect to the production of the primary crop plants, empirically.

I.4 Research Coverage

This thesis focus on primary crop plants which are paddy, maize, soybeans, peanuts, mungbeans, cassava and sweet potatoes, are based on the facts that despite the importance status as the main staples for Indonesian people (especially for paddy, maize and peanuts), importation of those products tends to increase. Insufficient domestic production of the primary crops plants to fulfill demand of the main staples for Indonesian people will weaken national food self sufficiency and can endanger national stability.

Period of 1997-2006 are the chosen time period for this thesis due to the facts that the Indonesian 1997-1998 Crisis made the importation of the primary crop plants increased significantly. That crisis also forced Government of Indonesia (GOI) to stop subsidy on chemical fertilizer, therefore increased fertilizer prize and eventually made the use of fertilizer decreased.

Ammonium Sulfate (ZA), Super Phosphate 36 (SP-36), Potassium Chloride (KCl) and solid Nitrogen-Phosphate-Potassium (NPK) are four out of fifteen fertilizers included in the Ministry of Industry and Trade Decree's No. 140/MPP/Kep/3/2002 that are chosen as focus of this thesis research. ZA fertilizer is the first fertilizer used by Indonesian farmers since 50's, so trends of usage for this fertilizer, especially after the implementation of the Mandatory SNI on fertilizer can give useful information for the thesis analysis. SP-36 is equally important for this thesis analysis, since this type of fertilizer is a substitute for Triple Super Phosphate (TSP) fertilizer and contained phosphor, one of the main macro nutrients needed to reach maximum production of the primary crop plants. Until now Indonesia is not yet capable to produce KCl fertilizer domestically, while this fertilizer contained Potassium, also as one of the main macro nutrients needed to reach maximum production of the primary crop plants. In addition, this fertilizer also used as one of the essential material to produced NPK fertilizer, so the quality, volume and effects of this fertilizer gives needed information for the analysis of this thesis. NPK fertilizer is a compound fertilizer, contained all macro nutrients needed to reach maximum production of the primary crop plants. So, usage, quality and trend of this fertilizer use also give important effects after implementation of the Mandatory SNI on fertilizer, which are also important for this thesis analysis.

I.5 Research Methodology

Seven agricultural products: paddy, maize, soybeans, peanuts, mungbeans, cassava and sweet potatoes productions are analyzed quantitatively with the Modified Cobb-Douglas production function approach, where mandatory SNI on fertilizer become dummy variable to see whether it affect overall production from 1997-2006. Estimation of the model was done through weighted fixed effect regression model using longitudinal/panel data set.

Qualitative analysis and Descriptive statistics also performed to see the effects of SNI implementation from the producer side and import side.

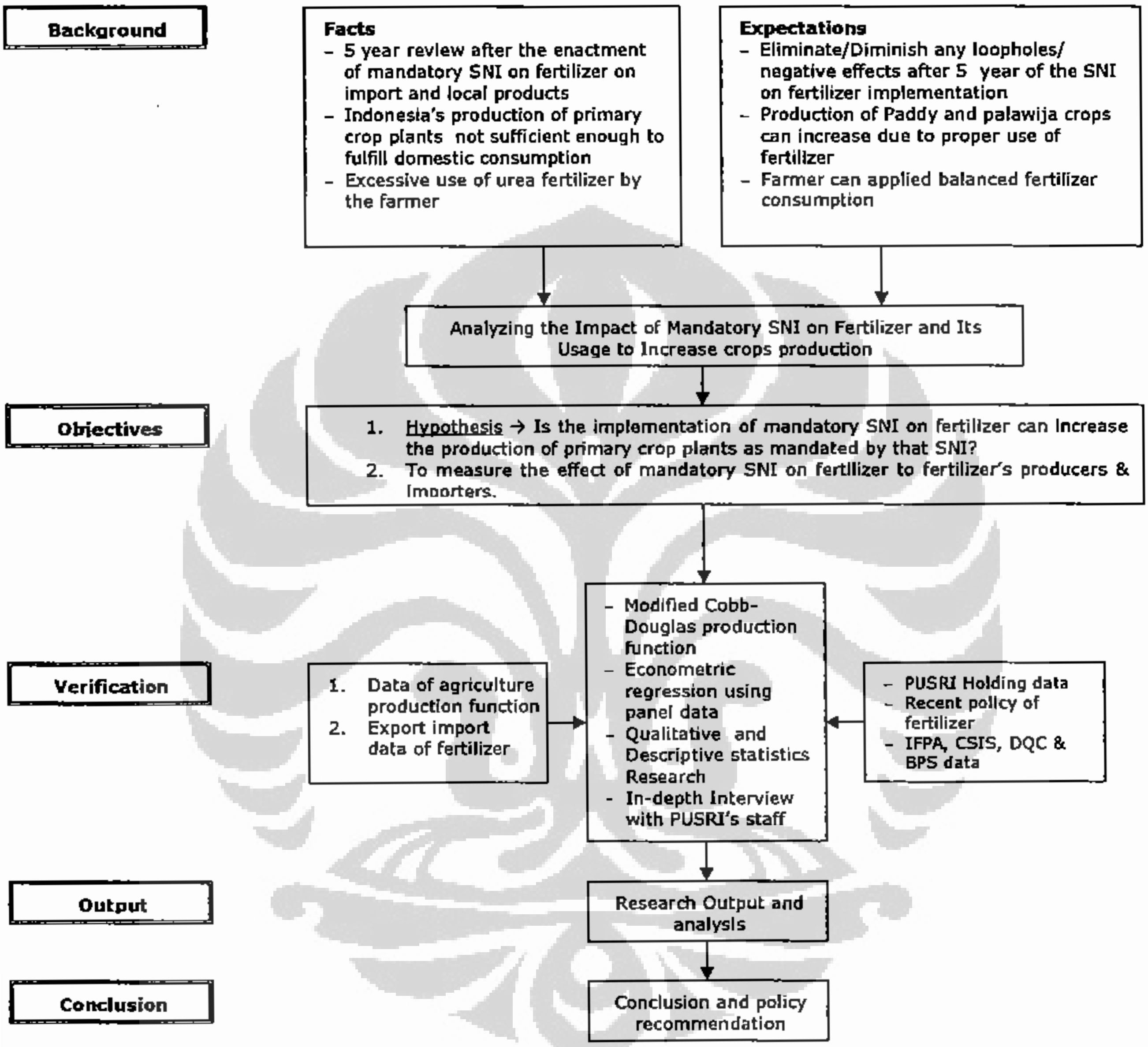
In-depth Interview is necessary to conduct to get insight information about effects of the implementation of Mandatory SNI on Fertilizer.

I.6 Data and Resources:

Data used for constructing the Modified Cobb-Douglas production function is the determinants of agricultural production, mainly taken from the Ministry of Agriculture and Central Bureau of Statistics (BPS). Agriculture and fertilizer data's are obtained from PUSRI Holding, Indonesian Fertilizer Producers' Association (IFPA), Directorate of Quality Control (DQC), Ministry of Trade, Centre for Strategic and International Studies (CSIS), and library research to construct qualitative analysis. Fertilizer data for export-import covers 10 years data from 1997 to 2006, with HS number 3104.20.00.00 (Potassium Chloride/KCl/Muriate of Potash/MOP), 3103.10.00.00 (Super Phosphat-36), 3105.20.00.00 (Solid NPK) and 3102.21.00.00 (Ammonium Sulfate/ZA).

I.7 Conceptual Framework

Here described the conceptual framework for the outline of this thesis, as follows:



CHAPTER II

STANDARDS AS A NON-TARIFF BARRIER IN TRADE FOR AGRICULTURAL'S SUPPORTING PRODUCTS

II.1 Different Conceptions of Non Tariff Barrier (NTB)

Hillman (1991) defines NTBs as "Any governmental device or practice other than a tariff which directly impedes the entry of imports into a country and which discriminates against imports, but does not apply with equal force on domestic production or distribution." Thornsbury et al. (1999) endorse this concept. Their definition includes standards of identity, measure, and quality, SPS measures, and packaging measures.

Roberts (1998) and Thornbury (1998) have classified regulations by policy instrument, by scope of the barrier, by regulatory goal, by legal discipline, by type of market restriction, by product category, and by geographical region. Such a classification helps to identify differences in food safety and quality standards among counties that could have protectionist tendencies.

However, distinguishing an NTB from a legitimate regulation for protecting consumers can be difficult. That is why other authors emphasize that the term "barrier" should not be applied to measures that may have an incidental effect of restricting trade but whose principal objective is to correct market inefficiencies. On the basis of a definition of NTBs given by Baldwin (1970), who restricted the concept to measures that decrease world global revenue, trade-restricting regulations that have overall positive welfare effects should not be considered NTBs. Mahé's (1997) definition of an NTB as a restriction other than a tariff that leads to a decrease in world welfare falls into this category. The idea of qualifying as protectionist a standard that differs from the one that would be chosen by a world-welfare-maximizing social planner also relies on the same idea. Other authors suggest using cost-benefit criteria to decide whether regulations that affect trade are legitimate.

A third definition of NTBs relies on the idea that a regulatory measure should be compared to the measure that would have been implemented if it had been designed for domestic purposes only (Maskus, Wilson, and

Otsuki 2001). Fisher and Serra (2000), for example, characterize a standard (in an open economy) as non-protectionist if it corresponds to the standard that the social planer would use if all firms were domestic. This makes it possible to account for the welfare-enhancing effect of a standard in the presence of negative externalities.

II.2 WTO Agreements in Non Tariff Barriers (NTB)

In order to ensure technical regulations, standards, and conformity assessment procedures are prepared, adopted and applied in a 'trade friendly' manner and not making justifiable discrimination against imported goods, WTO design a previously used schema since the GATT's era, which are the agreements on Non-Tariff Barrier. This measure taken by WTO since technical regulations/standards effect are not clearly seen like tariff did, but they also gives significant effect to the welfare of the nations. With these agreements, standard development process among its member countries can become more transparent and also promote the use of WTO's main principle's pillar: national treatment and non discrimination, in addition with the use of approved, sound science as the standards framework.

Basically, these agreements try to encourage the adoption of measures of specific principles in the application of standards and prevent discrimination between members when identical or similar conditions prevail, and reduce restrictions to the international trade. These agreements also promote measures based on international guidelines and common risk assessment techniques, encourage standards based on broad base principles participation and consensus and provide a mechanism for addressing issues related to developing country capacity to meet compliance costs.

Among all of WTO's agreement, the Agreement on Sanitary and Phytosanitary (SPS) Agreement and the Agreement on Technical Barriers to Trade (TBT Agreement) are the focus of this thesis research, due to their arrangement that are related to agriculture sector, especially those that related to the minimum quality standard for agriculture supporting products. The main difference on these two agreements lies at their scopes of agreement.

The SPS Agreement arranged principles for all members of WTO in making regulations that are 'necessary' to protect human, animal, and plant life or health from certain specific risks. Scope of these measures is usually as follows:

- additives in food or drink
- contaminants in food or drink
- toxic substances in food or drink
- residues of veterinary drugs or pesticides in food or drink
- certification: food safety, animal or plant health
- processing methods with implications for food safety
- labeling requirements directly related to food safety
- plant/animal quarantine
- declaring areas free from pests or disease
- preventing disease or pests spreading to or in a country
- other sanitary requirements for imports (e.g. imported pallets used to transport animals)

While The TBT Agreement scope includes technical requirements, voluntary standards and the procedures to ensure that these are met (called conformity assessment procedures). All of this scope that is not included with certain measures already included at the SPS agreement. TBT measures could cover any subject, from regulation to ship and ship equipment, to the shape of food packages. Pharmaceutical restrictions and the labeling of cigarettes are examples of TBT measures pertaining to human health. Scope of TBT measures typically deal with:

- labeling of composition or quality of food, drink and drugs
- quality requirements for fresh food
- volume, shape and appearance of packaging
- packaging and labeling for dangerous chemicals and toxic substances, pesticides and fertilizer
- regulations for ships and ship equipment
- etc.

Most measures related to human disease control are under the TBT Agreement, unless they concern food safety or diseases which are carried by plants or animals (such as rabies). In terms of food, labeling requirements dealing with nutrition claims, quality and packaging regulations are not considered to be SPS measures and hence are normally subject to the TBT Agreement. However, labeling requirements dealing with food safety are considered to be SPS measures.

The WTO Agreements relating with the procedures flow of SPS and TBT measures are similar in many ways. Both agreements recognize the rights of WTO member countries to establish technical regulations and to apply those regulations to imported products and acknowledge that right by laying down rules governing the development and application of such regulations, using a certain number of similar provisions. For the most part, the coverage of these two agreements is almost the same.

II.3 Definition of Standard

Definition taken from the NPES standards Bluebook, 2005, said that Standards are documented consensus agreements containing safety or technical specifications or other precise criteria to be used consistently as rules, guidelines, or definitions of characteristics for materials, products, processes and services.

David and Greenstein (1990), Swann (1990), distinguish standards from where they're made. De *facto* standards are standards that emerge from a competitive market process, where competing industries creates competing standards of their products to give the best gains for their customers, so customers will choose their products. *Institutional* Standards are standards that are produced by the coordinated efforts of standards setting bodies, mainly from the local government in order to overcome market failure and to make sure the health, safety, quality and environment protection are put in the highest priority.

In a similar way, there are wide accepted definitions of standards which are divided in two categories, mandatory standards and voluntary standards. Standards are mandatory if they are set by governments in the form of regulation by imposing technical requirements, testing, certification and labeling producers on imported, also domestic goods. Voluntary standards arise from a formal coordinated process in which key participants in a market or sector seek consensus, pretty much like *de facto* standard.

According to Swann (2000) based on the economic effect proposed by David (1987), standard can be divided into four categories:

a. **Compatibility / Interface Standards** are standards that help to expand market opportunities because they help to increase network effects (or externalities). These are the benefits companies get from being part of a large network of users. There are two broad categories of network externality: *direct* and *indirect*. Direct network externalities gives individuals/companies advantages/ benefits from the size of that network (such as becoming a subscriber to a telephone network depends on the number of the total subscriber that network had, more subscriber means better utilization of that network).

   Indirect advantages/benefits could be obtained from the "after sales" services network offered by companies (be it a good service network of competitive supply of spare parts for customers who have a common model of car, for example). In a race to seize the market dominance, *de facto* standards created not from the best technology from the perspective of technological performance (David, 1985; Grindley, 1992, 1995), but from the one that has been most effective and building a wide network of followers, and of support products from third party producers (e.g. software) that conforms to his standard. This "industry standard" may not be standard in the formal sense. They are not defined by committee, but rather are proprietary designs that win a position of market dominance.

b. **Minimum Quality / Safety Standards** are standards measure to overcome market failure. It eliminates/reduces information asymmetries between buyers and sellers. If the standard defines the product in a way that reduces buyer uncertainty, then first the risk to the buyer is reduced, and second there is less need for the buyer to spend time and money evaluating the product before purchase. As Blois, 1990; Hudson and Jones, 1997, 2000c; Jones and Hudson, 1996 stated, minimum quality/safety standards can be used to reduce *transaction costs* and *search costs*.

In order to overcome "Gresham's law", a proposition from Gresham that "bad drives out good" in the absence of the minimum quality standards, it may not be necessary to make these minimum quality standards becoming "public". But they must be co-operatively defined and certified to ensure that all remnants of Gresham's Law are overcome.

c. **Variety Reduction standards** performs two different functions. First, it seeks to exploit economies of scale by minimizing the wasteful proliferation of minimally differentiated models. So for example, high street stores stock suits in a limited range of standard sizes to exploit economies of scale. This may involve a certain compromise for some "non-standard" customers, and it is always possible to by a "perfect fit" in Saville Row, but at a price. The trade-off operating here is between choice and price.

   Second functions of this standard, however, held an even more important role for variety reduction, and this operates to the benefit of the producer as much as for the customer. In the formative stages of a market for a new technology, standards can play an important role in achieving focus and cohesion amongst the pioneers (Moore, 1991). Swann and Watts (2000) argue that some technologies get locked into a pre-paradigmatic stage because suppliers and users are too dispersed and there is no focus or critical mass in developing a market for that technology. The variety-reducing standard can help to achieve that focus, and hence help the market to take off. Standards play a role as a rallying post.

d. **Information/Measurement Standards** are usually treated as a distinct category from the above, but for many purposes it is sufficient to treat these as a hybrid of the above three categories. Take the example of different grades of petrol: four-star, unleaded, and super-unleaded. These are standards of product description that also offer the other three features. Most motorists are confident that one type of four-star is *compatible* with another, and so can fill up at a Shell garage one week and BP the next. Equally, these grades satisfy certain quality standards. And of course there are major economies of scale in distribution from the limited range of petrol grades.

II.4 Benefits of Standard

One of the important aim of standardization that definitely served as one of the standard's benefits is to help create a strong, open, and well-organized technological infrastructure that will serve as a foundation for innovation-led growth (Swann, 2000). The foundation itself will likely constraint some of the innovation activities that is questionable for promotes growth, but not for the subsequent innovation.

These infrastructure of standardization, in return will give positive effect on dissemination of innovation potential and on international trade, which are a precondition for international economic growth.

From the macroeconomics point of view (on companies, consumers & government) implementation of standards can build up a fairer competition in market, whereas companies' profit will likely reduce, but customers will get better product at the market. Standard that accepted in internationally will increases volume of trade, increasing imports as well as exports, and makes an important contribution to macroeconomic growth.

Standardization can lead to a lower transaction costs in the economic as a whole, as well to savings for individual business.

Possible hazards caused by substandard/wide range of standard products that can harm human's health, safety, quality reducing impacts and environmental condition can be reduced by implementing proper standards for such products.

Even if such standards make the cost to comply with them become higher, increased in profits can still be achieve (Jones and Hudson, 1996) because when those standards certifies certain product as safe, have good quality, preserve the environment and healthy those are compatible with complementary inputs such as the power supply, etc.; such certification can raise consumer demand for the imports (cf. Akerlof, 1970).

II.5 Negative effects of Standard

The general aim of the WTO Technical Barriers to Trade (TBT) and Sanitary and Phytosanitary (SPS) Agreements is to ensure that mandatory and voluntary standard, as well as testing and certification procedures, do not create unnecessary obstacles to international trade. However, it is recognized that countries have the right to establish protection, at levels they consider appropriate, for example for human, animal or plant life or for health or environment protection.

Mandatory standards imposed by governments at the border can produce serious distortions in commercial markets. For example, domestic regulatory systems may restrain trade and limit market entry through environmental, health, or safety mandates not based on international norms. These requirements may also be discriminatory within the context of WTO disciplines, including commitments undertaken by WTO members in the Agreement on Technical Barriers to Trade (TBT) or the Agreement on the Application of Sanitary and Phytosanitary Standards (SPS).

