

THE STRATEGY OF SUSTAINABLE SOYBEAN DEVELOPMENT TO INCREASE SOYBEAN NEEDS IN NORTH SUMATERA

Leni Handayani¹, Abdul Rauf², Rahmawaty³, Tavi Supriana⁴

¹Postgraduate Student of Agricultural Science, [University of North Sumatra](#), Indonesia, leni.handayani99@yahoo.com

² Faculty of Agriculture Agroekoteknologi, [University of North Sumatra](#), Indonesia, a.raufismail@gmail.com

³ Faculty of Agriculture of Forestry, [University of North Sumatra](#), Indonesia, ramhawaty1974@gmail.com

⁴ Agricultural Faculty of Agribusiness, [University of North Sumatra](#), Indonesia, tavihutasuhut@yahoo.co.id

Abstract

The objective of the research was to analyze both internal and external factors influencing the strategy of sustainable soybean development to increase soybean needs in North Sumatera. SWOT analysis was used as the method of the research through identifying internal factors in the development of sustainable soybean consist of: human resources, capital used, certified seed, cropping pattern, and land fertility level, utilization of natural potency, technology used, farm management system, the width of land and the use of tools of production. While, the external factors in the development of soybean consist of: soybean cost, soybean processing industry, farmer group organization, soybean demand, government regulation and policy, imported soybean importation, lack of education, climate change and weather, pests and diseases, And communications, availability of production facilities. The result of the research showed that the strategy to increase soybean production in the research area was aggressive strategy or SO strategy (Strengths - Oppurtunities) in which this strategy used the power of using the opportunity through three activities : (1). Using certified seeds based on government's regulations and policies. (2). Utilizing the level of soil fertility and cropping patterns in order to meet the demand of soybeans. (3). Utilizing human resources through being a member of a farmer group.

Keywords : Development, Sustainability, Soybean

1. Introduction

Availability of food is essential for the stability of a country. The ability to be self-sufficient can save foreign exchange that can be utilized for other strategic purposes. In fact, to date in Indonesia import needs especially in the sectors of food needs are always increasing because the demand exceeds the supply of available food. Healthy lifestyle changes and progresses in the field of agro-industry and farming sectors. These conditions ultimately trigger a shortcut to import soybeans to meet the needs of the public soy consumption. in addition, an increase in the volume of i mports was also caused by increased demand for import soybean because it has cheaper prices than local soybean [2]

This condition occurs because there are gaps in the production and consumption of soy every year. Gaps occur due to the rate of domestic soybean production is unable to meet the pace of soybean demand. Increased demand for soybeans occur due to increasing population, rising

incomes, Soybean is one of food crops with high protein content (ca. 39%) consequently highly enthused by consumers. In addition, soybean has a great prospect of market and it can help farmers to increase their income. Year by year, soybean's demand increases because of the increasing of human population, however, the domestic production of soybean is only possible to reach 998.870 ton (Statistics Indonesia, 2016) or 37 % of national demand. Finally to cover the lack of production, import is the only reasonable effort.

[7] According to dependence on food from abroad in large numbers will cripple national resilience and disrupt social, economic and political stability. Food security and food sovereignty have a direct effect on people's welfare.

There are some environmental factors related to the lower productivity of soybean. Drought and flooding as results of climatic anomaly and climate change are the main causal factors. Many sectors are affected by climate changes, and agriculture is the most susceptible sector related to extreme climate change. Ecosystem of rice and other food crops such as soybean are the common examples that impacted by the extreme climate changes [4]

Soybean (*Glycine max* L) is a highly nutritious food commodities as a source of vegetable protein and low cholesterol at an affordable price. Soybeans is also an important food commodity after rice and maize. Soy consumption in the form of fresh or in processed form can improve nutrition. Soybean plants can grow well in areas with rainfall around 100-400 mm / month with temperatures between 21-34 degrees C and at a height of not more than 500 m above sea. In Indonesia, many processed soybeans for various foodstuffs, such as tempeh, soy milk, tofu, bean curd, soy sauce, oncom, tauco, soybean cake, ice cream, edible oil, and soy flour. In addition, it is also widely used as an animal feed ingredient [3]