On the other hand they cause *compliance costs* because firms may need to adapt product design, re-organize production systems, incur re-labeling costs and face the costs of multiple testing and certification. This condition especially disfavored for foreign firms and importer firms in domestic market, trying to compete with similar domestic goods. It is more likely that the cost of complying with local standards will likely be higher for foreign firms compare with domestic firms. This will possibly raise entry barriers (higher up-front cost) or diminish the ability to compete (higher marginal costs).

The cost of conformity assessment or meeting the precise technical regulations can make additional barrier satisfy the requirements of the mandatory standards. Even tough exporting firms have already performed standard tests at their country with their public authorities of standard bodies; government at the importing countries may refuse to recognize those tests. They may require performing their own inspection at exporter's firm in their countries or adding additional inspection of the importer's goods shipment.

Other potential negative effects can arise from the different capacities between developing and developed countries (Stephenson, 1997; Wilson, 1995). Since it is most likely that the capacities of the developing countries for effective certifications and accreditation of testing facilities are behind the developed countries, developing countries will face difficulties to develop adequate standards and reach Mutual Recognition Agreement (MRA). Moreover, their trade to the developed countries will reduce due to their inability to comply with developed countries standards, thus the inequality between developed and developing countries getting wider and bigger.

II.6 Economic Effects of Standards Measures

Standards gives a better quality, efficiency of industries and provide the same footage level for import-export trade flows, in a sense that now traders and buyers have a better confidence for goods they're buying or selling because their expectation for those goods are now have a certain guarantee, provided by certain standards. Stephenson (1997) however, describes that standards can act both as trade facilitation and as barrier. That barrier may arise if, let say, imported goods from the country which that importer/factory of that goods hasn't met the standards required by the importing country, may impede the trade because additional cost to bear for each inspection at the customs border will make the flow of that goods reduced. This failure of meeting other country's standard definitely can lead standards to become as a barrier to trade.

According to Roberts (1999), standards as technical barrier to trade that may give impact to trade activities are divided into three mechanisms that gives different positive and negative effects; regulatory protection effects, supply shift effect, and demand shift effect.

In order to comply with technical requirements, additional costs are inevitable and give the regulatory protection effect. Mandatory standards works similar like tariff, giving the fact that a regulation gives some rents to the domestic sector. There are differences between these technical barriers, since standards don't provide income to the government like tariff does, and that loss is bear by the customers in form of deadweight loss. Therefore, the introduction of new technical regulation/standard and the effects from the international trade will create price difference, bear by the consumer.

Supply shift effect gives benefits to the overall welfare due to impact changes in imports from technical barrier to trade on the domestic supply offset by compliance cost for implementing the technical regulation. Benefits of standards example are the lower price applied to certain goods after comply with health, quality and environment protection standards are fulfill.

From the perspective of the consumers, increased available information on new regulations and goods can raise their demand for those analyzed goods. This is the demand shift benefits, among others. Other benefit happens when the introduction of standards improves transparency and reduces the cost of acquiring of information. The information can be related to quality (that the imported product meets a particular standard) or to geographical origin (which gives consumers additional knowledge about expected characteristics). Information asymmetry between consumer and producer will reduced because of that effect, treated the standards as public goods. Substitution elasticity will increase and more competitive market will emerge because of the increased similarity between products, arise from implementation of the regulations. Higher welfare, partially offsets by protectionist nature of regulations is the results of demand shift effects.

CHAPTER III

FERTILIZER INDUSTRY AND POLICY IN INDONESIA

III.1 Role of Fertilizer in Agriculture Production

Essential Nutrients needed for primary crop plants grows and harvests to their optimum capacity are: Carbon (C), Hydrogen (H), Oxygen (O), Nitrogen (N), Phosphor (P), Potassium (K), Sulfur (S), Calcium (Ca), Magnesium (Mg), Zinc (Zn), Cuprum (Cu), Boron (B) and Molybdenum (Mo)[3]. First three nutrients, C, H and O can be obtained by the plants through the air and water. Nutrients needed by plants in large quantities consecutively are Nitrogen (N), Phosphates (P), and Potassium (K), also known as macro primary nutrients elements and Sulfur (S), Calcium (Ca), Magnesium (Mg) also known as macro secondary nutrients elements. The need of Boron (B), Chloride (Cl), Cuprum (Cu), Ferro (Fe), Magnesium (Mg), Molybdenum (Mo) and Zinc (Zn) as micro nutrients elements for the plants is negligible, but the absence of these element's could have bad influence on plant's growing process.

N Nutrients are available from the urea fertilizer (N=46%), P nutrients can be obtained in form of TSP fertilizer (P_2O_5=46%) or SP-36 fertilizer (P_2O_5=36%) and K nutrients are available in the form of KCl Fertilizer (K_2O=60%)

Nitrogen contained in urea fertilizer has certain substance that is very important in photosynthesis process. These nutrients also beneficial for accelerating the growth rate of plants and adding more protein contained in those plants. Lacking N nutrients will make plants become pale, growth rate will reduce dramatically and make the plants shrink and color of leaves will become yellowish. Also, N nutrients deficiency will affect at the immature growth of fruits.

Phosphates (P_2O_5) contained fertilizers have benefit for the plant's root to absorbed more nutrients from the soil. These fertilizers also helped increase plants resistance from pest attacks and contagious diseases, also makes all the plant's point of growth gets more productive. If plants lacking phosphor, the plant's root will not grow to the fullest potential,

[3] IFPA's Book of Indonesia Fertilizer Industry, pg. 121-124.

fruits development will become bad, less beans produced and flowers blossoms will reduced.

Fertilizers with Potassium (K_2O) nutrients have advantageous effect in making the process of photosynthesis become more effective and efficient, faster plants' initial stage growth rate, increase the strength of the plant's trunk, decreasing the risk of increasing lay down rate of the plants, decreasing plant's chance to rot while in transport stage and put into storage, adding plant's resistance to pest attacks, contagious diseases and drought, also improved the flowers and fruits' quality. Insufficient amount of Potassium will make fruits' rate of falling decreased, plants become easy to breaks and falls, also will make shrink plants and slower growth of plants will likely to happen.

Intensive agricultural projects need a large quantity of nutrient available at the right time. In the case of an optimal intensification program, nutrients are required by the plants must be readily available in the soil. This fertilization technique is known as **"balanced fertilization".**

Based on national workshop on "Balanced Fertilization", organized by Indonesian Fertilizer Producer's Association (IFPA), Ministry of Industry and Trade and Ministry of Agriculture in Jakarta on 25th June 2002, balanced fertilization is defined as the addition of fertilizer into the soil with the amount and type of nutrient in the right proportion with the fertility of the soil and the need of nutrient by the plants to increase the quality and production of agricultural commodities.

This technique is proven to plays an important role at increasing productivity and quality of the agricultural commodities. Although other factors, such as draught or pest investing organism detrimental to the plants also contributes as negative factors for increasing productivity and quality of the agricultural commodities, fertilization is a factor that human can fully, control it, right from time of seeding. Unbalanced and unspecific location fertilization contributes to the decrease in Indonesia's agricultural production and quality and endangering national food self sufficiency.

Balanced fertilization could be done by using several types of single fertilizer simply which is blended (simple blending) or mixed through a mechanical blending technology (chemical blending), known as compound fertilizer with a specific formula.

III.2 Indonesia's Fertilizer Industry

Indonesia's fertilizer industry has begun since the 50's; where in the first Five Years Development Year (Repelita I) GOI has decided to build the first fertilizer plant[4]. This plan based on urgent need for Indonesia's primary crop plants production to increase significantly, so Indonesian demand for staples/primary foods can be fulfilled. The first Fertilizer plan in Indonesia, named Pabrik Pupuk Sriwidjaja (PUSRI) was inaugurated on the 4th July 1964, with total capacity of 100.000 metric ton/year of urea and 59.400 metric ton/year of ammonia production.

As shown in Table III.1, total of single-chemical nutrient fertilizer production in Indonesia since 2000 has reached a sufficient level to covered fertilizer demand in agricultural sector, especially primary crop plants. Total capacity for urea production reached 8 million ton/year at 2006, with average of capacity growth around 1.09%/year (1995-2006). While for TSP/SP-36, ZA and NPK, average of capacity growth since 1995 to 2006 remains the same. Total capacity for TSP/SP-36 reached 1 million ton/year, for ZA 0.65 million ton/year and for the compound fertilizer, NPK which produced by PT Petrokimia Gresik (PKG), has reached 0.30 million/year at year 2006. Total of compound fertilizer production are shown in table III.2, where only NPK Phonska produced chemically, with a share of 21% of all locally produced NPK.

Urea consumption for agriculture sector grows at average of 0.99%/year from 1995-2006, while TSP/SP-36 consumption for agriculture sector decrease at average growth of 1.57%/year from 1995-2006. A positive growth achieved by ZA and NPK fertilizers consumption from 1996-2006, with average of 1.37%/year and 102.16%/year respectively.

[4] IFPA's Book of Indonesia Fertilizer Industry, pg. 9.

Table III.1 Production Capacity of Single-Chemical Nutrient Fertilizer (000 ton)								
Producer	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Urea:								
PT Pusri	2,280	2,280	2,280	2,280	2,280	2,280	2,280	2,280
PT PKT	2,280	2,280	2,850	2,850	2,850	2,850	2,850	2,850
PT PKG	462	462	462	462	462	462	462	462
PT PKC	570	570	570	570	570	570	1,140	1,140
PT PIM	570	570	570	570	570	1,140	1,140	1,140
PT AAF	570	570	570	570	-	-	-	-
Total	**6,732**	**6,732**	**7,302**	**7,302**	**6,732**	**7,302**	**7,872**	**7,872**
SP-36:								
PT PKG	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
ZA:								
PT PKG	650	650	650	650	650	650	650	650

Source: PT Pusri (Holding)
PKT = Pupuk Kalimantan Timur
PKG = Petrokimia Gresik
PKC = Pupuk Kujang Cikampek
PIM = Pupuk Iskandar Muda
AAF = ASEAN Aceh Fertilizer

Table III.3 shows Indonesia's fertilizer consumption compares with its production from 2000-2006. Production of urea reach 5.66 million ton with a negative growth production of 0.67%/year from 1995-2006. The same trends occur with the production of TSP/SP-36, which reach 0.65 million ton at 2006, also with negative growth production of 2.61%/year from 1995-2006. Different trends occur at ZA and NPK production and their growth, with 0.64 million ton and 0.41 million ton of their production, respectively; while their production growth shows positive trends, each reach average growth of 0.65%/year and 53.87%/year from 1995-2006, respectively.

Table III.2 Production Capacity of Compound Fertilizer year 2006 (ton)					
No	**Producer**	**Location**	**Type**	**Capacity/yr**	**Process Making**
State Own Company					
1	**PT PKG**	Gresik	Phonska	300,000	Chemical Process
			NPK Kebomas	100,000	Blending & Granulation
2	**PT PKT**	Kaltim	Pelangi	200,000	Mechanical Blending
3	**PT PKC**	Cikampek	NPK Kujang	186,500	Mechanical Blending
	Sub Total			**786,500**	
Private Own Company					
4	**PT Sentana Adidaya Pratama**	Riau	NPK Mahkota	300,000	Fusion Blend Granulation
5	**PT Agri Indomas**	Palembang	Bunga Raya Mrh	120,000	Fusion Blend Granulation
6	**PT Kertopaten Kencana**	Surabaya	Tawon	60,000	Mechanical Blending
7	**PT Saprotan**	Semarang		60,000	Mechanical Blending
8	**PT Saribumi Dewata Lestari**	Bandung	PMLT Suburlin	12,000	Mechanical Blending
9	**PT Polowijo Gosari**	Gresik	PLLT Pallet	12,000	Mechanical Blending
10	**PT Saraswati Anugrah Makmur**	Gresik	PMLT Planta	10,000	Mechanical Blending
11	**PT Agro Subur Bumi Lestari**	Bandung	PML Agro	5,000	Mechanical Blending
12	**PT Indoagro Makmur Jaya**	Jakarta	PML Diamond	5,000	Mechanical Blending
13	**PT Pasir Maung Fertilizer**	Bogor	PMLT-PMF	5,000	Mechanical Blending
14	**PT Pukati Bahana Agro Politan**	Gorontalo		50,000	Mechanical Blending
15	**Other Producer**	---	----	6,000	---
	Sub Total			**645,000**	
	TOTAL			**1,431,500**	

Source: PT Pusri (Holding)

Table III.3 Production and Agriculture Consumption of Fertilizer (000 ton)								
Fertilizer		2000	2001	2002	2003	2004	2005	2006
Urea	Production	6,320	5,321	6,068	5,720	5,669	5,870	5,663
	Consumption	3,543	3,857	3,792	3,911	4,211	4,013	3,972
SP-36	Production	520	654	563	688	738	820	649
	Consumption	589	654	527	803	794	798	711
ZA	Production	544	539	465	479	683	762	636
	Consumption	507	470	391	604	635	593	601
NPK	Production	30	56	115	202	265	413	700
	Consumption	20	35	75	110	190	262	400

Source: PT Pusri (Holding)

The production component for producing fertilizer is the use of natural gas, with a share out of total urea's production cost is as much as 40-50%. Therefore, real price of fertilizer is depends heavily from the price of natural gas as one of the input factors to produce fertilizer. Availability also plays important role, since maximal utilization of the fertilizer plants also depends heavily on the natural gas stock/reserve for fertilizer production. As seen in Table III.4, low utilization, even ASEAN Aceh Fertilizer plants' shut down since 2004 caused by low reserve on national natural gas to support fertilizer industry.

Table III.4
Utilization of the Fertilizer Production Capacity (%)

Producer	2000	2001	2002	2003	2004	2005	2006
Urea:							
PT Pusri	84.42	87.95	89.15	90.06	90.08	89.73	90.14
PT PKT	98.14	92.35	73.05	70.99	79.73	93.51	77.72
PT PKG	73.90	67.77	49.98	56.32	74.54	88.50	72.81
PT PKC	99.02	95.49	93.81	102.81	92.44	87.86	74.70
PT PIM	116.53	38.66	102.81	86.14	58.82	21.87	17.98
PT AAF	102.99	23.23	105.55	53.61	—	—	—
average	**95.83**	**67.58**	**85.73**	**76.66**	**79.12**	**76.29**	**66.67**
TSP/SP-36							
PT PKG	51.96	65.39	55.30	68.77	73.82	81.97	64.89
ZA							
PT PKG	83.68	82.91	71.56	73.74	105.01	117.19	97.92
NPK (Phonska							
PT PKG	10.07	18.73	21.90	37.98	67.41	92.99	137.55

Source: PT Pusri (Holding)

III.3 Fertilizer as Strategic Product in Indonesia's Agriculture Production

Fertilizer is one of the main production factors in agriculture sectors, especially for primary crop plants production. Together with the good seed provided at the plant season for these plants, and a good treatment of irrigation during the growing stage, these factors give significant affect to increasing production and productivity of the primary crop plants. GOI gives great attention to make sure that the quality of the fertilizer is maintained at the best level, so it can gives significant impact to Indonesia's agriculture policy, particularly with national food self-sufficiency (Ketahanan Pangan Nasional) policy. Therefore, GOI always put high priority to make a conducive, comprehensive and supportive atmosphere in fertilizer policy, so that farmers, especially small ones can get fertilizers they needs easily with low price and good standards.

National food self-sufficiency plays an important part in national resilience against international interests. Countries that have high dependency on importation of their main food/staple will have higher chance to get into food crisis. As a strategic commodity of almost all nations in the world, nations will suffer great cost of economy, politics and social, if they cannot guarantee the stability of main food staple supply and stock for their people. Food security concerns with the problems of availability, stability of stocks, accessibility and capability.

GOI has established strategy to make sure the fertilizers needed by farmers is available from 1979 to 1998, in term of exact price, exact time, exact types, exact amounts, exact location and exact quality of standards ("prinsip enam tepat"). In addition, GOI put strict guidelines to fertilizer producers to put highest priorities in securing fertilizer demand, before they can export their fertilizer that is not consumed by local demand, also by established the same retail price of fertilizer for agriculture sector throughout Indonesia's domain.

With the increase demand of fertilizer use to support higher primary crop plants production, many substandard quality of compound fertilizer (NPK) has emerged, whether from import of locally produced. To ensure that fertilizer used by Indonesian farmers meets with proper quality, GOI through Minister of Industry and Trade had issued Decree No. 140/MPP/Kep/3/2002 regarding with Mandatory SNI on Fertilizer. This Decree's goals are to provide farmer with proper quality of fertilizers, so that they can achieve higher productivity, with the attention to the environmental preservation, and to achieve fairer competition in fertilizer industry and trade.

III.4 Implementation of Mandatory SNI on Fertilizer

As written in the Government Regulations No. 102/2000 regarding with the National standardization, national standardization aims at enhancing consumer, business actors, labor and other groups of society protection, especially for health, security, safety or environmental preservation. National standardization also aims at helping international trade flows and also to achieve a healthy competition environment in trade.

Ministry of Industry and Trade has issued Ministerial Decree No. 140/MPP/Kep/3/2002 regarding with Mandatory SNI on Fertilizer, with the aims to raise success of agribusiness that inline with sustainable environment and enhance customer protection. Table III.5 shows the list of fertilizers that include in that Decree. Since this fertilizer SNI is mandatory by Government Regulation, it is categorized as an institutional Standard, where this standard's type is the results from coordinated efforts of standards setting bodies (David and Greenstein, 1990; Swann, 1990).

Table III.5
List of fertilizers included in Ministry of Industry and Trade Decree No. 140/MPP/Kep/3/2002

NO.	FERTILIZER TYPES	NO. SNI
1	Triple Super Phosphate (TSP) fertilizer	SNI 02-0086-1992
2	Ammonium Sulfate (ZA) fertilizer	SNI 02-1760-1990
3	Ammonium Chloride fertilizer	SNI 02-2581-1992
4	Triple Super Phosphate Plus-Zn fertilizer	SNI 02-2800-1992
5	Solid NPK fertilizer	SNI 02-2803-1992
6	Dolomite fertilizer	SNI 02-2804-1992
7	Potassium Chloride (KCl) fertilizer	SNI 02-2805-1992
8	Mono Ammonium Phosphate (MAP) fertilizer	SNI 02-2810-1992
9	Urea Ammonium Phosphate (UAP) fertilizer	SNI 02-2811-1992
10	Diamonium Phosphate (DAP) fertilizer	SNI 02-2858-1992
11	Super Phosphate 36 (SP-36) fertilizer	SNI 02-3769-1995
12	Natural Phosphate fertilizer for agriculture	SNI 02-3776-1995
13	SP-36 Plus Zn fertilizer	SNI 02-4873-1998
14	Amino Acid Processing Residue fertilizer	SNI 02-4958-1999
15	Boric fertilizer	SNI 02-4959-1999

Source: Ministry of Industry and Trade Decree's No. 140/MPP/Kep/3/2002

After issued Decree No. 140/MPP/Kep/3/2002 regarding with Mandatory SNI on Fertilizer, Ministry of Industry and Trade issued Decree No. 635/MPP/Kep/9/2002 regarding with Appointing Laboratories/testing facilities for Fertilizer Testing. There are twenty four Laboratories /testing facilities listed in this Decree. Any types of fertilizers that are included in mandatory SNI on fertilizer's list have to conduct test for quality control by appointed Laboratories /testing facilities listed in Ministry of Industry and Trade issued Decree No. 635/MPP/Kep/9/2002. After the implementation of this mandatory SNI on fertilizer, there are improvements in several types of fertilizer standard, so those specific SNI are updated with the new one. However, the urgency to also update the Ministry of Industry & Trade Decress's No. 140/MPP/Kep/3/2002 is not right away, since only minor change applied to these new SNI from the old one. Table III.6 gives the list of the latest SNI revision.

Table III.6
List of Revised SNI on Fertilizer from Ministry of Industry and Trade Decree No. 140/MPP/Kep/3/2002

NO.	FERTILIZER TYPES	SNI OLD	SNI NEW
1.	Triple Super Phosphate (TSP) fertilizer	SNI 02-0086-1992	SNI 02-0086-2005
2.	Ammonium Sulfate (ZA) fertilizer	SNI 02-1760-1990	SNI 02-1760-2005
3.	Ammonium Chloride fertilizer	SNI 02-2581-1992	SNI 02-2581-2005
4.	Triple Super Phosphate Plus-Zn fertilizer	SNI 02-2800-1992	SNI 02-2800-2005
5.	Dolomite fertilizer	SNI 02-2804-1992	SNI 02-2804-2005
6.	Potassium Chloride (KCl) fertilizer	SNI 02-2805-1992	SNI 02-2805-2005
7.	Mono Ammonium Phosphate (MAP) fertilizer	SNI 02-2810-1992	SNI 02-2810-2005
8.	Urea Ammonium Phosphate (UAP) fertilizer	SNI 02-2811-1992	SNI 02-2811-2005
9.	Diamonium Phosphate (DAP) fertilizer	SNI 02-2858-1992	SNI 02-2858-2005
10.	Super Phosphate 36 (SP-36) fertilizer	SNI 02-3769-1995	SNI 02-3769-2005
11.	Natural Phosphate fertilizer for agriculture	SNI 02-3776-1995	SNI 02-3776-2005

As for four types of fertilizers that are analyzed in this thesis, the SNI stated that the minimum requirement of each type of fertilizers is as follows:

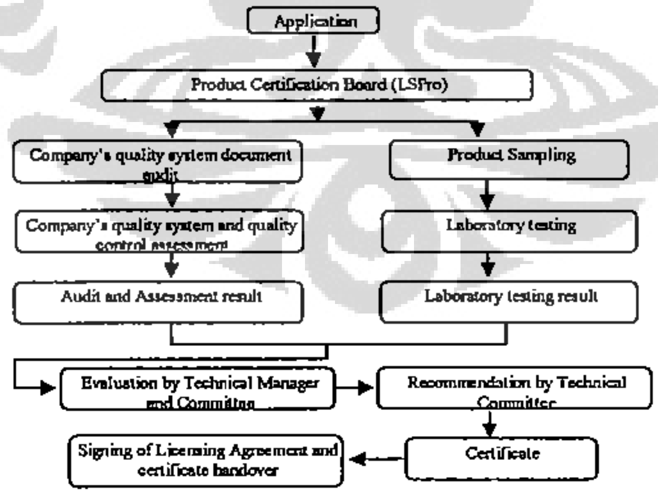
- ZA fertilizer, for it's nutrient content must have minimum of 21% of Nitrogen and 24% of Sulfur;
- SP-36 fertilizer, for it's nutrient content must have minimum of 36% of Phosphates, and 5% of Sulfur;
- KCl fertilizer, for it's nutrient content must have minimum of 60% of Potash 35% of Chloride;
- As for NPK fertilizer, there are several types of fertilizer with different nutrient content. For Example, NPK (12-12-17-2) fertilizer contains of several nutrients, which are; 12% of Nitrogen, 12% of Phosphates, 17% of Potash and 2% of Magnesium. Number behind the 'NPK' gives information of each type of nutrients contain in that fertilizer, started from Nitrogen, Phosphates, Potash and Magnesium (if only 3 numbers behind it, then there is no Magnesium contained in it).

It is important to maintain an effective system on registration, verification and monitoring process related with the implementation of the SNI so the purpose of each specific mandatory SNI can be reached in a maximum, effective ways. Related to all Minister of Industry and Trade's Decrees concerning with the SNI, on November 2002 Minister of Industry and Trade has issued Decree 753/MPP/Kep/11/2002 regarding with Standardization and Monitoring of The Indonesian National Standard (SNI). This Decree arranged mechanism of quality control for domestic and imported goods that have SNI. This Decree regulate about the quality control mechanism, where mandatory every product distributed in domestic market that the application of SNI already mandatory must put SNI label on the products. This decree also regulate about the obligation for importers of SNI products must have Product Registration Certificate (SPB - *Surat Pendaftaran Barang*) and Product Registration Number (NPB - *Nomor Pendaftaran Barang*) in order to pass the Customs procedures and distributed in domestic market, with the purpose is to control the quality of imported goods that distributed in domestic market.

This Decree also arranged labeling procedures for SNI traded goods in domestic market, where the SNI traded goods must have SNI label on the package, with the purpose giving information for consumers that the products already comply with minimum standards of SNI. A complete SNI certification scheme can be seen in figure III.1.

To Acquire the SNI label for the product, domestic producers and foreign supplier, usually represented by Indonesian importers, (for this case, fertilizer importers) that want to sell the imported fertilizer in domestic market must register their product to the product certification Board (LS-Pro - *Lembaga Sertifikasi Produk*). Then, the company or the factory will be assess by assessors from LS-Pro or foreign Product Certification Board that have a Mutual Recognition Agreement (MRA) with Indonesia, which already accredited and authorized by National Accreditation Committee (KAN - *Komite Akreditasi Nasional*) to as the process of issuing Certificate of Conformity (CoC). The assessors will perform overall performance on the quality system of the factory and the quality of the product. The assessment of the factory quality system done with field auditing on production process division or the critical point of production with the standards of system of SNI 19-9001-2001 or ISO 9001:2000, while evaluation of the product quality done by taking the product sample from the factory and the foreign market for imported fertilizer, to test at the laboratory to confirm that the product has fulfill the requirement of the mandatory SNI.

Figure III.1
SNI Certification Scheme



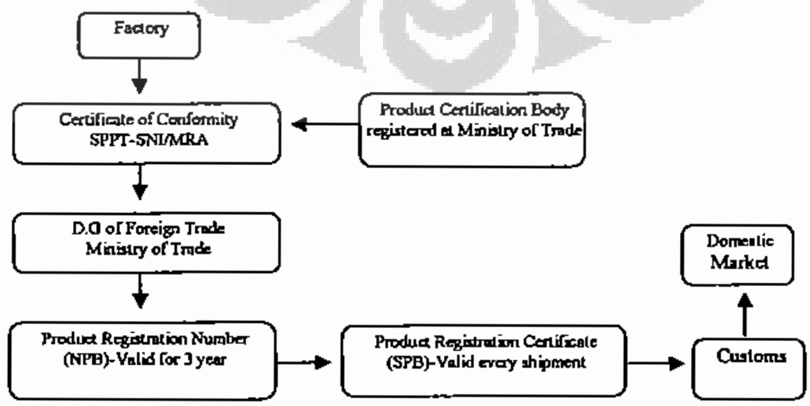
Having passed the certification process, the product is now become certified SPPT-SNI and have the right to using SNI label (SPPT-SNI -

Sertifikat produk Pengguna Tanda SNI) on the products. The use of SNI label will be evaluate every year to make sure the consistency of factory quality system and product quality with surveillance by auditors. The time period for the SPPT-SNI and SNI label is 3 year and can be extend as requested.

Every time fertilizer importers (or any importers who want to import SNI requirements goods) want to enter Indonesia's market, they must fulfill some requirements of importation. One of the requirements regarding to the application of SNI is that they has to have what so call Product Registration Certificate/SPB that include on the Product Registration Number/NRP. The importers must have SPB as to fulfill conditions for Customs administration inspection in every shipment. According to the regulation the registration of SPB is free of charge.

As seen in Figure III.2, importer should submit application letter to Director General of Foreign Trade chq Director for Quality Control (Director of PPMB --> *Direktur Pengawasan dan Pengendalian Mutu Barang*) in order to acquire Product Registration Certificate/SPB. Several mandatory requirements such as Importers Identification Numbers, SPPT-SNI or Certificate of Conformity, Bill of Lading, Invoice and packing list, etc., should accompany that letter for verification process. Importer then will receive a registration receipt. In maximum of 10 day of working day Director of PPMB will issue SPB if the application meets the administrative requirement or issue rejection letter if the application fail to meet the requirement.

Figure III.2
Quality Control of Mandatory SNI Product



CHAPTER IV

THEORETICAL FRAMEWORK FOR MODIFIED COBB-DOUGLAS PRODUCTION FUNCTION

IV.1 Cobb-Douglas Production Function Framework

In Microeconomics, a production function asserts that the maximum output of a technologically—determined production process is a mathematical functions of input factors of production[5]. Alternatively, a production function can be defined as the specification of the minimum input requirements needed to produce designated quantities of output, given available technology.

There are several ways of specifying the production function. In a general mathematical form, a production function can be expressed as:

$Q = f(X_1, X_2, X_3, \ldots, X_n)$

where:

Q = quantity of output

$X_1, X_2, X_3, \ldots, X_n$ = factor inputs (such as capital, labor, land or raw materials). This general form does not encompass joint production, which is a production process, which has multiple co-products or outputs.

One way of specifying a production function is simply as a table of discrete outputs and input combinations, and not as a formula or equation at all. Using an equation usually implies continual variation of output with minute variation in inputs, which is simply not realistic. Fixed ratios of factors, as in the case of laborers and their tools, might imply that only discrete input combinations, and therefore, discrete maximum outputs, are of practical interest.

Other formulation is as a linear function:

$Q = a + bX_1 + cX_2 + dX_3, \ldots$

where a, b, c, and d are parameters that are determined empirically.

One of the infamous production functions which used at this research is a Cobb-Douglas production function (multiplicative):

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[5] Wikipedia online database

$$Q = aX_1^{b}X_2^{c}$$

This production function first introduced by an American economist Paul Douglas (1892-1976) and mathematician Charles W. Cobb, where Q is output, *a, b & c* are constants and X_1 & X_2 are Labor and Capital, respectively. They constructed this production function to approximate the output of American manufacturing from 1899 to 1922 as a function of the average number of employed wage earners and the value of fixed capital goods, reduced to dollars of constant purchasing power (Cobb and Douglas 1928).

As Fertilizer is long considered as one of the important traditional input for agriculture production, many researcher mentioned later in this chapter were elaborate on Cobb-Douglas production function and its derivation to measure level of production and productivity in agriculture sector. They tried to see comprehensively, whether fertilizer can significantly contribute to increase production and productivity of agriculture's commodity.

IV.2 Previous Study on Agriculture Production and Productivity

Study assessing the contribution various effects of the traditional agriculture production determinants (land, fertilizer, livestock and tractor) is done intensively over the past five decades. This situation is not surprising, due to the critical importance of providing main staple to people all over the world, especially at the Least Developing Countries (LDC). Colin Clark (1940), in his pioneering study Conditions of Economic Progress, first examined productivities per unit of land area and per unit of labor over time and across countries. Almost three decades later Hayami (1969) and Hayami and Inagi (1969) revived interests in cross-country time series analysis of land and labor productivity in agriculture. Trueblood and Ruttan (1995), involved estimation of cross country production functions and multifactor productivity as their subsequent research.

Kawagoe et al. (1985), using data with Cobb-Douglas framework for 1960, 1970 and 1980 in 21 developed countries (DCs) and 22 LDCs, estimated cross-country production functions with dummy variables for

1970 and 1980, with the Cobb-Douglas production specification. They found technological regression during both decades for the LDCs, but technological progress in the DCs, also inline with constant return to scale for LDCs and increasing return to scale in developed countries. Kawagoe and Hayami (1985) found similar results in that data sets, where the results indicated that internal factor endowments (land and livestock), technical inputs (machinery and fertilizer) and human capital would account for approximately one fourth of the productivity gap between the developing and developed world, using an indirect production function. Lau and Yotopoulos results also showed negative productivity for LDCs during the 1970s, but an increase during the 1960s.

Assessing the productivity performance of the agricultural sector in Indonesia has been difficult due to data deficiencies, but significant improvements in agricultural input and output measurement have recently been provided by van der Eng (1996). In particular, van der Eng provides new and improved estimates of agricultural cropland in Indonesia.

These estimates differ markedly from the agricultural land use provided by FAO, which has been the primary source of data used in previous assessments of productivity growth in Indonesia (see, for example, Mundlak et al., 2002; Suhariyanto, 2001). In addition, previous assessment of agricultural growth have sometimes used changes in agricultural value-added rather than changes in output quantities, which confounds the effect of prices and quantity changes in growth measurement.

IV.3 Model Specification and Limitation

Since Cobb-Douglas production function is widely use with the agricultural economic research, then following the work of Aryal (2003), this thesis model research using a widely used Cobb-Douglas production as follows:

$$Y_{it} = A \prod X_{it}^{\alpha_{xit}} + \varepsilon_{it}$$

Where, Y_{it} = Production of paddy across region i over year t

X_{it} = Factors of production

α_{it} = Share of demand of factor use

ε_{it} = Disturbances across region i over year t

Taking log both sides the above function can be written as,

$$\ln Y_{it} = \alpha_0 + \alpha_{ft} \ln F + \alpha_{st} \ln S + \alpha_{it} \ln I + \alpha_{ic} \ln C + \alpha_{lt} \ln L + \varepsilon_{it}$$

Where, F = Fertilizer
S = Seeds
I = Irrigation
C = Credit
L = Labour

Since macroeconomic data for Indonesia's national agriculture production variables are not all available, a modification of this Cobb-Douglas production function is inevitable. Aggregate data on production of seeds is not available on national level, while data on credit is available aggregately, this research omit the use of this variable due to the fact that data on specific credit to specific commodities of primary crop plants (paddy, maize, soybeans, peanuts, mungbeans, cassava and sweet potatoes) are not available.

The same bias also occurred with the labor data, since the available aggregate labor data at national level is the total of people who worked at agriculture sector, which include people worked outside the primary crop plants. However, due to the importance significance of this variable, where as we know, without human variable it is impossible to produced anything, then this research forced to still used this variable, with the possible negative effect to the result of the estimation.

The modified Cobb-Douglas production function to measure Indonesia's aggregate production for seven commodities of primary crop plants after the implementation of the mandatory SNI on fertilizer is as follows:

$$\text{Ln PRODUCTION} = c_0 + c_1 \text{ Ln HARVESTED} + c_2 \text{ Ln LABOR} + c_3 \text{ Ln BUFFALO} + c_4 \text{ Ln UREA} + c_5 \text{ Ln NON UREA} + c_6 \text{ D\_SNI} + \varepsilon_n$$

Where:

PRODUCTION	=	Total production of each seven commodities, in Metric Ton.
HARVESTED	=	Total of the joined irrigated, semi irrigated, rain fed land for each seven commodities, in Hectare (Ha).
LABOR	=	Total of labor worked in agriculture sector, in person.
BUFFALO	=	Total buffalo in agriculture sector, in heads.
UREA	=	Proxy of total urea fertilizer used for each seven commodities, in Metric Ton.
NON-UREA	=	Proxy of total of ZA, KCl, SP-36 & NPK fertilizer used for each seven commodities, in Metric Ton.
D_SNI	=	Dummy SNI, with value=1 after one year the enactment of mandatory SNI on fertilizers in 2002.
ε_n	=	Error term.

Four additional variables are added in this modified Cobb-Douglas production function, which are BUFFALO, UREA, NON_UREA and D_SNI variables.

BUFFALO variable represents total buffalo in agriculture sector, where adding this variable to this model is seen as a necessary option to compensate the absence of credit as a variable. This variable is chosen instead of other technological-supporting factor, such as tractor, due to the fact that data on other variable is scarce and incomplete. However, this variable also has the same drawbacks like LABOR variable, since the data availability only exists at national level, not at each seven commodities of primary crop plants.

UREA and NON_UREA variable are the expanded form of the fertilizer variable used in Aryal (2003) to capture different effect of urea fertilizer and four fertilizers (ZA, SP-36, KCl and NPK fertilizers) included in the mandatory SNI on fertilizer. While this variables also have the same drawbacks as labor and buffalo variables, extrapolation methods can be used to make better prediction with this model. Prediction of UREA and NON_UREA use at each primary crop plants are results of total HARVESTED area of each commodity's share (in percentage) multiply with the total national consumption of the specific fertilizer use in the specific year.

D_SNI variable is a dummy variable to control change after the implementation of the Mandatory SNI on Fertilizer to measure any effect on the production increase/decrease of the primary crop plants.