Indonesia's dependence on soybean causes the commodity to be vulnerable to scarcity. Therefore, in order to spur the increase of soybean production to meet the domestic demand and import substitution which is increasing, it is necessary to study the sources of production growth in various provinces in Indonesia. Available land resources both within the agro-ecosystem of wetland, dryland and tidal swamps, are still large enough that can be used as a development area of soybean. In these agro-ecosystems, the intensity of planting is still low and there is considerable widespread sleeping land that has not been utilized [1]

The import price of imported soybean is mainly due to the efforts of importing countries to protect their soybean farmers, especially the United States (US). In 1998/1999, the US Department of Agriculture (USDA) provided soybean export credit with soft requirements to Indonesian soybean importers through a US \$ 12 million PI-480 program. This program can not be implemented because it is not guaranteed by the Government of Indonesia [6]

The import price of imported soybean is mainly due to the efforts of importing countries to protect their soybean farmers, especially the United States (US). In 1998/1999, the US Department of Agriculture (USDA) provided soybean export credit with soft requirements to Indonesian soybean importers through a US \$ 12 million PI-480 program. This program can not be implemented because it is not guaranteed by the Government of Indonesia. [5] Suggest four policies that can be taken to increase soybean production, namely: (1). Price-oriented pricing policies on producers, (2). Development of technology package (3). Subsidies of production facilities, and (4). Control of import and domestic trade.

2. Research Method

The data collected in this research consist of primary data and secondary data. Primary data is in the form of questionnaires obtained from the results of interviews as many as 120 soybean farmers consisting of 4 districts in North Sumatra namely Langkat, Deli Serdang, Serdang Bedagai and Simalungun using a list of questions that have been prepared previously. Secondary data are supporting data obtained from related institutions such as Central Bureau of Statistics (BPS) of North Sumatra and other related institutions. The method used in this research is SWOT analysis and position matrix to determine strategy in soybean development. This matrix produces four sets of alternative strategic possibilities, as illustrated in the diagram below :

Table 1. Position Matrices for Determining Strategies in Soybean Development

IFAS	STRENGTHS (S) • Determine 5 -10 internal strength factors	WEAKNESSES (W) • Determine 5 - 10 internal weakness factors
EFAS	STRATEGI SO • Determine 5 - 10 external opportunity factors Create strategies that use force to take advantage of opportunities	STRATEGI WO Creating strategies that minimize weaknesses to take advantage of opportunities
TREATHS (T)	STRATEGI ST • Determine 5 - 10 external threat factors Create strategies that use the power to deal with threats	STRATEGI WT Create strategies that minimize weaknesses and avoid threats

Prior to the data analysis as above then first performed data collection using the matrix model internal strategy factor, external factor matrix as below:

Table. 2. Category Assessment of Internal and External Factors

Rating	Category	Internal Factors	External Factors
4	Very Good	Strength	Oppurtunity
3	Good	Strength	Oppurtunity
2	Pretty Good	Strength	Oppurtunity
1	Not Good	Strength	Oppurtunity
1	Very Good	Weakness	Threats
2	Good	Weakness	Threats
3	Pretty Good	Weakness	Threats
4	Not Good	Weakness	Threats
Total Score			

Each internal factor of strength and external factors of opportunity are categorized as excellent until it is not good and given twigs ranging from 4 to excellent category to 1 for bad category. Whereas any internal factors of weakness and external factors of threats are categorized very well until not good and given twigs ranging from 4 for good category to 1 for bad category.

3. Results And Discussion

Sustainable Soy Development Strategy

Every farm certainly faces problems in the production process. But the problems in dealing with these goals must be able to determine the right development strategy of production in order to be able to position themselves in a favorable position. Based on the of data processing obtained from soybean farmers in the study area, the result is as follow.

Table 3. Merging of Internal and External Strategy Factor Factoring Matrix for Sustainable Soybean Development