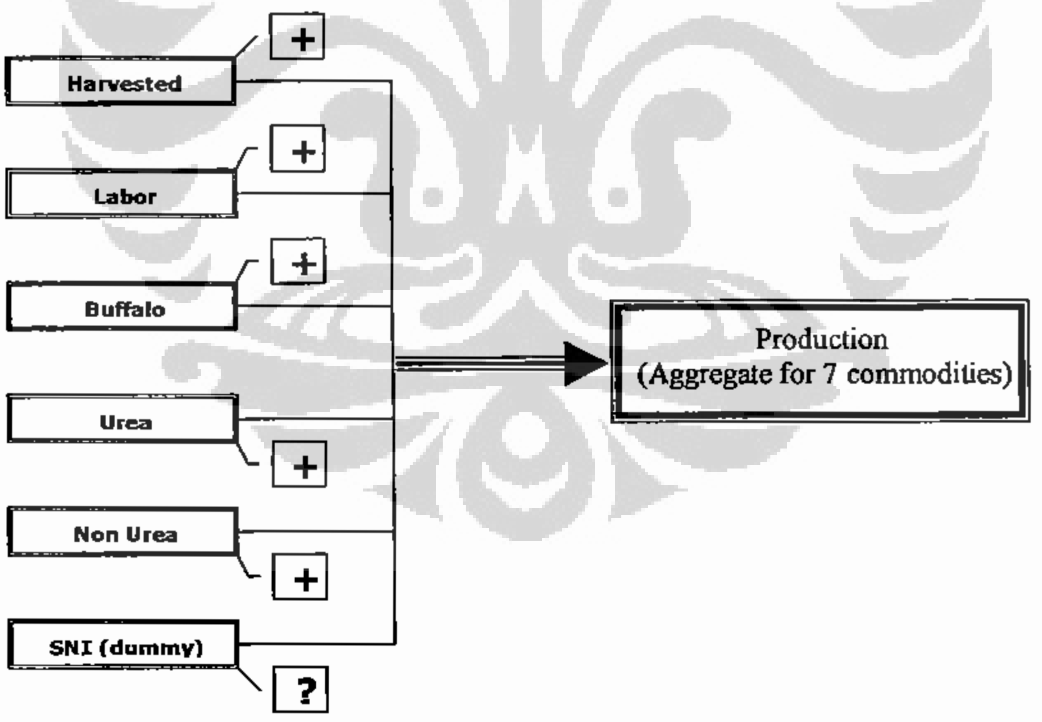
IV.4 Hypothesis and Expected Parameter Sign

Hypothesis for this modified Cobb-Douglas production function, followed by expected signs at the result are:

a. Total area of each production for primary crop plants, represented in HARVESTED variable, are positively significant to the increase of the primary crop plants' production, due to the fact that production area is an important factor of primary crop plants' production. Therefore, the expected sign at the result of the model is positive;
b. Total labor worked in agriculture sector, represented by the LABOR variable, is positively significant to the increase of the primary crop plants' production, with the same reasoning like HARVESTED, where labor is an important factor of primary crop plants' production. Therefore, the expected sign at the result of the model is positive;
c. Total Buffalo in agriculture sector, represented by the BUFFALO variable, is positively significant to the increase of the primary crop plants' production. Therefore, the expected sign at the result of the model is positive;
d. Total Urea fertilizer and Non urea fertilizer (ZA, SP-36, KCl and NPK) use in each production for primary crop plants, represented by UREA and NON_UREA variables respectively, are positively significant to the increase of the primary crop plants' production. This could happen due to the fact that fertilizer is an important factor of primary crop plants' production, the same as labor and production area. Therefore, the expected sign at the result of the model is positive;

e. Implementation effect of the mandatory SNI on fertilizer in this model is expected to give whether positive or negative effect to the production of the primary crop plants. If positive, then this regulation is successful in providing a better quality of fertilizer that contributes to the increase of the primary crop plants' production. If negative, then this regulation serves as trade barrier due to the possibility that the imported fertilizer is declining after this regulation's implementation. The fertilizer import's decline will affect negatively to the production of the primary crop plants, mainly because the reduced use of KCl fertilizer will make the productivity of the primary crop plants become small/stagnant. In short, the effect of the mandatory SNI on fertilizer is still ambiguous. Figure IV.1 gives overall picture of the hypothesis and expected parameter sign of the modified Cobb-Douglas production function.

Figure IV.1
Diagram of the Expected Parameter Sign for Modified Cobb Douglas Production Function



- '+' signs denote positive correlation between dependent variables and independent variable.
- '?' sign denote ambiguous correlation between SNI (dummy) variable and independent variable.

IV.5 Model Estimation and Justification

Estimation of the model was done through weighted fixed effect regression model using longitudinal/panel data set. Following Gujarati (2003)[6], the reason of choosing this technique is as follows:

a. Since panel data related to individuals, firms, states, countries, etc, over time, there is bound to be heterogeneity in these units. The techniques of panel data estimation can take such heterogeneity explicitly into account by allowing for individual-specific variables, as we shall show shortly.

b. By combining time series of cross-section observations, panel data give more informative data, more variability, less collinearity among variables, more degrees of freedom & more efficiency.

c. By studying the repeated cross section of observations, panel data are better suited to study the dynamics of change.

d. Panel data can better detect and measure effects that simply cannot be observed in pure cross-section or pure time series data.

e. Panel data enables us to study more complicated behavioral models.

f. By making data available for several thousand units, panel data can minimize the bias that might result if we aggregate individuals or firms into broad aggregates.

In short, panel data can enrich empirical analysis in ways that may not be possible if we use only cross-section or time series data.

Final result of this model analysis achieved after the remedy of the serial correlation and heteroskedasticity problem.

IV.6 Data and Resources

Data used for constructing the Modified Cobb-Douglas production function is the determinants of agricultural production, mainly taken from the Ministry of Agriculture, Central Bureau of Statistics (BPS), PUSRI Holding, Indonesian Fertilizer Producers' Association (IFPA) and Centre for Strategic and International Studies (CSIS). The data are from the year 1997 during (Indonesia's crisis) to 2006.

[6] Gujarati. 2003. *Basic Econometrics*. page 637-638 fourth ed. Mc. Graw Hill.

CHAPTER V

ANALYSIS OF MANDATORY SNI ON FERTILIZER FOR PRODUCTION OF THE PRIMARY CROP PLANTS

This Chapter divided into two main parts. The first part discussed the regression result and interpretation of the modified Cobb-Douglas production function for mandatory SNI on fertilizer's implementation to production of the primary crop plants. The second part discussed impact of mandatory SNI on fertilizer to producer and importer, qualitatively.

V.1 Analysis of Mandatory SNI on Fertilizer Using Modified Cobb-Douglas Production Function

With the modified Cobb-Douglas production function prepared for this thesis research, analysis regarding with fertilizer use, production of the primary crop plants and other agricultural effects after the implementation of the Mandatory SNI on fertilizer are try to observed using econometrics regression.

V.1.1 Results of the Econometrics Regression

Using panel data consist of seven commodities in the agriculture's primary crop plants sector (paddy, maize, soybeans, peanuts, mungbeans, cassava and sweet potatoes) from year 1997 – 2006, the results of this regression try to answer the first objectives, whether the implementation of mandatory SNI on fertilizer can increase the production of primary crop plants as the results of the proper quality of fertilizers used by Indonesia farmers. The analysis runs on EVIEWS 4.1 and the empirical results for the data using common OLS and the result can be seen in table V.1:

Table V.1 OLS Regression Result on Production of the Primary Crop Plants (Ln)			
Variable (ln)	**Coefficient**	**Std. Error**	**Sign**
Intercept	135.1843	53.63392	**
HARVESTED	-2.577198	0.447170	**
LABOR	-4.273857	1.531566	**
BUFFALO	-3.744995	2.005856	**
UREA	3.206038	1.466319	**
NON_UREA	0.450405	1.409123	ns
SNI (dummy)	-0.178079	0.330369	ns
R^2	0.792004	RSS	45.04644
Adj. R^2	0.772195	DW. stat	0.096410

** denote significance levels 5% respectively.
ns denote no significance.

The value of the Durbin-Watson stat that is below 1.5 showed a strong indication that a positive first order serial correlation interference with the estimation results (Johnston and Dinardo, 1997). The simplest and most widely used model to remedy this disturbance is by using the first-order autoregressive, or AR (1). Regression results, show at table V.2 after adding AR (1) is as follows:

Table V.2 OLS Regression Result with AR(1) on Production of the Primary Crop Plants (Ln)			
Variable (ln)	**Coefficient**	**Std. Error**	**Sign**
Intercept	12.21822	8.272474	ns
HARVESTED	0.682832	0.095411	**
LABOR	-0.355678	0.093494	**
BUFFALO	-0.369229	0.146399	**
UREA	0.139751	0.062738	**
NON_UREA	0.114950	0.049162	**
SNI (dummy)	0.045991	0.016322	**
AR(1)	1.001781	0.003603	**
R^2	0.999720	RSS	45.04644
Adj. R^2	0.999684	DW. stat	2.875944

** denote significance levels 5% respectively.
ns denote no significance.

Regression results show good estimation, since t-statistics shows that all variables are significant at a 5% level of probability. But still, looking at a high Durbin-Watson stat, it is imperative to see the regression results using fixed effect. Again, another analysis run is conducted; using fixed effect on panel data regression with no weighting, and table V.3 shows the results below:

Table V.3 Regression Result using Fixed Effect on Production of the Primary Crop Plants (Ln)			
Variable (ln)	**Coefficient**	**Std. Error**	**Sign**
HARVESTED	0.688508	0.077757	**
LABOR	-0.368888	0.095127	**
BUFFALO	-0.373877	0.105069	**
UREA	0.131971	0.065432	**
NON_UREA	0.129660	0.040971	**
SNI (dummy)	0.047015	0.012060	**
AR(1)	0.614613	0.112451	**
Specific Intercept (fixed effect)			
Commodities	**Intercept**	R^2	0.999720
PADDY	14.67763	Adj. R^2	0.999684
MAIZE	14.28118	RSS	45.04644
SOYBEANS	13.26706	DW. stat	2.875944
PEANUTS	13.16159		
CASSAVA	16.16315		
MUNGBEANS	12.96757		
SPOTATOES	15.28586		

** denote significance levels 5% respectively.

To see if there are individual effects, F-test and Chow-test were conducted to see if there are any. Table V.4 below shown the result.

Table V.4
F-Test and Chow-Test Result

Remarks	SSR1 PLS	SSR2 FEM	R^1 Pool	R^1 Fixed Effect	N	T	F Stat.	F Table α=5%	Ho	Results
Production	0.054927	0.039332	0.99972	0.999799	7	10	3.7006 (F-test) 3.668 (Chow-test)	2.2656	Fstat > Ftable	Cross Section have individual effect

Result of both tests shows that F Stat results from F-test and Chow-test are higher than F Table value on 5% significance level. It is proven then that the model has individual effect. The modified Cobb-Douglas production function will regressed further used fixed effect model, no weighting, since T>N.

Even tough the result of the regression shows all variables are significant at 5% level, a Langrage Multiplier (LM) test need to perform to see whether heteroskedasticity interfere with the model. LM test's result (table V.5) on the modified Cobb-Douglas production function fixed effect model, no weighting shows that there is heteroskedasticity interfering with the model.

Table V.5
LM Test's Result

X^2 (5%)	LM value	X^2 > LM	results
12.59159	33.9050855	False	Heteroskedasticity

To overcome heteroskedasticity problem, a Generalized Least Square regression is use for remedial regression. So the final results of the model (Table V.6) is a Generalized Least Square, Cross Section Weights to estimates the modified Cobb-Douglas Production Function with dummy SNI, to see any effects, be it positive or negative, after mandatory SNI on fertilizer implementation in 2003.

Table V.6
Regression Result using Fixed Effect on Production of the Primary Crop Plants (Ln)

Variable (ln)	Coefficient	Std. Error	Sign
HARVESTED	0.687391	0.092388	**
LABOR	-0.373243	0.113724	**
BUFFALO	-0.377969	0.124271	**
UREA	0.133962	0.078278	ns
NON_UREA	0.129780	0.048985	**
SNI (dummy)	0.046961	0.014301	**
AR(1)	0.616649	0.133493	**
Specific Intercept (fixed effect)			
Commodities	**Intercept**	**Weighted**	
PADDY	14.85353	R^2	0.999714
MAIZE	14.45107	Adj. R^2	0.999638
SOYBEANS	13.43345	RSS	0.055774
PEANUTS	13.32785	DW. stat	1.893821
CASSAVA	16.32647	**Un-Weighted**	
MUNGBEANS	13.13090	R^2	0.999717
SPOTATOES	15.44768	Adj. R^2	0.999641
		RSS	0.055553
		DW. stat	1.882915

** denote significance levels 5% respectively.
ns denote no significance.

V.1.2 Interpretation on the Model

Summary of all regressions process until the final results can be seen in table V.7. After using AR (1) at the model II to model IV, the consistencies of all variables are close, which means that the significance of the model is high. Since R^2, Adj R^2 and DW-stat comparison shows that model IV is the best model among others, then this research use it as base of analysis.

All variables, except for UREA show a statistically significant value/probability in 5% level at model IV. A high level of R^2 suggests the possibility of multicollinearity, since UREA variable is not statistically significant. However, since other tests and measurements to the model (serial correlation, heteroskedasiticity, autocorrelation) shows no trouble for the model, that possibility can be put aside.

A positive correlation happens between HARVESTED and PRODUCTION, where for 1 % increase in HARVESTED, where total land for primary crop plants planted, there is a 0.6 % increase in PRODUCTION of those commodities. It seems that elasticity of HARVESTED to the PRODUCTION shows an elastic one, and that supports by the fact that land conversion from the farm land to other type of land (factories, dwellings, etc) is high. That contributes to the stagnant level of production of primary crop plants. If that condition can be reversed, surely the production of primary crop plants will increase as suggested by the model.

Negative correlations because of incompatible data are inevitable in this model, where LABOR and BUFFALO contributes negatively to the PRODUCTION, where for 1 % increase in LABOR and BUFFALO, makes the PRODUCTION decrease by 0.373 % and 0.377 %, respectively.

It is possible that with the facts that average Javanese farmers owned only 0.2 Ha/farmers, will contribute negatively if additional labor is added. That happened because the productivity of those labors is decreased significantly, and will contribute to the negative growth of the primary crop plants. While buffalo as theproduction utilization factors in the primary crop plants plays important role, the facts that buffalo data covers not only agriculture sector, but also other sectors (food, other type of agriculture, etc) makes bias in the regression result. It's possible that negative correlations happened because the increase in total buffalo absorbed not to the primary crop plants' sector, but to other sectors mentioned above.

Fertilizers that are categorized in NON_UREA, which are SP-36, ZA, NPK and KCl contributes positively to the PRODUCTION, where for a 1 % increase in NON_UREA will make the PRODUCTION increase by 0.129%. The inelastic condition for this correlation suggests that these types of fertilizers might not a major factor in increasing production of the primary crop plants.

Table V.7 Comparison of all models				
variable (Ln)	Coefficient [t-statistic]			
	I	II	III	IV
	PLS, common, no intercept	PLS, common, no intercept, AR(1)	Fixed effect, no weighting, AR(1)	GLS, Cross Section Weighting, AR(1)
Intercept	135.1843 [-2.520500]	12.21822 [1.476973]	--- ---	--- ---
HARVESTED	-2.577198 [-5.763346]	0.682832 [7.156739]	0.688508 [8.854566]	0.687391 [7.440294]
LABOR	-4.273857 [-2.790514]	-0.355678 [-3.804267]	-0.368888 [-3.877851]	-0.373243 [-3.282018]
BUFFALO	-3.744995 [-1.867031]	-0.369229 [-2.522066]	-0.373877 [-3.558391]	-0.377969 [-3.041479]
UREA	3.206038 [2.186453]	0.139751 [2.227547]	0.131971 [2.016909]	0.133962 [1.711354]
NON_UREA	0.450405 [0.319635]	0.11495 [2.338198]	0.12966 [3.164709]	0.12978 [2.649398]
D_SNI	-0.178079 [-0.539032]	0.045991 [2.817784]	0.047015 [3.898329]	0.046961 [3.283769]
AR(1)	--- ---	1.001781 [278.0346]	0.614613 [5.465592]	0.616649 [4.619321]
Specific Intercept (fixed effect)				
PADDY	---	---	14.67763	14.85353
MAIZE	---	---	14.28118	14.45107
SOYBEAN	---	---	13.26706	13.43345
PEANUTS	---	---	13.16159	13.32785
MUNGBEANS	---	---	16.16315	16.32647
CASSAVA	---	---	12.96757	13.1309
SWEET POTAOES	---	---	15.28586	15.44768
R SQUARE	0.792004	0.99972	0.999799	0.999714
Adj R SQUARE	0.772195	0.999684	0.999746	0.999638
DW-STAT	0.09641	2.875944	2.655583	1.893821

It turn out that the implementation of Mandatory SNI on fertilizer, represents with the dummy variables D_SNI, will likely to increase PRODUCTION since that Decree has been enacted. Further analysis need to be done to explain why only a small percentage of PRODUCTION increase, showing inelastic condition is happened after the D_SNI implemented.

Cross-section/individual effect explanation from the model's result shows that if there are changes to the independent variable, PRODUCTION, and then potential commodities that receive immediate effect is CASSAVA, since it has the highest fixed effect. Following CASSAVA are commodities as follows: SPOTATOES, PADDY, MAIZE, SOYBEANS, PEANUTS and MUNGBEANS.

V.1.3 Unbalanced Use of Fertilizer in Indonesia

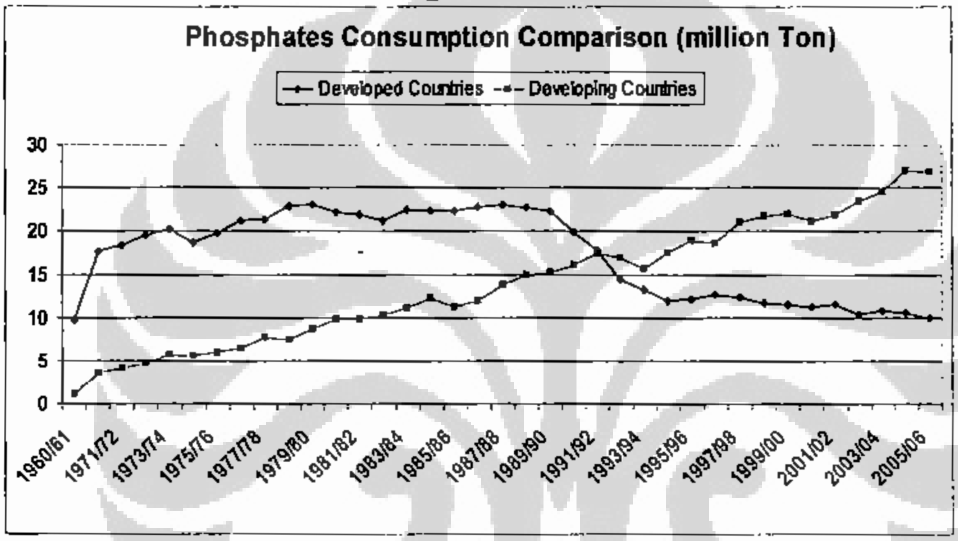
Indonesia's consumption of various types of fertilizers show unbalance use. Urea consumption are use excessively compare with ZA, NPK, KCl or SP-36. So, it is possible that the insignificant level of the regression results for UREA fertilizers linked with this fact. Positive contribution of NON_UREA variable consists of ZA, SP-36 and KCl fertilizers support this finding.

As one of the Asian countries that rely heavily on agriculture's product to meets national staple demand, Indonesia must give highest priority with all resources available for increasing primary crop plants' production. Fertilizer technology, which supports agriculture products' mass production, was first use by the European and North American Countries. Since Indonesia and other Asian Countries started using fertilizer 80 years after European and North American Countries did, and use Nitrogen fertilizer heavily to fulfill the demand of Asian people main staple production, the tendency to use excessively Nitrogen fertilizer is inevitable. Although Phosphates (P_2O_5) and Potash (K_2O) fertilizers are finally used 40 years later after the use of Nitrogen fertilizers, the growth rate is lower. Annex I, II and II shows World consumption on Nitrogen, Phosphate and Potash since the 60's.

At Europe and North America Countries, Phosphates (P_2O_5) and Potash (K_2O) fertilizers are used initially before Nitrogen (N) fertilizers, where on Asia is the opposite. As the founder of the chemical fertilizer that supports mass production for agriculture's products, it's natural for those countries to started earlier using those chemical fertilizers, but with a very different consumption pattern compares with Asian Countries. They put the use of Phosphates (P_2O_5) and Potash (K_2O) fertilizers as the higher priority, since their farming were livestock basis, where the needs of Nitrogen (N) nutrients can be fulfilled from the waste of those herds and from the relay planting system, using the crops for their livestock food in that system. Figure V.1 and figure V.2 give overall picture of Phosphates (P_2O_5) and Potash (K_2O) fertilizers use between Developed Countries and

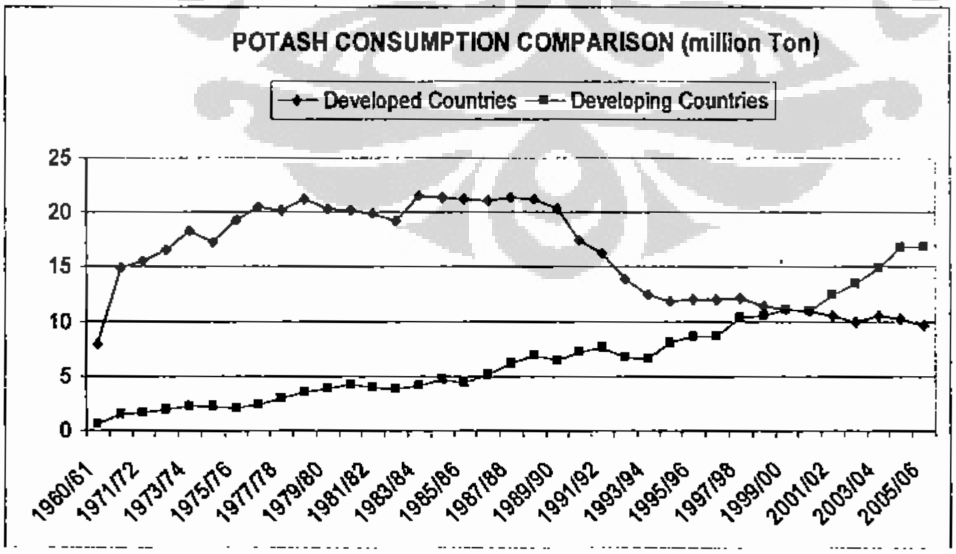
Developing Countries since 60's. As Shown in those figures, developing Countries' consumption on Phosphates (P_2O_5) and Potash (K_2O) fertilizers are slowly catch up with developed countries consumption. Phosphates (P_2O_5) fertilizer consumption of developing countries reached the same amount with the developed countries at 1991/1992 and continues to increase. Potash (K_2O) fertilizers consumption of developing countries reached the same amount with the developed countries at 1999/2000 shows a slower growth rate.

Figure V.1



Source: IFA

Figure V.2

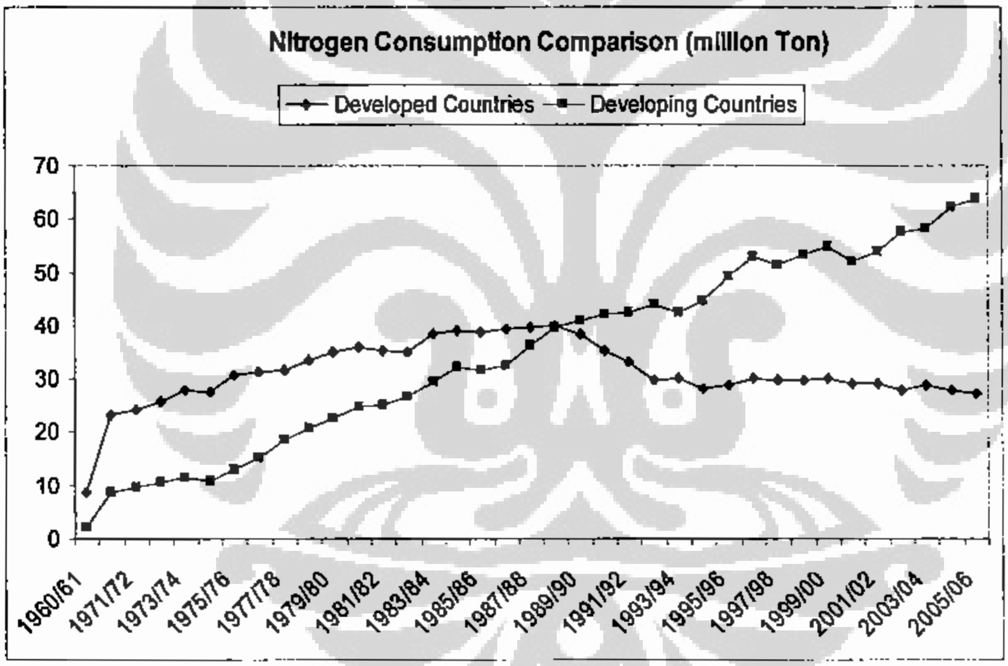


Source: IFA

However, as figure V.3 shows, Nitrogen (N) fertilizer consumption of developing countries shows a much higher rate of growth and reached the same amount with the developed countries at 1988/1989 with a high increase rate until now.

As the results of this two contrast condition, Phosphates (P_2O_5) and Potash (K_2O) nutrients contain in Asian soils depleted at a faster rate compares to the soil in Europe and North America. Asian pattern of the land fertilization neglected the development of land fertility, instead of making it depleted due to the urgent need of Asian countries to fulfill the demand of their people need of sufficient rice production.

Figure V.3



Source: IFA

As Table V.8 shows, the average recommended fertilizer use for primary crop plants are 175 Kg/Ha for Nitrogen contained fertilizer, 90 Kg/Ha for P_2O_5 fertilizer and 30 Kg/Ha for K_2O fertilizer, with the average ratio of 6:3:1. However, Indonesia's fertilizer consumption trends since 1975 shows that, only a few years where the ratio of fertilizer use is close to the recommended one. From 1987 to 1993 the ratio of the fertilizer use is relatively close to the recommended one and it is natural that during 1975 to 1986 Nitrogen and P_2O_5 fertilizer use is higher than recommended,

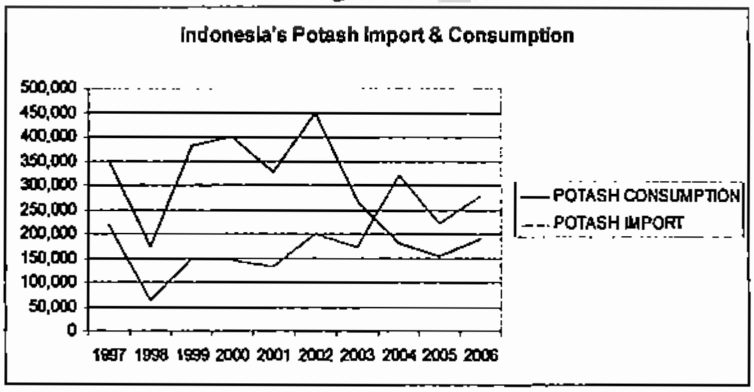
Table V.8 Recommended Fertilizer Use on Primary Crop Plants (Kg/Ha)			
Type of Plant	N	P_2O_5	K_2O
Paddy	250	100	50
Maize	250	100	30
Soybeans	150	100	20
Peanut	150	100	20
Mungbeans	150	100	20
Cassava	100	50	20
Sweet Potatoes	150	50	50
Average use (rounded)	175	90	30
ratio (rounded)	6	3	1

Source: IFPA

since Indonesia wanted to achieve national food sufficiency program (swasembada pangan), with the exception of the year 1981, where there is a sudden decline in K_2O fertilizer, resulted with a bad ratio of fertilizer use as big as 47:16:1. However, as the Table V.9 shows, since 1993 until now the ratio of fertilizer use tends to get wider, with the biggest range of ratio at 2005 (28:5:1).

As one of the ASEAN's country that hit with economic crisis during 1997-1998, Indonesia's use on fertilizer also facing sharp declined during to that crisis, especially for Potash (K_2O) fertilizer. Figure V.4 shows that during 1998, Potash's (K_2O) fertilizer consumption and import decreased dramatically. Since Indonesia can't produce Potash (K_2O) fertilizer on its own, importation of that fertilizer become crucial since that is the only way to obtain it. Further analysis of excessive use of Nitrogen fertilizer will conduct at the next chapter.

Figure V.4



Source: IFA

Table V.9 INDONESIA's FERTILIZER CONSUMPTION & RATIO						
YEAR	UREA	TSP/SP.36	KCl	RATIO		
	Ton/Thn	Ton/Thn	Ton/Thn	UREA	TSP/SP36	KCl
1,975	385,662	128,526	34,413	11	4	1
1,976	348,554	93,117	24,285	14	4	1
1,977	639,374	135,404	69,420	9	2	1
1,978	827,790	224,612	108,998	8	2	1
1,979	1,400,952	266,425	122,058	11	2	1
1,980	1,740,551	483,591	123,311	14	4	1
1,981	2,167,227	732,141	46,454	47	16	1
1,982	2,038,530	712,697	88,365	23	8	1
1,983	2,380,522	834,411	179,141	13	5	1
1,984	2,609,197	951,564	251,955	10	4	1
1,985	2,604,468	1,046,967	290,411	9	4	1
1,986	2,738,241	1,175,701	237,353	12	5	1
1,987	2,795,874	1,190,528	369,734	8	3	1
1,988	2,916,466	1,316,432	478,463	6	3	1
1,989	2,925,421	1,278,428	457,259	6	3	1
1,990	2,977,591	1,262,789	509,857	6	2	1
1,991	3,096,627	1,255,941	444,195	7	3	1
1,992	3,410,348	1,290,085	481,594	7	3	1
1,993	3,094,802	1,173,158	365,675	8	3	1
1,994	3,288,466	1,124,533	302,080	11	4	1
1,995	3,710,455	1,069,909	403,900	9	3	1
1,996	3,917,858	900,284	375,293	10	2	1
1,997	3,323,601	663,478	350,270	9	2	1
1,998	4,289,648	868,837	172,133	25	5	1
1,999	3,140,033	394,949	380,000	8	1	1
2,000	3,959,656	623,260	400,000	10	2	1
2,001	3,934,985	645,388	326,920	12	2	1
2,002	4,273,137	600,991	450,000	9	1	1
2,003	4,369,953	784,204	266,502	16	3	1
2,004	4,361,450	813,318	181,909	24	4	1
2,005	4,321,398	722,300	155,000	28	5	1
2006*	4,409,818	682,700	190,000	23	4	1

* Estimation figures
Source: IFPA

V.1.4 Is It Good or Not So Good?

Although there are seems to be positive correlation between implementation of Mandatory SNI on fertilizer with total production of primary plant crops, the effect is not as big as it would be expected. The result of the regression model shows that with the SNI implementation, production of primary crops plants will likely to increase, but not much, only 0.04% increase.

As mentioned in this research objectives, positive impacts expected from the implementation of the Mandatory SNI on fertilizer can increase the production of primary crop plants, which are paddy, maize, soybeans, peanuts, mungbeans, cassava and sweet potatoes. With this increase, farmer's welfare is expected to improve too, with the assumption that the prices of their crops production are sold at normal rate. Table V.10 shows the productivity of primary crop plants from 1997-2006. After the Economic crisis at 1997, in 1998 paddy, soybeans and peanuts productivity declined. It is likely because the increase price of Potash (K_2O) fertilizer because to obtain that fertilizer farmer/producer/fertilizer related company must import it. Lack of of Potash (K_2O) fertilizer will have a significant impact in decreasing the productivity. Productivity of maize and sweet potatoes increased, mainly because people plant those crops on unused land due to the crisis. Immediately after the implementation of Mandatory SNI on fertilizer, productivity of paddy increase from 44.69 Qu/Ha to 45.38 Qu/Ha after a lower productivity happened at 2001, as much as 43.88 Qu/Ha. All palawija crops (Maize, soybeans, peanuts, cassava, mungbeans and sweet potatoes) also increased during that period.

Table V.10
Land Productivity/Yield (Qu/Ha)

Year	Paddy	Maize	Soybeans	Peanuts	Cassava	mungbeans	sweet potatoes
1997	44.32	26.14	12.13	10.96	122	8.90	95
1998	41.97	26.43	11.92	10.63	122	9.02	95.75
1999*	42.52	26.63	12.01	10.55	122	8.89	94.31
2000	44.01	27.65	12.34	10.77	125	8.95	94
2001	43.88	28.45	12.18	10.84	129	8.87	97
2002	44.69	30.88	12.36	11.10	132	9.19	100
2003	45.38	32.41	12.75	11.49	149	9.73	101
2004	45.36	33.44	12.80	11.58	155	9.95	103
2005	45.74	34.54	13.01	11.61	159	10.08	104
2006*	46.11	34.70	12.96	11.87	163	10.26	104

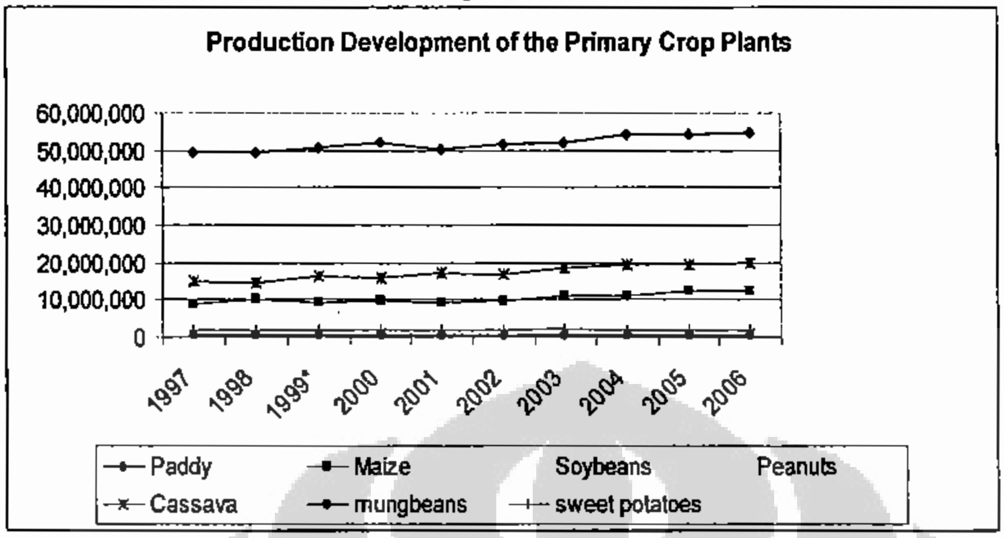
BPS-Statistics Indonesia & Directorate General of Foodcrops, Ministry of Agriculture

* Excluding TIM-TIM since 1999

** Third Forecast Figure

While the development of the primary crop plants' production before and after the implementation of the mandatory SNI on fertilizer can be shown with graphic at figure V.5. Growth rate for seven commodities of primary crop plants from 1997-2002 are as follows: 0.9% for paddy, 3.2% for maize, -13.4% for soybeans, 2% for peanuts, 3.2% for cassava, 3.5% for mungbeans and 0.8% for sweet potatoes.

Figure V.5



Source: BPS-Statistics Indonesia & Directorate General of Food-crops, Ministry of Agriculture

After the implementation of mandatory SNI on fertilizer, since 2003 until 2006, there is a positive change in production growth for paddy, maize, soybeans and peanuts, with the growth rate of 1.6%, 3.4%, 4.7% and 2.2%, respectively. Opposite condition occurs with cassava, mungbeans and sweet potatoes production, with the growth rate of 2.3%, -0.2% and -3.3% respectively, lower compares before the fertilizer SNI's implementation. This findings are opposite with the econometrics's findings, where cassava and sweet potatoes should have positive impact after the implementation of mandatory SNI on fertilizer. This condition could happen, probably due to the fact that land conversion has changed many cassava and sweet potatoes production land to new settlements. CPO fields, etc. While the growth rate of paddy, maize and soybeans shows increasing trends, it's not big enough to sustain domestic consumption. Indonesia still import rice, corn and soybeans to satisfied domestic consumptions, and in the long run, it is possible that this country become dependent to importation of agriculture products, because of its inability to increase production and productivity growth of those sector.

V.2 Analysis of Mandatory SNI on Fertilizer

This chapter will explain qualitatively the effect of the mandatory SNI on fertilizer from the producer side and importer side. Also, improvement on this mandatory SNI at the regulation level to overcome obstacles or negative effects that incurs during first 5 years implementation, is subject to analyze at this chapter.

V.2.1 Effect to the Producer

There are used to be six main producers of chemical fertilizer in Indonesia. These producers are: PT Pupuk Sriwidjaja, located in Palembang, South Sumatra, PT Petrokimia Gresik, located in Gresik, East Java, PT Pupuk Kujang in Cikampek, West Java, PT Pupuk Kalimantan Timur in Bontang, East Kalimantan, PT ASEAN Aceh Fertilizer in Lhokseumawe, Aceh, and PT Pupuk Iskandar Muda also in Lhokseumawe, Aceh. In 2004, PT ASEAN Aceh Fertilizer was shut down due to the lack of natural gas as raw material for producing fertilizer.

Although total natural gas use by the fertilizer industry accounts only around 7% out of total production of Indonesia's natural gas, it is difficult for fertilizer industry to get sufficient supply. Indonesia has several contracts of natural gas supply to developed country such as Japan, European countries, etc, with high contract value compare to domestic contract with fertilizer companies to fulfill their demand of natural gas as the dominant material of the fertilizer production, total of 40-50% of total urea production cost.

An example taken from one of the fertilizer producer's audit by Finance/Monetary Audit Agency (BPK), which is PT Petrokimia Gresik's Main selling price (harga pokok penjualan) budget on subsidized fertilizer at 2006. The audit findings show at Annex I, that the largest part of the components to produce subsidized fertilizer at PT Petrokimia Gresik is the cost of natural gas, as big as 46.62%. Detailed for all cost components to produce fertilizer at 2006 by PT Petrokimia Gresik until FOT/FOB (Free On Truck/Free On Board) are as follows:

- Natural gas cost,
- Other raw material cost,
- Water material cost,
- Additional material cost,
- Salary and wellness cost,
- Maintenance and spare parts cost,
- Insurance and Services,

- Overhead, Administration and common (umum) cost,
- Depreciation and Amortization cost,
- Interest and Bank cost,
- Bag and Bagging cost, and
- Margin profit 10%.