Strategic Factors	Rating	weight	Score
Internal Strategy Factor			
<i>Strength</i>			
1. Human Resources in Producing Soybean	3	10	30
2. The capital used by farmers			
3. Use of Certified Seeds	2	6,67	13,34
4. Improving Cropping Patterns and Utilizing Potential Land	4	13,33	53,32
5. Availability of Land for Soybean Planting	4	13,33	53,32
	2	6,67	13,34
Total Strength Score	15	50	163,32
<i>Weakness</i>			
1. Utilization of Natural Potential	3	11,54	34,62
2. Technology used Farmers	3	11,54	34,62
3. Management System in Strive	3	11,54	34,62
4. Area of Cultivated Land	2	7,69	15,38
5. Use of Production Facilities	2	7,69	15,38
Total Weakness Score	13	50	134,62
Difference (Strength - Weakness)			28,70
External Strategic Factors			
<i>Oppurtunity</i>			
1. Selling Price of Soybean	2	5,89	11,78
2. The existence of Soybean Processing Industry	4	11,76	47,04
3. Farmer Group Organizations	3	8,83	26,49
4. Soy demand	4	11,76	47,04
5. Government Regulations and Policies	4	11,76	47,04
Total Opportunity Score	17	50	152,90
<i>Threats</i>			
1. Entrance of Imported Soybean	3	10,71	32,13
2. Lack of Counseling	2	7,14	14,28
3. Climate Change and Weather	2	7,14	14,28
4. Pest and Disease Attacks	3	10,71	32,13
5. The development of Information and Communication Technology	3	10,71	32,13
6. Availability of Production Facility Cois	1	3,57	3,57
Threats Total Score	14	50	128,52
Range (Opportunity – Threats)			24,38

Source: Primary Data Analysis

The data above shows that the difference of internal strategy factor (strength-weakness) is equal to 28.70 which means the influence of strength is greater than the influence of weakness in soybean development in research area. While the difference of external strategy factor (opportunity-threat) is 24.38 which means the influence of opportunity is greater than the effect of the threat on soybean development in the research area.

Table. 4. SWOT Matrix

INTERNAL	STRENGTH (S)	WEAKNESS (W)
	<ol style="list-style-type: none"> 1. Human resources in producing soybean (S1) 2. The capital used by farmers (S2) 3. Use of certified seed (S3) 4. Improved cropping pattern and utilization of land potential (S4) 5. Fertility Rate Land (S5) 	<ol style="list-style-type: none"> 1. Utilization of natural potential (W1) 2. The technology used (W2) 3. Management system in business (W3) 4. Cultivated area (W4) 5. use of production means (W5)
EXTERNAL	STRATEGY SO	STRATEGY WO
	<ol style="list-style-type: none"> 1. Utilizing human resources by being a member of farmer group (S1, O3) 2. Using certified seeds according to government regulations and policies (S4, O5) 3. Utilizing land fertility and cropping patterns to meet soybean demand (S5, S4, O1, O2, O4) 	<ol style="list-style-type: none"> 1. Utilizing demand and selling price of soybean by expanding farming land and managing natural potency (W1, W4, O1, O3) 2. Following training to improve skills in the use of technology (W2, O2, O3, O5) 3. Encourage the improvement of farmer group activities in the form of farm management training (W3, O3)
THREATS (T)	STRATEGY ST	STRATEGY WT
<ol style="list-style-type: none"> 1. The entry of imported soybean (T1) 2. Lack of education (T2) 3. Climate change and cuaca (T3) 4. Pests and diseases (T4) 5. The development of information and communication technology (T5) 6. availability of production facility kiosk (T6) 	<ol style="list-style-type: none"> 1. Using the land fertility level and improved cropping patterns to overcome the attacks of pests and diseases (S5, S4, T4) 2. Using capital to obtain the required production facilities (S2, T6) 	<ol style="list-style-type: none"> 1. Looking for information that can give hope for a better (W3, T5) 2. Utilizing existing counseling for soybean farming on available land (W4, T2, T3, T6)

From the above strategy results can be poured policies, programs and activities of soybean development as follows:

Strategy (S1,O3)	: Utilizing human resources by becoming a member of farmer groups
Effort	: Appropriate human resource upgrading so as to ensure the sustainability of a good production process so that the products can be maintained in quality, through the organization of farmer' groups, the farmers' experience will increase
Program	: Increased production, productivity and quality of sustainable soybean
Activities	: Agricultural institutions provide training to farmers
Strategy (S4,O5)	: Use certified seeds according to government regulations and policies
Effort	: Increase the production of soybean with the use of certified seed to ensure good quality of crop quality
Program	: Prevention of the use of poor quality seeds
Activities	: Certified seeds obtained from agricultural services provided free of charge through farmer groups designated as seed breeders of F2 and F3 derivatives
Strategy (S5, S4, O1, O2, O4)	: Utilizing the land fertility and cropping patterns to meet the demand for soybeans
Effort	: Increasing production by planting soybeans on suitable land for soybean crops and the utilization of vacant land (fallow) post-harvest rice can keep the soybean stock for industry.
Program	: The dependence of farmers on inorganic fertilizers (chemical) that make agricultural land damaged, the use of organic fertilizer can improve soil structure to be better
Activities	: Provision of subsidized fertilizer by the government to soybean farmers.

4. Conclusion

The strategy to increase soybean production in the research area is aggressive strategy or SO (Strengths - Oppurtunities) strategy that uses the power to exploit the existing opportunities with the following activities: (1). Use certified seeds in accordance with government regulations and policies. (2). Utilizing the level of soil fertility and cropping patterns to be able to meet the demand for soybeans. (3). Utilizing human resources by becoming a member of a farmer group.

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Acknowledgements

The strategy of sustainable soybean development to increase soybean need in North Sumatera

L Handayani¹, A Rauf², Rahmawaty³, T Supriana⁴

¹A Graduate Student of Agricultural Science, Universitas Sumatera Utara, Indonesia

²Department of Agriculture Agroekoteknologi, Universitas Sumatera Utara, Indonesia

³Department Agriculture Forestry, Universitas Sumatera Utara, Indonesia

⁴Department Agriculture Agribusiness, Universitas Sumatera Utara, Indonesia

Email : leni.handayani99@yahoo.com

Abstract: The objective of the research was to analyze both internal and external factors influencing the strategy of sustainable soybean development to increase soybean needs in North Sumatera. SWOT analysis was used as the method of the research through identifying internal factors in the development of sustainable soybean. The strategy to increase soybean production in the research area was aggressive strategy or strategy of SO (Strengths - Opportunities) that is using force to exploit existing opportunity with activities as follows : (1). Use certified seeds based in accordance with government regulations and policies. (2). Utilizing the level of soil fertility and cropping patterns in order to meet the demand of soybeans. (3). Utilizing human resources by becoming a member of a farmer group.

1. Introduction

Soybeans are the most important food crops after rice and maize. In addition, soy is also a commodity palawija rich in protein. Fresh soybeans are much needed in the food industry and soybean meal is needed for the feed industry. Soybean plays a role as an important vegetable source in order to increase the nutrition of the community because in addition to safe for health is also relatively cheap compared to the source of animal protein [1]

National soybean production has not been able to meet the needs, because the actual harvested area is still inadequate and the productivity is still low. Productivity at the farm level averaged 1.3 tons / ha, while the production potential reached 2.0 to 2.5 tons /ha. The large gap is partly due to the application of technology at the farmer level is still low, the use of limited seed and human resources still weak. Every year the industry knows tempe requires at least 1.85 million tons of soybeans, as well as the soy and tauco industry of around 325,220 tons. In addition, the seed industry also needs 25,843 tons of soybean, as well as for feeding about 8,319 tons of soybeans. To meet the shortage of needs each year, soybean imports reached 1.3 million tons. In fact, Indonesia is one of the countries that depend on imports of soybeans from the United States (US).

Availability of food is essential for the stability of a country. The ability to be self-sufficient can save foreign exchange that can be utilized for other strategic purposes. In fact,

to date in Indonesia import needs especially in the sectors of food needs are always increasing because the demand exceeds the supply of available food. healthy lifestyle changes and progress in the field of agro-industry and farming sectors. Conditions such as these that ultimately trigger a shortcut to import soybeans to meet the needs of the public soy consumption. in addition, an increase in the volume of imports was also caused by increased demand for import soybean because it has cheaper prices than local soybean [2]

Currently, soybean cultivation in paddy fields only reaches 65% of the total harvest area. The opportunity to increase soybean production is wide open due to the availability of potential area of about 800 thousand ha spread over 10 provinces. But the problem faced is to instill trust and interest of farmers to want to plant soybeans aback. [3]Argue that price protection is an effective way of encouraging increased production, adoption of fertilizer technology and labor absorption compared to fertilizer price subsidies. Acid Soils amelioration technology with high Al content is generally well known, that is by liming, giving organic matter and P fertilization from natural phosphate⁶. The soybean cultivation that reaches over 20 million ha in Brazil is almost entirely done on acid soils with high productivity after land amelioration is applied [5]