Interestingly, although the natural gas cost for producing urea fertilizer is high, the contrary happens with the natural gas cost for producing ZA, SP-36 and KCL in PT PKG at 2006, where the share of total production cost compare with natural gas cost to each types of fertilizer are 4.55%, 2.11% and 0.59%, respectively. However, other raw material cost's share for those fertilizers are 57%, 73.38% and 68.16%, respectively, compare to urea fertilizer which don't need any other raw material, only natural gas.

To grasp the effect of Mandatory SNI on Fertilizer to these main fertilizer producers, an in-depth interview has been done with one of the staff at the PUSRI Holding at 20th September 2007. Mr. Yunilwan is head of the subdivision of Marketing at PUSRI Holding, and actively involved during the making of Ministry of Industry and Trade Decree's No. 140/MPP/Kep/3/2002. He explained that, from a cost structure of fertilizer production, there is no change had to be done to comply with that Decree, since all major fertilizer plant in Indonesia already comply with International Standard/ISO, right from the plant construction. Besides that, it is an easy job for them to change any setting at their plant to comply with that Decree, if necessary, at no/minimal cost. Their concern, mainly, is the distribution of fertilizer after the production stage finished, where PUSRI Holding hold responsible to distribute subsidized fertilizer until line IV. Another concern is the availability and price contracts of natural gas as main material for producing urea fertilizer. However, those problems are beyond the scope of this research.

On the other hand, implementation of the mandatory SNI on fertilizer give significant advantage for small and medium fertilizer producer in Indonesia. There are more than 300 companies that categorized as small and medium fertilizer producer, and the significant increase in their numbers caused by the fact that most of Indonesian farmer become excessively using nitrogen fertilizer. They believe that only with Nitrogen fertilizer they can increase production and productivity of their crop plants. This wrong perception comes from past dissemination of fertilizer industry, during the first Five Years Development Year (Repelita I), where instead of promoting balanced fertilization, where farmers should use fertilizer according to the condition of their soil, instead they overwhelmed with product promotion of first chemical urea fertilizer produced. That makes many Indonesian farmers become fanatic with certain type of urea fertilizer, and tends to use it excessively on their soil. Furthermore, the fact that urea fertilizer through subsidy is cheaper than other type of fertilizer (shown at table V.11) made this fertilizer as a favorite for decades. This condition give negative contribution to primary crop plants production and productivity, because compare to the 1980-1990 period, primary crop plants growth rate of productivity has declined at the 1990-2000 period. That's why the demand for balanced fertilization to the land increasing sharply.

These small and medium fertilizer producer believe that the application of the location-specific fertilization, as a national concept, declared decades ago to increasing the efficiency of fertilizer use, are best achieved from small or medium scale production to specific location, where this production can adjust to consumer's demand at that location with the best, unique fertilizer ingredients for that specific location.

With that spirit, at 2000 these fertilizer companies throughout Indonesia formed an association, called Indonesia's Small and Medium Fertilizer Producer Association. Also, in order to increase their capabilities, at 2003 with the cooperation from the Ministry of Industry and Trade, as much as 28 small and medium companies in West Java alone have passed the Mandatory SNI on Fertilizer. This shows their enthusiasm and responsibility to their product so that can fulfill the quality expected by Indonesian farmer. Nowadays, almost every member of this association has the Mandatory SNI on fertilizer. In order to achieve a healthy competition, these companies hoped that GOI can give healthy situation to business condition by ensuring the minimum quality of fertilizer use in their area has SNI certified, also cooperation between them on fertilizer distribution monitoring.

Table V.11
Development of the Fertilizer Price

Year	Urea	ZA	TSP/SP36	KCl
1988	165	165	210	200
1989	185	185	260	210
1990	210	210	280	250
1991	220	220	310	280
1992	240	240	340	300
1993	260	260	480	330
1994	260	295	480	350
1995	260	295	480	420
1996	330	355	525	480
1997	400	450	600	480
1998	450	506	675	850
1998*	1,115	1,000	1,600	1,650
1999	1,150	1,000	1,600	1,650
2000	1,150	1,000	1,600	1,650
2001	1,150	1,000	1,600	1,650
2002	1,150	1,000	1,600	1,650
2003**	1,150	1,000	1,500	-
2003***	1,150	950	1,400	-
2004	1,150	950	1,400	-
2005	1,150	950	1,400	-
2006****	1,200	1,050	1,550	1,750

*) Effective since first December 1998
**) Effective since first January 2003 - 31 Juli 2003
***) Effective since first August 2003 - 31 December 2003
****) Effective since 17 May 2006

Source: IFPA

V.2.2 Effect at the Import Side

There are several perspectives to analyze the effect of mandatory SNI on fertilizer to the import side, whether from the Indonesia Customs' point of view, importer's point of view and descriptive statistics on 5 years Mandatory SNI's implementation level. Also, problems relating with the implementation of this mandatory SNI's also discussed in this part.

V.2.2.1 Indonesia Customs' Point of View

The implementation of the Mandatory SNI on fertilizer gives positive effect for Indonesian Customs to perform their duties at the border. Now they have ground rules to perform checking, inspect the suspected goods and perform preventive measures, such as sealed off suspected illegally imported fertilizer. If, the imported fertilizer not accompany with SPB or SPPT-SNI, they have the rights to keep the goods at customs area until the importer acquired the SPB, so their goods can be released.

At 2007 alone, Indonesian Customs at the Belawan Port, Medan, recorded that although this company, PT Asia Kurnia Prima is well known as a major fertilizer distributor that already imported fertilizer several time with complete documents, when the company imported 6,500 MT of Ammonium Sulfate (ZA) fertilizer, arrived at 21st February 2007 with incomplete document (didn't have SPB), Customs sealed the company's goods until the documents are completed. PT Asia Kurnia Prima must bear the warehouse costs and demurrage costs while their goods at the Belawan port.

V.2.2.2 Importer's Point of View

Mandatory SNI on Fertilizer required importers (and also domestic producer) to have Product Certificate for Using SNI Label (SPPT-SNI – *Sertifikat Produk Pengguna Tanda-SNI*) that is to certify their products so they can use the SNI label in their product which is use to show that the products is already comply with SNI requirement and can distributed in domestic market.

This certification process, however, adding production cost to the applicants, and there is differences in certification fees for domestic producers and importers. As shown in Table V.12, for first time users, total cost of certification procedures for domestic producers is 16 million rupiah while for importers the cost is 8,550 US dollar or around 76.9 million rupiah, while certification procedures for continue of using the SNI label is 5.5 million rupiah for domestic producers and 2,550 US dollar or around 24.7 million rupiah for importers, while at Table V.13 shows, cost for extending the certification labels.

For importers, beside the certification fees they also have to pay for transportation and accommodation for the assessors. So, while the certification cost for importers is the same no matter from where the imported fertilizer coming from, transportation and accommodation fees is different between one country to another. The transportation and

Table V.12
Cost Structure of Certification Procedures of the Rights of Using SNI Label
(For first user)

No	Cost Structure	Domestic (Rp.)	Imported (US$)	Imported (Rp.)
1	Registration	1,000,000	500	4,500,000
2	Supplier's quality system document audit*)	1,000,000	500	4,500,000
3	Supplier's quality system assessment*)	6,000,000	2,500	22,500,000
4	Supplier's quality control assessment	2,400,000	2,500	22,500,000
5	Commodity sampling and quality control	1,600,000	1,500	13,500,000
6	Evaluation by certification technical committee	2,500,000	550	4,950,000
7	Certification issue	1,500,000	500	4,500,000
	TOTAL COST	16,000,000	8,550	76,950,000

Source: Directorate of Quality Control, Ministry of Trade
Assumption: Rp 9000/1US$

accommodation fees are depends on destination country and how expensive the living cost there. These fees are valid both for those whoare the first time using the SNI label and those who already have the right of using SNI label and want to continue using it when the time period expire.

Other Costs that the importers must bear beside the cost for obtaining process of the SPPT-SNI is the cost of imported goods quality control mechanism. While the procedures for having SPPT-SNI that only need one time of procedures and valid for the next three year, in quality control mechanism it is requires for importers to register their imported fertilizer every time they imports and enters Indonesia's jurisdiction. Importers must register the product to Directorate for Quality Control (Directorate PPMB); a government agency with the main duty is to control the quality of imported goods categorized in as a mandatory SNI's goods. The purpose of this mechanism is to control the quality of imported fertilizer that will distribute in Indonesia's market already comply with the requirement of SNI by making sure that imported fertilizer that enters Indonesia's territory already have SPPT-SNI.

Table V.13
Cost Structure of Certification Procedures of the Rights of Using SNI Label (For extended user)

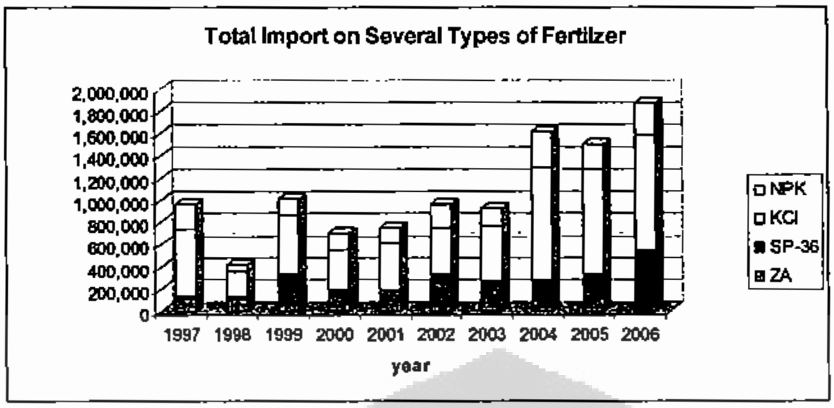
No	Cost Structure	Domestic (Rp.)	Imported (US$)	Imported (Rp.)
1	Company quality system assessment	1,800,000	1,250	11,250,000
2	Company quality control assessment	1,200,000	750	6,750,000
3	Certification technical evaluation	2,500,000	750	6,750,000
	TOTAL COST	5,500,000	2,550	24,750,000

Source: *Directorate of Quality Control, Ministry of Trade*
Assumption: Rp 9000/1US$

V.2.2.3 Statistics on Fertilizer import

Indonesia's importer pattern in importing ZA, SP-36, KCl and NPK fertilizers is showing different pattern since the implementation of the Mandatory SNI on Fertilizer at 2002. Although the pattern different, the reason of the importation of fertilizer remains the same, that is due to increasing demand of specific fertilizer type during specific planting time. Figure VI.6 shows a sharp decrease as much as 112% and 77% decrease for imports of ZA (2004) and SP-36 (2003) after the implementation of that SNI, respectively. The reason might be the decrease consumption on ZA fertilizer from 675,511 MT in 2003 to 667,129 MT in 2004. As for the SP-36 fertilizer importation decrease in 2003, although there is an increase in SP-36 fertilizer consumption, from 600,991 MT in 2002 to 784,204 MT in 2003, PKG's plant utilization also increase, from 55.30% of utilization in 2002 to 68.77% of utilization in 2003. But since the consumption of SP-36 fertilizer again increase to become 813,318 MT in 2004, increase of SP-36 fertilizer's import is inevitable, giving a 74% of importation increase in 2004.

Figure V.6



Source: Information & Data Centre, Ministry of Trade

V.2.2.4 Problem with the SNI Implementation

After the implementation of the Mandatory SNI on Fertilizer in 2002, Ministry of Industry and Trade, through Directorate of Quality Control, Directorate General of Foreign Trade have issued SPB's since 2003. As seen in Table V.14, data of mandated fertilizer consists of four types out of total fifteen fertilizers used in this thesis research shows the fluctuations of fertilizer import.

However this is only for the SPB, while for the SPPT-SNI certified process, most of the importers didn't have that certification. They reasoned that the cost they bear for obtaining that certificate was hard to compensate with their selling because the fertilizer importation they conducted were not regularly done.

Table V.14
Summary of total fertilizer importation (4 types + TSP) that must have SPB

TYPE	2003	2004	2005	2006
NPK	151,834.00	479,578.44	337,427.35	269,003.58
KCl	167,095.00	990,495.25	1,081,033.22	1,793,504.04
A. Sulfat	30,859.00	161,348.83	207,439.12	329,220.05
TSP	20,800.00	185,324.65	209,993.80	99,376.80
SP-36	0.00	19,640.70	30,805.80	216,786.60

Source: DQC, Ministry of Trade

As the result, Ministry of Industry and Trade Decree's regarding with the Standardization and Monitoring of The Indonesian National Standard (SNI) No. 753/MPP/Kep/11/2002 implementation was far from effective. To overcome that problem, at 2007 Ministry of Trade issued a new Decree replacing the No. 753's Decree with the Decree's No. 14/M-

DAG/PER/3/2007. This new regulation gives stricter condition for SNI's fertilizer importer, where they must have a certificate of their source of import (SPPT-SNI) in addition to process SPB every time the importers import those goods.

V.2.3 SNI's Impact to Balanced Fertilization

There is rising awareness from the GOI through Ministry of Agriculture due to the fact that, imbalance use fertilizer and excessive use of Nitrogen fertilizer to soils throughout Indonesia can lead to a stagnant, even reduced production and productivity of primary crop plants. In order to overcome that problem, Ministry of Agriculture through its research centre has created 'demonstration plot' (demplot) throughout Indonesia to show Indonesian farmers the significant effect of using balance fertilization in increasing land's production and productivity. This Demplot also served as promotion place for new products, especially new NPK fertilizer that with all advantages this fertilizer has, if farmers don't know for sure the benefit of using the fertilizer, they won't buy it. As PT PKT done, shows in table V.15, with demplot's result using NPK Pelangi, their own fertilizer product, this company also promoting for the use of this fertilizer, while promoting balance fertilization.

There is a potentially positive impact with the implementation of the mandatory SNI on fertilizer since 2002. With the implementation of this SNI, GOI through Ministry of Agriculture can cooperates with fertilizer producers, be it small/medium or large one to promotes balanced fertilization to the farmers. Farmers already know the importance impact of applied the right content of nutrients to their soil, and with the promotion price offers by GOI and producers, plus addition of credit funds provided by local government banks, they can apply this balanced fertilizer at affordable price, and at the end will increase the production and productivity of their primary crop plants.

Table V.15
DEMPLOT RESULT ON NPK PELANGI FERTILIZER & PADDY'S FARMER INCOME ANALYSIS(*)

No	Location	Production Result			Production Cost			Profit		Additional profit (Rp)	Increase (%)
		Pelangi (ton)	Other Fert (ton)	Increase (%)	Pelangi (Rp)	Other Fert (Rp)	Pelangi (%)	Pelangi (Rp)	Other Fert (Rp)	[7-8]	[9:8]
		1	2	3	4	5	6	7	8	9	10
1	WEST JAVA	8,97	7,11	26,73	3.780.414	3.751.878	0,84	7.015.201	4.818.320	2.196.881	52,32
2	CENTRAL JAVA	8,22	6,17	33,29	4.076.438	4.067.797	0,21	6.480.538	3.886.553	2.593.984	66,7
3	EAST JAVA	7,97	6,34	25,67	4.066.592	3.808.611	6,77	4.607.996	3.119.509	1.488.487	47,72
4	BALI	9,13	7,42	23,02	3.136.445	3.023.945	3,72	3.314.664	4.720.964	1.593.700	33,76
5	S-KAL E-KAL	7,36	4,27	72,8	4.177.250	3.805.025	9,78	4.831.150	1.598.575	3.232.575	202,2
6	NE-SUL	4,43	3,16	40,25	1.973.000	1.529.400	29	2.452.000	1.629.500	825.500	51
7	S-SUL	8,22	5,95	36,22	2.852.316	2.287.182	24,71	5.255.273	3.567.818	1.687.455	47
AVERAGE		7,76	5,77	37,14	3.437.494	3.181.977	10,72	5.279.546	3.334.463	1.945.512	71,53

(*) price assumption for unhusked rice Rp1.200 per kg

Source: Pupuk Kaltim Web Site

CHAPTER VI

CONCLUSION AND POLICY RECOMMENDATION

VI.1 Conclusion

The modified Cobb-Douglas Production Function is sufficient as a proxy to measure the impact of Mandatory SNI on fertilizer to Indonesia's main crops production (paddy, maize, soybeans, peanuts, mungbeans, cassava and sweet potatoes).

With dummy-SNI included in that production function, the effect shown from the regression shows that, although small, there is a positive effect on the primary crop plants production after the implementation of Mandatory SNI on fertilizer.

Furthermore, with the qualitative analysis done at Chapter VI, it seems that the implementation of Mandatory SNI on fertilizer has little/no effect to the fact proposed by Calvin and Krissoff (1998), that the use of minimum standards somehow restricts trade more than what tariff did. From the fluctuation of imports shown at figure VI.1 we can see that at Mandatory SNI on fertilizer case, the possibility that this standard give negative effect as Technical Barrier to Trade is small.

From the producer side, the implementation of the Mandatory SNI on fertilizer gives them many benefits, in the way that low quality of imported fertilizer will get harder to penetrate Indonesia's market. Small and Medium fertilizer producer companies also get benefits from the implementation of this SNI, so their fertilizer's product can have minimum standard of quality and people's acceptance to their product will increase.

Indonesian Customs can easily inspect and stop any suspicious, below standard import fertilizer. Indonesian law enforcements also have better tools to monitor and secure any illegal fertilizer product, be it locally product or imported. With all this positive results, it turns out that importers must pay more in order to have the right using SNI Label (SPPT-SNI – *Sertifikat Produk Pengguna Tanda-SNI*).

As for the production of the primary crop plants, the implementation of Mandatory SNI on fertilizer appears to have positive effects in increasing productivity of those seven commodities. However, Indonesia critically needs a large increase in primary crop plants' productivity if the target of national food self-sufficiency program (Ketahanan Pangan Nasional) becomes reality.

VI.2 Policy Recommendation

Several crucial implication leads to recommendation of the future of implementation of the Mandatory SNI on fertilizer, are as follows:

VI.2.1 Stricter Enforcement for SNI Related Regulation

It is important that the mandatory SNI on fertilizer, along with other mandatory SNI's should implemented in the best, effective ways, so farmers can enjoy high quality of fertilizers that will ensure the production and productivity of the primary crop plants' increase. Started at 2007 with the implementation of the Ministry of Trade Decree's No. 14/M-DAG/PER/3/2007, replacing the Ministry of Industry and Trade Decree's No. No. 753/MPP/Kep/11/2002 GOI worked hard to ensure that the monitoring system of imported fertilizer and local fertilizer is working effectively.

However, as shown in Annex V, up until June 2007 only 4 out of total 60 importers at 2007 that have SNI certificate. Diah Maulida, Director General of Foreign Trade, Ministry of trade stated that the availability of imported fertilizer is still guaranteed, since one of those 4 importers that already have the SNI certificate is the biggest fertilizer importers. She urged the rest of the fertilizer importers to make haste in the process of SNI certification before December 2007.