Conditions in the field also show that the application of soybean production technology components by farmers is not complete. Implementation of drainage channels, such as the width and depth of the channel, the number and location of the channel) is not in accordance with the recommendations. The soybean production technology package in NTB area shows the diversity of production level achieved by farmers between planting time, location and season. Application of true and exact technology package able to obtain result > 2.0 ton / ha[6]

There are some environmental factors related to the lower productivity of soybean. Drought and flooding as results of climatic anomaly and climate change are the main causal factors. Many sectors are affected by climate changes, and agriculture is the most susceptible sector related to extreme climate change. Ecosystem of rice and other food crops such as soybean are the common examples that impacted by the extreme climate changes [7]

Soybean (*Glycine max* L) is a highly nutritious food commodities as a source of vegetable protein and low cholesterol at an affordable price. Soybeans also an important food commodity after rice and maize. Soy consumption in the form of fresh or in processed form can improve nutrition. Soybean plants can grow well in areas with rainfall around 100-400 mm / month with temperatures between 21-34 degrees C and at a height of not more than 500 m above sea. In Indonesia, many processed soybeans for various foodstuffs, such as tempeh, soy milk, tofu, bean curd, soy sauce, oncom, tauco, soybean cake, ice cream, edible oil, and soy flour. In addition, it is also widely used as an animal feed ingredient [8]

From the above problems, it needs to be studied further about The Strategy of Sustainable Soybean Development to Increase Soybean Needs in North Sumatera.

2. Research Method

The data collected in this research consist of primary data and secondary data. Primary data is in the form of questionnaires obtained from the results of interviews as many as 120 soybean farmers consisting of 4 districts in North Sumatra namely Langkat, Deli Serdang, Serdang Bedagai and Simalungun using a list of questions that have been prepared previously. Secondary data are supporting data obtained from related institutions such as Central Bureau of Statistics (BPS) of North Sumatra and other related institutions. The method used in this

research is SWOT analysis and position matrix to determine strategy in soybean development. This matrix produces four sets of alternative strategic possibilities, as illustrated in the table 1.

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Rating	Category	Internal Factors	External Factors
4	Very Good	Strength	Oppurtunity
3	Good	Strength	Oppurtunity
2	Pretty Good	Strength	Oppurtunity
1	Not Good	Strength	Oppurtunity
-4	Very Good	Weakness	Threats
-3	Good	Weakness	Threats
-2	Pretty Good	Weakness	Threats
-1	Not Good	Weakness	Threats
Total Score			

Each internal factor of strength and external factors of opportunity is given very good category until it is not good and given a 4 start rating for category very good up to 1 for not good category. whereas any internal factors of weakness and external threat factors are categorized as excellent until not good and given a rating ranging from - 4 very good category up to - 1 for not good category.

3. Results And Discussions

3.1. Sustainable Soy Development Strategy

Every farming certainly faces problems in the production process. But the problems in dealing with these goals must be able to determine the right development strategy of production in order to be able to position them selves in a favorable position. Based on the of data processing obtained from soybean farmers in the study area, the result is as follow.

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1. Human Resources in Producing Soybean	3	10	30
2. The capital used by farmers			
3. Use of Certified Seeds	2	6,67	13,34
4. Improving Cropping Patterns and Utilizing Potential Land	4	13,33	53,32
	4	13,33	53,32
5. The Level of Land Fertility	2	6,67	13,34
Total Strength Score	15	50	163,32
<i>Weakness</i>			
1. Utilization of Natural Potential	-3	11,54	34,62
2. Technology used Farmers	-3	11,54	34,62
3. Management System in farming	-3	11,54	34,62
4. The area of land cultivated	-2	7,69	15,38
5. Use of production facilities	-2	7,69	15,38

Total Weakness Score	13	50	134,62
Difference (Strength - Weakness)			28,70
External Strategic Factors			
Oppurtunity			
1. Selling Price of Soybean	2	5,89	11,78
2. The existence of Soybean Processing Industry	4	11,76	47,04
3. Organization of Farmer Groups	3	8,83	26,49
4. Demand for Soybeans	4	11,76	47,04
5. Regulations and government policies	4	11,76	47,04
Total Opportunity Score	17	50	152,90
Threats			
1. Entry of imported soybeans	-3	10,71	32,13
2. Lack of Counseling	-2	7,14	14,28
3. Climate Change and Weather	-2	7,14	14,28
4. Development of Information and Communication Technology	-3	10,71	32,13
5. Availability kiosks Means of Production	-1	3,57	3,57
Threats Total Score	14	50	128,52
Range (Opportunity – Threats)			24,38

Source: Primary Data Analysis

The data above shows that the difference of internal strategy factor (strength-weakness) is equal to 28.70 which means the influence of strength is greater than the influence of weakness in soybean development in research area. While the difference of external strategy factor (opportunity-threat) is 24.38 which means the influence of opportunity is greater than influence of the threat on soybean development in the research area.