During this transition process, it is imperative for GOI to perform a strict but also flexible approach to all the problems, in order to get maximum effect in regulating mandatory SNI. Proper preparation, publication and monitoring also need to be done so the GOI can play its role as regulator and monitoring agent.

VI.2.2 Strategies in Promoting Balance Fertilization

In order to effectively promoting balance fertilization to the farmers, GOI through Ministry of Agriculture should reach them at the production centre. GOI can create 'demonstration plot' as sample for applied balanced fertilization, usually conducted by fertilizer producers. Farmers come in this demplot in at two occasions, which are; Farmers Gatering, consists of 30-60 farmers, conducted in the regional meeting area (balai desa); and Farmers Field Day, with maximum 10 people, usually conducted twice a month, at random place.

With this kind of promotion, farmers can follow the demplot examples in their land, along with the credit availability to help farmers purchase fertilizers they need, and in the end they can enjoy the production and productivity of the primary crop plants' increase.

VI.3 Future Research

For future research, a more comprehensive approach of measuring Technical Barrier to Trade (TBT), whether with gravity model approach, price wedge approach, inventory based approach, survey approach, partial equilibrium and CGE approach, will give a better results. Also, more elaboration in searching the availability of data to support better estimation is needed to avoid specification bias.

REFERENCES

Cobb, C. W. and P. H. Douglas. 1928. *A Theory of Production*, American Economic Review, 18: Supplement, 139 - 165.

Hayami, Y. 1969. *On The Use of the Cobb-Douglas Production Function on the Cross-Country Analysis of Agricultural Production.* Farm Economist.

Johansen, L. 1972. *Production Functions: An Integration of Micro and Macro, Short Run and Long Run Aspects.* North-Holland Publishing Company, Amsterdam, London.

Sukana, E. and Notohadiprawiro, T. 1988. *Peranan Pupuk dalam Pembangunan Pertanian.* University of Gadjah Mada repro (2006).

Ronnen, Uri. 1991. *Minimum Quality Standards, Fixed Costs, and Competition. The RAND Journal of* Economics, Vol. 22, No. 4. pp. 490-504.

Swann, P., P. Temple and M. Shurmer. 1996. *Standards and Trade Performance: TheUK Experience.* Economic Journal, 106 (438): 1297-1313.

Mahé, L.P. 1997. *Environment and Quality Standards in the WTO: New Protectionism in Agricultural Trade? A European Perspective.* European Review of Agricultural Economics 24: 480-503.

Deardorff, Alan V. Stern, Robert M. 1997. *Measurement of Nontariff Barriers.* Research Seminar In International Economics, Discussion Paper No. 395.

Kurz D.H. and N. Salvadori 1997. *Theory of Production: A Long Period Analysis,*Cambridge University Press, U.K.

Calvin, L. and B. Krissoff. 1998. *Technical Barriers to Trade: A Case Study of Phytosanitary b*arriers and US-Japanese Apple Trade. Journal of Agricultural and Resource Economics, 23(2): 351-366.

Pindycks, Robert S., and Daniel L. Rubinfeld 1998. *Econometric Models and Economic Forecast.* Fourth Edition. McGraw-Hill International Editions. Singapore.

World Trade Organization. 1999. *The Legal Text, The Results of the Uruguay Round of Multilateral Organization.* The Press Syndicate of the University of Cambridge, Cambridge.

Roberts, D., Josling, E. Timothy, et al. 1999. Analyzing *Technical Barriers to Trade in Agricultural Markets.*Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture. Technical Bulletin No. 1876.

Swamm, G M Peter. 2000. *The Economics of Standardization: Final Report for Standard and Technical Regulations Directorate Department of Trade and Industry.* Manchester Business of School, University of Manchester.

Beghin, John C., Bureau, Jean-Cristophe. 2001. *Quantification of Sanitary, Phytosanitary, and Technical Barriers to Trade for Trade Policy Analysis.* Working Paper 01-WP 291, Central for Agricultural and Rural Development, Iowa State University.

Maskus, K.E., Wilson, J.S., Otsuki, T. 2001. *Quantifying the Impact of Technical Barriers to Trade: A Framework for Analysis.* The University of Michigan Press.

Wilson, John S. 2002. *Standards, Regulation, and Trade: Development, Trade, and the WTO; a Handbook Chapter 41.* The International Bank for Reconstruction and Development/ The World Bank.

Gujarati, Damodar N. 2003. *Basic Econometrics.* Fourth Edition, McGraw-Hill, New York.

Hsiao, C. 2003. *Analysis of Panel Data*, Cambridge University Press, Cambridge, the United Kingdom

Aryal, B. and Aryal, J. P. 2003. *Estimation of Paddy Production Function in Nepal Using Panel Data*. Department of Economics and Social Sciences, Agricultural University of Norway.

Maskus, K. E., Otsuki, T., Wilson, J.S. 2005. *The Cost of Compliance with Product Standards for Firms in Developing Countries: An Econometric Study*. World Bank Working Paper #3590, World Bank: Washington, DC.

Makarim, A. K. 2005. *Pemupukan Berimbang pada Tanaman Pangan: Khususnya Padi Sawah.* Seminar Rutin Puslitbang Tanaman Pangan, Bogor.

Widarjono, Agus. 2005. *Ekonometrika: Teori dan Aplikasi Untuk Ekonomi dan Bisnis*. Edisi Pertama, Ekonesia, Yogyakarta.

Essaji, Azim. 2006. *Technical Regulation and Specialization in International Trade.* School of Business and Economics, Wilfrid Laurier University.

Chen, M. X., T. Otsuki and J.S. Wilson. 2006. *Do Standards Matter for Export Decisions?.* Mimeo.

Ferrantino, Michael. 2006. *Quantifying The Trade And Economic Effects Of Non-Tariff Measures.* OECD Trade Policy Working Paper No. 28, TD/TC/WP(2005)26/FINAL.

Annex I
Regression's Result with PLS, common, no intercept

Dependent Variable: LOG(PRODUCTION?)
Method: Pooled Least Squares
Date: 12/27/07 Time: 01:34
Sample: 1997 2006
Included observations: 10
Number of cross-sections used: 7
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	135.1843	53.63392	2.520500	0.0143
LOG(HARVESTED?)	-2.577198	0.447170	-5.763346	0.0000
LOG(LABOR?)	-4.273857	1.531566	-2.790514	0.0070
LOG(BUFFALO?)	-3.744995	2.005856	-1.867031	0.0666
LOG(UREA?)	3.206038	1.466319	2.186453	0.0325
LOG(NON_UREA?)	0.450405	1.409123	0.319635	0.7503
D_SNI?	-0.178079	0.330369	-0.539032	0.5918

R-squared	0.792004	Mean dependent var	14.98035
Adjusted R-squared	0.772195	S.D. dependent var	1.771650
S.E. of regression	0.845590	Sum squared resid	45.04644
Log likelihood	-83.89765	F-statistic	39.98168
Durbin-Watson stat	**0.096410**	Prob(F-statistic)	0.000000

Annex II
Regression's Result with PLS, common, no intercept, AR(1)

Dependent Variable: LOG(PRODUCTION?)
Method: Pooled Least Squares
Date: 12/27/07 Time: 02:00
Sample: 1997 2006
Included observations: 10
Number of cross-sections used: 7
Total panel (balanced) observations: 63
Convergence achieved after 6 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	12.21822	8.272474	1.476973	0.1454
LOG(HARVESTED?)	0.682832	0.095411	7.156739	0.0000
LOG(LABOR?)	-0.355678	0.093494	-3.804267	0.0004
LOG(BUFFALO?)	-0.369229	0.146399	-2.522066	0.0146
LOG(UREA?)	0.139751	0.062738	2.227547	0.0300
LOG(NON_UREA?)	0.114950	0.049162	2.338198	0.0230
D_SNI?	0.045991	0.016322	2.817784	0.0067
AR(1)	1.001781	0.003603	278.0346	0.0000

R-squared	0.999720	Mean dependent var	14.98290
Adjusted R-squared	0.999684	S.D. dependent var	1.777940
S.E. of regression	0.031602	Sum squared resid	0.054927
Log likelihood	132.5209	F-statistic	28027.59
Durbin-Watson stat	2.875944	Prob(F-statistic)	0.000000

Annex III
Regression's Result with Fixed Effect, no weighting, AR(1)

Dependent Variable: LOG(PRODUCTION?)
Method: Pooled Least Squares
Date: 12/27/07 Time: 02:03
Sample: 1997 2006
Included observations: 10
Number of cross-sections used: 7
Total panel (balanced) observations: 63
Convergence achieved after 13 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(HARVESTED?)	0.688508	0.077757	8.854566	0.0000
LOG(LABOR?)	-0.368888	0.095127	-3.877851	0.0003
LOG(BUFFALO?)	-0.373877	0.105069	-3.558391	0.0008
LOG(UREA?)	0.131971	0.065432	2.016909	0.0492
LOG(NON_UREA?)	0.129660	0.040971	3.164709	0.0027
D_SNI?	0.047015	0.012060	3.898329	0.0003
AR(1)	0.614613	0.112451	5.465592	0.0000
Fixed Effects				
_PADDY--C	14.67763			
_MAIZE--C	14.28118			
_SOYBEANS--C	13.26706			
_PEANUTS--C	13.16159			
_CASSAVA--C	16.16315			
_MUNGBEANS--C	12.96757			
_SPOTATOES--C	15.28586			

R-squared	0.999799	Mean dependent var	14.98290
Adjusted R-squared	0.999746	S.D. dependent var	1.777940
S.E. of regression	0.028332	Sum squared resid	0.039332
Log likelihood	143.0403	F-statistic	18777.63
Durbin-Watson stat	2.655583	Prob(F-statistic)	0.000000

Annex IV
Final Regression's Result with GLS, Cross-Section Weighting, AR(1)

Dependent Variable: LOG(PRODUCTION?)
Method: GLS (Cross Section Weights)
Date: 12/19/07 Time: 02:10
Sample: 1997 2006
Included observations: 10
Number of cross-sections used: 7
Total panel (balanced) observations: 63
Convergence not achieved after 500 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(HARVESTED?)	0.687391	0.092388	7.440294	0.0000
LOG(LABOR?)	-0.373243	0.113724	-3.282018	0.0019
LOG(BUFFALO?)	-0.377969	0.124271	-3.041479	0.0038
LOG(UREA?)	0.133962	0.078278	1.711354	0.0933
LOG(NON_UREA?)	0.129780	0.048985	2.649398	0.0108
D_SNI?	0.046961	0.014301	3.283769	0.0019
AR(1)	0.616649	0.133493	4.619321	0.0000
Fixed Effects				
_PADDY--C	14.85353			
_MAIZE--C	14.45107			
_SOYBEANS--C	13.43345			
_PEANUTS--C	13.32785			
_CASSAVA--C	16.32647			
_MUNGBEANS--C	13.13090			
_SPOTATOES--C	15.44768			

Weighted Statistics

R-squared	0.999714	Mean dependent var	14.98289
Adjusted R-squared	0.999638	S.D. dependent var	1.773259
S.E. of regression	0.033738	Sum squared resid	0.055774
Log likelihood	137.3355	F-statistic	13171.52
Durbin-Watson stat	1.893821	Prob(F-statistic)	0.000000

Unweighted Statistics

R-squared	0.999717	Mean dependent var	14.98290
Adjusted R-squared	0.999641	S.D. dependent var	1.777940
S.E. of regression	0.033671	Sum squared resid	0.055553
Durbin-Watson stat	1.882915		

Annex V

WORLD NITROGEN CONSUMPTION (MILLION TON)

year	West Europe	Central Europe	Eastern Europe & Central Asia	North America	Latin America	Oceania	Africa	WANEA	South Asia	North-east & South-east Asia	East Asia	World	Developed	Developing
1960/61	3.35	0.76	0.77	2.82	0.42	0.03	0.14	0.26	0.31	1.2	0.77	10.83	8.55	2.28
1970/71	7.08	2.74	4.61	7.69	1.34	0.14	0.52	0.75	1.91	1.62	3.36	31.75	23.13	8.61
1971/72	7.37	2.81	5.18	7.6	1.39	0.14	0.66	0.83	2.3	1.7	3.52	33.49	24.01	9.49
1972/73	7.91	2.97	5.61	7.96	1.64	0.2	0.72	0.98	2.44	1.84	4.02	36.29	25.64	10.64
1973/74	8.32	3.16	6.22	8.81	1.67	0.22	0.71	1.05	2.38	2.19	4.6	39.33	27.86	11.48
1974/75	7.88	3.41	6.7	8.34	1.85	0.21	0.72	1.01	2.32	2.03	4.02	38.49	27.51	10.97
1975/76	8.42	3.88	7.34	10	1.89	0.19	0.83	1.24	2.81	2.06	5.24	43.9	30.79	13.11
1976/77	8.84	3.71	7.25	10.26	2.24	0.24	0.88	1.44	3.23	2.1	6.33	46.52	31.39	15.14
1977/78	9.13	3.87	7.52	9.74	2.53	0.21	0.88	1.59	3.81	2.32	8.41	50.02	31.57	18.45
1978/79	9.84	4.21	7.66	10.49	2.51	0.26	0.89	1.63	4.46	2.52	9.74	54.21	33.58	20.63
1979/80	10.43	4.25	7.47	11.23	2.68	0.28	0.98	1.77	4.69	2.67	11.02	57.46	34.86	22.6
1980/81	10.2	4.18	8.26	11.77	2.83	0.28	1.21	1.92	4.93	2.73	12.47	60.78	35.79	24.9
1981/82	10.04	4.41	8.38	10.95	2.85	0.29	1.28	2.08	5.27	2.92	12.02	60.5	35.28	25.21
1982/83	10.41	4.51	9.04	9.4	2.84	0.3	1.16	2.35	5.64	2.98	12.83	61.47	34.85	26.62
1983/84	10.62	4.58	10.3	11.31	2.7	0.35	1.07	2.62	6.61	3.15	14.37	67.68	38.26	29.41
1984/85	10.8	4.57	10.28	11.76	3.22	0.4	1.18	2.59	6.99	3.4	15.85	71.02	38.95	32.06
1985/86	11.1	4.55	10.95	10.77	3.4	0.38	1.24	2.59	7.34	3.47	14.57	70.37	38.86	31.51
1986/87	11.45	4.4	11.48	10.41	3.77	0.38	1.23	2.86	7.65	3.75	14.28	71.66	39.21	32.45
1987/88	11.37	4.3	11.78	10.72	3.92	0.42	1.13	3.13	7.67	3.91	17.45	75.8	39.62	36.18
1988/89	11.34	4.64	11.59	10.77	3.8	0.43	1.25	3.11	9.3	4.11	19.28	79.61	39.81	39.8
1989/90	11.13	4.52	9.92	11.24	3.78	0.48	1.23	3.36	9.69	4.14	19.62	79.12	38.34	40.78
1990/91	10.38	3.35	8.58	11.4	3.73	0.5	1.29	3.24	10.26	4.35	20.32	77.56	35.39	42.16
1991/92	10.07	2.08	7.84	11.64	3.5	0.54	1.24	3.23	10.41	4.09	20.88	75.46	33.07	42.39
1992/93	9.23	1.94	5.34	11.65	3.54	0.59	1.27	3.54	10.98	4.38	21.28	73.75	29.72	44.03
1993/94	9.34	1.84	3.98	12.9	3.67	0.69	1.42	3.53	11.39	4.5	19.05	72.44	29.92	42.52

1994/95	9.74	2.08	2.64	12.08	3.88	0.73	1.27	3.33	12.29	4.64	20.4	72.84	28.25	44.63
1995/96	9.8	2	2.55	12.74	3.91	0.83	1.11	3.4	12.94	4.72	24.06	78.07	28.88	49.18
1996/97	10.12	2.3	2.72	12.87	4.41	0.99	1.34	3.65	13.46	5.07	26	82.94	29.99	52.95
1997/98	10	2.23	2.8	12.82	4.57	1	1.3	3.83	14.07	4.86	23.87	81.34	29.78	51.56
1998/99	10.04	2.2	2.48	12.92	4.76	1.08	1.31	4.12	14.57	5.45	23.89	82.83	29.66	53.17
1999/00	10.16	2.05	2.54	12.85	4.69	1.27	1.39	4.24	15.05	5.46	25	84.7	29.89	54.9
2000/01	9.33	2.29	2.56	12.06	4.98	1.23	1.36	4.05	14.39	4.87	24.07	81.19	29.07	52.12
2001/02	9.36	2.39	2.64	12.47	5.02	1.32	1.46	4.02	14.89	5.02	24.3	82.89	29.09	53.8
2002/03	9.08	2.31	2.56	12.61	5.11	1.33	1.6	4.03	14.11	5.42	27.35	85.49	27.89	57.6
2003/04	9.18	2.32	2.49	13.47	5.98	1.3	1.53	4.16	14.92	5.53	26.17	87.06	28.76	58.29
2004/05	8.75	2.42	2.6	12.75	5.96	1.43	1.58	4.45	15.85	5.61	28.8	90.21	27.96	62.26
2005/06	8.47	2.44	2.66	12.19	5.67	1.4	1.43	4.55	17.04	5.56	29.44	90.86	27.17	63.69