Table. 3. SWOT Matrix

INTERNAL	STRENGTH (S)	WEAKNESS (W)
	<ol style="list-style-type: none"> Human Resources in Producing Soybean (S1) The capital used by farmers (S2) Use of Certified Seeds (S3) Improving Cropping Patterns and Utilizing Potential Land (S4) The Level of Land Fertility (S5) 	<ol style="list-style-type: none"> Utilization of Natural Potential (W1) Technology used Farmers (W2) Management System in farming (W3) The area of land cultivated (W4) Use of production facilities (W5)
EXTERNAL	STRATEGY SO	STRATEGY WO
	<ol style="list-style-type: none"> Utilizing human resources by being a member of farmer group (S1, O3) Using certified seeds according to government regulations and policies (S4, O5) Utilizing land fertility and cropping patterns to meet soybean demand (S5, S4, O1, O2, O4) 	<ol style="list-style-type: none"> Utilizing demand and selling price of soybean by expanding farming land and managing natural potency (W1, W4, O1, O3) Following training to improve skills in the use of technology (W2, O2, O3, O5) Encourage the improvement of farmer group activities in the form of farm management training (W3, O3)
THREATS (T)	STRATEGY ST	STRATEGY WT
<ol style="list-style-type: none"> Entry of imported soybeans (T1) Lack of Counseling (T2) Climate Change and Weather (T3) 	<ol style="list-style-type: none"> Using the land fertility level and improved cropping patterns to overcome the attacks of pests and diseases (S5, S4, T4) Using capital to obtain the required 	<ol style="list-style-type: none"> Looking for information that can give hope for a better farming (W3, T5) Utilizing existing counseling for soybean farming on available

4. Development of Information and Communication Technology (T4)	production facilities (S2, T6)	land (W4, T2, T3, T6)
5. Availability kiosks Means of Production (T5)		

From the above strategy results can be poured policies, programs and activities of soybean development as follows:

Strategy (S1,O3) :

Utilizing human resources by becoming a member of farmer groups

Effort :

Appropriate human resource upgrading so as to ensure the sustainability of a good so that the production can be maintained its quality, through the organization of farmer' groups, the farmers' experience will increase

Program :

Increased production, productivity and quality of sustainable soybean

Activities :

Agricultural institutions provide training to farmers

Strategy (S4,O5) :

Using seeds certified in accordance with government regulations and policies

Effort :

Increase the production of soybean with the use of certified seed to guarantee quality yields the good one

Program :

Prevention use of seeds that less quality

Activities :

Certified seeds obtained from agricultural services provided free of charge through farmer groups designated as seed breeders of F2 and F3 derivatives

Strategy (S5, S4, O1, O2, O4) :

Utilizing the land fertility and cropping patterns to meet the demand for soybeans

Effort :

Increasing production by planting soybeans on suitable land for soybean crops and the utilization of vacant land (fallow) post harvest rice can keep the soybean stock for industry.

Program :

The dependence of farmers on inorganic fertilizers (chemical) that make agricultural land damaged, the use of organic fertilizer can improve soil structure to be better

Activities :

Provision of subsidized fertilizer by the government to soybean farmers.

4. Conclusion

1. The strategy to increase soybean production in the research area is aggressive strategy or SO (Strengths - Oppurtunities) strategy that uses the power to exploit the existing opportunities
2. With use the fower to exploit the existing opportunities with the following activities : (1). Use certified seeds in accordance with government regulations and policies. (2). Utilizing the level of soil fertility and cropping patterns to be able to meet the demand for soybeans. (3). Utilizing human resources by becoming a member of a farmer group

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Balas Ke: leni handayani <leni.handayani99@yahoo.com>
Kepada: "rahmawaty@usu.ac.id" <rahmawaty@usu.ac.id>

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