Source : IFA

Annex VI

WORLD POSPHATE CONSUMPTION (MILLION TON)

year	West Europe	Central Europe	Eastern Europe & Central Asia	North America	Latin America	Oceania	Africa	WANEA	South Asia	North-east & South-east Asia	East Asia	World	Developed	Developing
1960/61	3.87	0.64	1.09	2.56	0.33	0.8	0.28	0.11	0.09	0.69	0.23	10.73	9.64	1.09
1970/71	5.89	1.86	3.13	4.67	0.93	1.08	0.5	0.31	0.63	1.03	1.07	21.11	17.59	3.52
1971/72	6.1	1.99	3.37	4.74	1.1	1.21	0.57	0.37	0.65	1.07	1.29	22.46	18.4	4.06
1972/73	6.33	2.14	3.52	5	1.43	1.41	0.6	0.44	0.71	1.17	1.46	24.21	19.47	4.74
1973/74	6.69	2.37	3.6	5.1	1.43	1.48	0.66	0.51	0.78	1.37	2.04	25.82	20.18	5.64
1974/75	5.47	2.47	4.16	4.67	1.62	0.83	0.69	0.49	0.6	1.27	1.91	24.18	18.67	5.51
1975/76	5.38	2.57	4.74	5.24	1.68	0.9	0.73	0.65	0.65	1.27	1.97	25.78	19.83	5.95
1976/77	5.79	2.67	4.9	5.6	1.98	1.14	0.79	0.84	0.85	1.25	1.87	27.68	21.23	6.45
1977/78	5.81	2.84	5.1	5.21	2.25	1.19	0.75	0.94	1.16	1.37	2.27	28.9	21.27	7.63
1978/79	6.37	2.91	5.36	5.7	2.28	1.3	0.78	0.95	1.44	1.5	1.57	30.17	22.84	7.33
1979/80	6.44	2.95	5.48	5.54	2.47	1.32	0.82	1.13	1.54	1.62	2.4	31.71	23.02	8.69
1980/81	5.89	2.76	5.59	5.56	2.77	1.2	0.97	1.03	1.6	1.57	3.1	32.03	22.16	9.87
1981/82	5.49	3.02	5.88	5.01	2.15	1.17	1.08	1.06	1.72	1.6	3.43	31.61	21.84	9.77
1982/83	5.47	2.86	6.11	4.42	2.08	1.08	0.95	1.32	1.88	1.66	3.6	31.44	21.19	10.24
1983/84	5.55	3.01	6.46	5.16	1.79	1.1	0.91	1.49	2.21	1.73	4.17	33.59	22.44	11.15
1984/85	5.4	3.06	6.64	4.96	2.5	1.1	0.95	1.53	2.4	1.8	4.19	34.55	22.36	12.19
1985/86	5.26	2.79	7.62	4.5	2.33	0.99	0.96	1.47	2.55	1.8	3.18	33.47	22.27	11.2
1986/87	5.28	2.82	8.35	4.28	2.78	0.98	0.93	1.51	2.71	1.95	3.17	34.76	22.81	11.95
1987/88	5.25	2.59	8.56	4.38	2.86	1.14	0.87	1.67	2.82	1.97	4.63	36.76	22.97	13.78
1988/89	5.15	2.62	8.56	4.35	2.72	1.03	0.9	1.63	3.36	2.06	5.36	37.72	22.75	14.97
1989/90	5.04	2.54	8.18	4.55	2.39	1.05	0.86	1.76	3.67	2.08	5.46	37.58	22.38	15.2
1990/91	4.49	1.5	7.81	4.39	2.67	0.8	0.83	1.87	3.89	2.18	6.03	36.07	19.97	16.1
1991/92	4.19	0.6	6.55	4.42	2.34	0.95	0.81	1.72	4.03	2.12	7.5	35.27	17.73	17.54
1992/93	3.75	0.64	3.23	4.64	2.3	1.11	0.82	1.8	3.6	2.15	7.12	31.18	14.33	16.85
1993/94	3.67	0.61	2.02	4.74	2.61	1.16	0.9	1.79	3.34	2.29	5.77	28.89	13.24	15.65

1994/95	3.74	0.58	0.72	4.63	2.82	1.32	0.81	1.45	3.57	2.2	7.66	29.48	11.95	17.54
1995/96	3.62	0.65	0.8	4.77	2.5	1.37	0.74	1.52	3.61	2.16	9.2	30.94	12.1	18.84
1996/97	3.79	0.7	0.98	4.88	3.01	1.38	0.77	1.56	3.57	2.1	8.44	31.2	12.63	18.57
1997/98	3.63	0.67	0.8	4.9	3.34	1.48	0.77	1.55	4.64	2.01	9.57	33.37	12.32	21.05
1998/99	3.61	0.62	0.65	4.53	3.43	1.44	0.78	1.61	4.8	2.06	9.8	33.33	11.64	21.69
1999/00	3.5	0.56	0.57	4.57	3.32	1.46	0.82	1.62	5.66	2	9.39	33.47	11.47	22
2000/01	3.09	0.59	0.58	4.5	3.84	1.61	0.75	1.58	5.17	1.68	9.09	32.48	11.29	21.19
2001/02	3	0.64	0.63	4.84	3.94	1.67	0.79	1.35	5.33	1.65	9.51	33.35	11.51	21.84
2002/03	2.96	0.62	0.61	4.55	4.08	1.59	0.88	1.31	4.98	1.78	10.48	33.83	10.33	23.51
2003/04	2.92	0.63	0.61	5.06	4.87	1.52	0.82	1.44	5.12	1.83	10.45	35.28	10.75	24.53
2004/05	2.75	0.65	0.68	4.83	5.57	1.56	0.87	1.44	5.88	1.9	11.33	37.47	10.48	26.99
2005/06	2.56	0.67	0.69	4.48	4.6	1.49	0.78	1.46	6.46	1.84	11.75	36.78	9.89	26.89

Source : IFA

Annex VII

WORLD POTASH CONSUMPTION (MILLION TON)

year	West Europe	Central Europe	Eastern Europe & Central Asia	North America	Latin America	Oceania	Africa	WANEA	South Asia	North-east & South-east Asia	East Asia	World	Developed	Developing
1960/61	3.74	0.66	0.77	2.06	0.24	0.09	0.1	0.01	0.07	0.69	0.05	8.48	7.96	0.52
1970/71	5.35	1.99	2.57	4.01	0.64	0.21	0.23	0.04	0.28	0.89	0.08	16.29	14.85	1.44
1971/72	5.56	2.19	2.79	4.1	0.65	0.2	0.28	0.04	0.34	0.85	0.06	17.08	15.54	1.54
1972/73	5.62	2.46	3.24	4.18	0.76	0.23	0.31	0.06	0.39	0.95	0.08	18.29	16.46	1.83
1973/74	6.04	2.66	3.61	4.8	0.91	0.29	0.31	0.05	0.41	1.12	0.24	20.41	18.21	2.2
1974/75	5.33	2.68	3.88	4.24	0.94	0.24	0.35	0.05	0.38	1.17	0.18	19.45	17.24	2.21
1975/76	5.19	3.15	5.18	4.95	0.93	0.2	0.32	0.05	0.32	0.97	0.16	21.42	19.32	2.09
1976/77	5.5	2.88	5.58	5.54	1.13	0.24	0.34	0.07	0.34	1.1	0.16	22.9	20.53	2.37
1977/78	5.49	2.88	5.4	5.28	1.37	0.24	0.35	0.06	0.56	1.18	0.21	23.04	20.11	2.92
1978/79	5.72	2.94	5.4	5.98	1.5	0.26	0.35	0.06	0.65	1.32	0.42	24.6	21.16	3.44
1979/80	5.92	2.86	4.41	6.02	1.57	0.24	0.35	0.07	0.68	1.46	0.51	24.09	20.33	3.76
1980/81	5.63	2.7	4.9	6.1	1.83	0.22	0.37	0.08	0.71	1.23	0.62	24.39	20.22	4.17
1981/82	5.58	3.03	4.91	5.44	1.31	0.24	0.42	0.08	0.77	1.28	0.84	23.88	19.89	3.99
1982/83	5.64	2.8	4.99	4.74	1.4	0.25	0.4	0.09	0.83	1.22	0.61	22.98	19.17	3.8
1983/84	5.72	2.92	6.2	5.62	1.24	0.27	0.37	0.12	0.89	1.38	0.82	25.56	21.5	4.06
1984/85	5.83	2.81	6.17	5.43	1.69	0.29	0.38	0.12	0.96	1.5	0.78	25.95	21.32	4.64
1985/86	5.71	2.72	6.82	4.98	1.7	0.23	0.42	0.14	0.93	1.49	0.47	25.63	21.23	4.4
1986/87	5.89	2.77	6.68	4.78	2.02	0.22	0.43	0.16	0.99	1.52	0.71	26.17	21.08	5.08
1987/88	5.75	2.63	7.05	4.91	2.13	0.23	0.42	0.17	1.04	1.71	1.36	27.4	21.3	6.09
1988/89	5.87	2.55	7.04	4.75	2.21	0.27	0.44	0.16	1.21	1.9	1.62	28.02	21.21	6.8
1989/90	5.71	2.16	6.38	5.08	2.02	0.28	0.44	0.17	1.34	1.85	1.25	26.68	20.33	6.36
1990/91	5.09	1.5	5.16	4.87	2	0.24	0.44	0.19	1.5	1.9	1.81	24.61	17.47	7.14
1991/92	4.7	0.62	5.02	4.9	1.9	0.25	0.43	0.16	1.52	1.84	2.31	23.72	16.19	7.53
1992/93	4.11	0.49	3.31	4.99	1.92	0.28	0.42	0.2	1.03	1.92	1.89	20.58	13.84	6.74
1993/94	4.15	0.49	1.65	5.09	2.14	0.32	0.45	0.22	1.05	1.97	1.44	19.08	12.44	6.63

1994/95	4.26	0.55	1.05	4.94	2.39	0.36	0.43	0.19	1.3	2.07	2.35	19.87	11.8	8.07
1995/96	4.33	0.57	0.94	5.08	2.33	0.38	0.4	0.18	1.34	2.17	2.84	20.55	11.95	8.6
1996/97	4.38	0.63	0.85	5.23	2.7	0.35	0.42	0.2	1.18	2.2	2.58	20.73	12.06	8.67
1997/98	4.31	0.66	0.97	5.17	3.11	0.39	0.44	0.21	1.57	2.09	3.5	22.42	12.09	10.33
1998/99	4.15	0.63	0.83	4.85	3.1	0.37	0.47	0.25	1.54	2.12	3.62	21.94	11.41	10.53
1999/00	3.94	0.59	0.77	4.84	2.94	0.36	0.43	0.34	1.9	2.24	3.83	22.21	11.05	11.16
2000/01	3.56	0.64	0.74	4.79	3.41	0.38	0.43	0.34	1.8	1.94	3.83	21.86	10.91	10.95
2001/02	3.47	0.62	0.76	4.84	3.88	0.39	0.47	0.37	1.88	1.96	4.37	23.02	10.59	12.43
2002/03	3.39	0.63	0.77	4.83	3.95	0.38	0.46	0.3	1.84	2.23	4.74	23.51	10.01	13.5
2003/04	3.37	0.65	0.79	5.36	5.23	0.41	0.42	0.35	1.85	2.54	4.59	25.55	10.57	14.97
2004/05	3.24	0.66	0.85	5.03	5.27	0.42	0.44	0.42	2.24	2.77	5.73	27.08	10.21	16.87
2005/06	3.04	0.69	0.85	4.65	4.45	0.39	0.39	0.44	2.6	2.8	6.15	26.44	9.62	16.82

Source : IFA

Annex VIII

COST COMPONENT's TO PRODUCE FERTILIZER until FOB/FOT at PT PETROKIMIA GRESIK YEAR 2006

COST TYPES	unit	UREA		ZA		SP-36		NPK	
		total	every ton	total	every ton	total	every ton	total	every ton
Total subsidized fertilizer	ton	415,000		600,000		700,000		400,000	
Natural gas cost	Rupiah	241,826,310,000	582,714	33,605,520,000	56,009	23,006,137,000	32,866	5,479,152,000	13,698
Other raw material cost	Rupiah	0		420,983,292,000	701,639	798,434,203,000	1,140,620	636,269,628,000	1,590,674
TOTAL Raw Material Cost	**Rupiah**	**241,826,310,000**	**582,714**	**454,588,812,000**	**757,648**	**821,440,340,000**	**1,173,486**	**641,748,780,000**	**1,604,372**
Water material cost	Rupiah	511,214,000	1,232	407,604,000	679	561,470,000	802	12,260,000	31
Additional material cost	Rupiah	69,527,419,000	167,536	48,064,248,000	80,107	36,533,413,000	52,191	32,693,208,000	81,733
Salary and wellness cost,	Rupiah	47,852,666,000	115,308	42,775,248,000	71,292	62,426,980,000	89,181	35,654,700,000	89,137
Maintenance and spare parts cost	Rupiah	13,084,369,000	31,529	14,830,488,000	24,717	32,690,846,000	46,701	12,924,348,000	32,311
Insurance and Services	Rupiah	8,776,881,000	21,149	4,746,606,000	7,911	15,450,855,000	22,073	4,225,156,000	10,563
Overhead, Administration and common cost	Rupiah	25,378,317,000	61,153	34,747,716,000	57,913	54,874,701,000	78,392	36,125,320,000	90,313
Depreciation and Amortization cost	Rupiah	33,622,163,000	81,017	10,154,310,000	16,924	12,344,059,000	17,634	27,853,044,000	69,633
Interest and Bank cost	Rupiah	18,899,444,000	45,541	33,045,504,000	55,076	16,057,671,000	22,940	28,990,584,000	72,746
Bag and Bagging cost	Rupiah	22,386,590,000	53,944	28,034,226,000	46,724	35,631,435,000	50,902	28,382,828,000	70,957

Total Production Cost to FOB/FOT	Rupiah	481,865,373,000	1,161,121	671,394,762,000	1,118,991	1,088,011,771,000	1,554,303	848,610,228,000	2,121,526
Margin profit 10%	Rupiah	48,186,537,300	116,112	67,139,476,200	111,899	108,801,177,100	155,430	84,861,022,800	212,153
TOTAL FOB/FOT	**Rupiah**	**530,051,910,300**	**1,277,234**	**738,534,238,200**	**1,230,890**	**1,088,011,771,000**	**1,709,733**	**933,471,250,800**	**2,333,678**

Source: BPK Report 2006 on State-own Company

Annex IX

List of Fertilizer's Importer Based on SNI status

January-June 2007

No	Importer	Form	Fertilizer Type	Country of Origin	Certificate status
1	Agri Indomas	PT	KCl	Jordan & Russia	Don't have
2	Agri Pacc	PT	NPK Natural Phospate	Malaysia Malaysia	Don't have
3	Agro Indomas	PT	NPK Natural Phospate	Malaysia Tunisia & Malaysia	Don't have
4	Agrotama Tunas Sarana	PT	NPK	Netherlands	Don't have
5	Antarniaga Nusantara	PT	Am. Sulfate	Japan	Don't have
6	Anugrah Kimia Ariwidya	PT	Am. Chloride	China	Don't have
7	Asia Kimindo Prima	PT	Am. Sulfate KCl	China Spain	Don't have
8	Asia Pupuk Guna Lestari	PT	DAP	China	Don't have
9	Asli Mulya	CV	Am. Sulfate	China-Taipeh	Don't have
10	Banjar Agro Sejahtera	PT	NPK NPK	China Japan	Don't have
11	Bumi Tani Subur	PT	TSP	China	Don't have
12	Caraka Agrindotama	PT	NPK	Singapore	Don't have
13	CCM Agripharma	PT	KCl Natural Phospate Natural Phospate	Germany Egypt Russia	Already aqcuired
14	CCM Indonesia	PT	KCl	Germany	Don't have
15	Galatta Lestarindo	PT	TSP	China	Don't have

16	Galic Bina Mada	PT	KCl NPK	USA USA	Don't have
17	Global Bara Deogras	PT	Am. Sulfate	China	Don't have
18	Graha Flora Indonesia	PT	NPK	USA	Don't have
19	Gunung Kuda	CV	NPK	USA	Don't have
20	Kalatham	PT	NPK DAP	Netherlands China	Don't have
21	Kebun Pantai Raja	PT	NPK	Malaysia	Don't have
22	Kertopaten Trading Coy	CV	Am. Sulfate	China	Don't have
23	Kharisma Karimun Putra	PT	NPK	Malaysia	Don't have
24	Kitani	PT	NPK	Malaysia	Don't have
25	Lautan Luas	PT	KCl	Belarussia	Don't have
26	Mega Setia Agung Kimia	PT	NPK	Malaysia	Don't have
27	Meroke Tetap Jaya	PT	KCl NPK	Germany Belgium	Already aqcuired
28	Mestika Karunia Utama	PT	NPK	Malaysia	Don't have
29	Mitra Austral Sejahtera	PT	NPK	Malaysia	Don't have
30	Multi Gambut Industri	PT	KCl	Malaysia	Don't have
31	Multi Mas Chemindo	PT	Natural Phospate NPK TSP DAP Am. Sulfate KCl	Egypt Malaysia China China China Russia	Don't have
32	Multigreen Indonesia	PT	NPK	Malaysia	Don't have
33	Nelson	CV	NPK	Malaysia	Don't have
34	Nufanadia Kencana	PT	Am. Chloride	China	Don't have
35	Nusamas Kimia Persada	PT	Natural Phospate	Egypt	Don't have
36	Parna Raya	PT	Am. Sulfate	Egypt	Don't have
37	Permata Agro Persada	PT	KCl	Russia	Don't have

38	Petrokimia Gresik	PT	Am. Sulfate SP-36 Natural Phospate DAP KCl	Japan, China & Russia China Egypt China Jordan & Canada	Don't have
39	Pupuk Hikay	PT	NPK Natural Phospate KCl	Malaysia & Thailand Tunisia Jordan	Already aqcuired
40	Pupuk Sriwidjaja	PT	TSP KCl	China Russia	In process of obtaining SPPT/CoC SNI
41	Putra Nusa	CV	NPK	Belgium	Don't have
42	Rolimex Kimia Nusamas	PT	TSP Natural Phospate	China Australia	In process of obtaining SPPT/CoC SNI
43	Sandika Natapalma	PT	NPK	Malaysia	Don't have
44	Santani Agro Lestari	PT	NPK	Belgium & Germany	In process of obtaining SPPT/CoC SNI
45	Santani Sejahtera	PT	TSP NPK	China Belgium & Germany	In process of obtaining SPPT/CoC SNI
46	Saprotan Utama	CV	NPK Am. Sulfate	Belgium, China & Netherlands China	In process of obtaining SPPT/CoC SNI
47	Sasco Indonesia	PT	Am. Sulfate KCl Natural Phospate	Korea & Japan Russia, Ukraine & Egypt Egypt	Don't have

			NPK TSP	Malaysia China	
48	Sentana Adidaya Pratama	PT	MAP Natural Phospate TSP KCl DAP Am. Phosphate	China Egypt China China, Canada China China	In process of obtaining SPPT/CoC SNI
49	Setia Gunung Benuan	PT	Borate	USA	Don't have
50	Sime Indo Agro	PT	Natural Phospate KCl Am. Sulfate	Tunisia Canada Australia & Japan	Don't have
51	Sukindo Supra Semesta	PT	Natural Phospate	China	Don't have
52	Sumber Agrindo Sejahtera	PT	NPK	Singapore & Japan	Don't have
53	Taiko Persada Indoprima	PT	KCl	Russia & Belarussia	In process of obtaining SPPT/CoC SNI
54	Tandes Lautan	PT	DAP	China	Don't have
55	Tanindo Subur Prima	PT	NPK	Netherlands & Thailand	Don't have
56	Timuraya Tunggal	PT	KCl	Jordan	Don't have
57	Unichem Candi Industri	PT	KCl	Canada	Don't have
58	United Agro Indonesia	PT	NPK	Malaysia	Don't have
59	Unitrada Komutama	PT	Natural Phospate	Egypt	Don't have
60	Yara Indonesia	PT	NPK	Norway	Already aqcuired

Source: DQC, Ministry of Trade