Empowerment of farmers in increasing production of environmentally friendly soybean plants: case study in Pandeglang regency Indonesia

A Mulyaningsih*, A T Sumantri

1Department of Agribisnis, Faculty of Agriculture, Universitas Sultan Ageng Tirtayasa, Jl. Raya Jakarta Km 4 Pakupatan Serang Banten Indonesia

*Corresponding author: asihmulya@ymail.com

Abstract. Soybean is one of the food commodities needed as a supplement to food nutrition because it is rich in vegetable protein, carbohydrates and fats. This study aims to analyze the empowerment of soybean farmers in Pandeglang Regency. The population in this study were soybean farmers in two sub-districts in Pandeglang Regency, Banten Province, namely Carita and Panimbang Subdistricts, which are centers of soybean plants. The number of samples is 150 farmers, soybean, two sub-districts in Pandeglang Regency, Banten Province. The research activities were carried out for three months (April to June 2019). Data is collected and processed using descriptive statistics and inferencing statistics. Data analysis with Different Mann Withney Test. The results showed that there were significant differences in the empowerment of farmers in the two sub-districts in Pandeglang District, where the empowerment of soybean farmers in Carita District was lower than that of Soybean Farmers in Panimbang District. For this reason, it is necessary to increase the empowerment of soybean farmers in Carita Subdistrict by increasing technical capabilities in managing soybean farming, the ability to overcome problems in soybean farming, to improve soybean farming planning capabilities. In addition, it is also necessary to increase the perception of soybean farmers that soybean commodities are potential commodities to be developed.

Keywords: empowerment, soybean.

1. Introduction

Soybean is an important food commodity in Indonesia because it is widely used as a source of vegetable protein for public consumption and the food industry in Indonesia. Soybean seeds contain many nutrients such as protein 30-50%, fat 15-25% and several important nutrients, such as vitamins (phytic acid) and lecithin [7]. The multipurpose nature of soybean causes high demand for soybeans in the country. In addition, the benefits of soybeans as a cheap source of protein make soybeans increasingly in demand. As the population increases, the demand for soybeans in the country has the potential to increase every year. Estimated domestic demand for soybeans per year is 2.4 million - 2.6 million tons, of which 70% - 80% these needs are met from imported soybeans. On the other hand, the ability to produce soybean domestically there is a tendency to decline from year to year so that the level of dependence on soybean imports is also high. Therefore efforts must be made to increase domestic soybean production.
Based on research carried out by several parties, various technologies have been found to increase function soybean production in Indonesia, but only a small portion is applied by farmers. This is because farmers consider the application of technology unprofitable because the price of soybeans in the market is low due to the presence of cheap imported soybeans. Therefore farmers only use makeshift technology so that production is not optimal and causes the productivity of national soybeans to be relatively low.

Based on the problems faced by farmers, it is necessary to find an alternative how so that the low input technology applied by farmers does not reduce soybean production, such as the use of drought resistant cultivars, little fertilization and weeds that are resistant to weeds. Finding cultivars that are resistant to weeds is an important thing because weeds can increase production costs and can reduce soybean yield. This is considered important because weeds are one of the contributors to the decline in soybean yields.

The ability of farmers to implement environmentally friendly innovations in addition to being seen from the technical and environmental aspects, can also be seen from the ability of farmers to plan and evaluate their farming in order to obtain business efficiency. The ability to adapt in the form of fighting power and adaptive power is generally still low. This can be seen from submission to unfavorable conditions, such as carrying out cultivation activities through hereditary methods, surrender to the conditions of infertile land, limited availability of water, pest attacks, low production and other problems encountered. Adaptation to various types of changes that occur, including market appetite for products that are safe for chemical residues, is still not anticipated by farmers in conducting their farming. Support for increasing farmer empowerment can be seen from the synergistic partnership capability in the form of building communication, interacting and collaborating as an important process in exchanging experiences, ideas, changing knowledge and views. The ability of farmers to cooperate with other groups and organizations is expected to overcome problems of limited capital and technology, improvement of product quality and marketing problems.

Based on the results of previous studies emphasizing the aspects of cultivation techniques, overcoming the negative impacts of conventional agriculture and evaluating the level of application of technology in programs to increase soybean production [15], [4], [16], [11], [13], [8], [6], [10]. The results of research related to farmer empowerment focus more on aspects of developing farmers' capabilities through institutions or farmer groups [1], [3], [19], [14], [18], not yet seeing the learning process of farmers as subjects that have the potential to be improved its ability through the power it has. The purpose of this study was to analyze the empowerment of soybean farmers in Pandeglang Regency.

2. Materials and Methods
This study used a survey method by distributing questionnaires. Qualitative analysis is done by in-depth interviews to explore or explore (exploratory) and understand the experiences of informants in the concept of empowerment. The format of questions is arranged in an ordinal scale with response categories arranged in a matrix form and consists of four answer choices, namely: always, often, rarely, never [12]. This study uses a probability sample design, meaning sampling is based on the idea that the entire population unit has the same opportunity to be sampled [2], [9]. The study was conducted for three months from April to June 2019 at the soybean production center in two sub-districts in Banten Province, namely Carita and Panimbang Districts. The sample in this study were 150 farmers from two sub-districts where each sub-district was 75 soybean farmers.

This study uses a probability sample design, meaning sampling is based on the idea that the entire population unit has the same opportunity to be used as a method [2], [9]. To see the difference in the level of empowerment of farmers, the data were analyzed using a Mann Withney different test conducted using SPSS 21 program assistance (Statistical Product and Service Solution 21).

**Mann Withney**

\[ U_1 = n_1 n_2 + \frac{n_1 (n_1 + 1)}{2} - R_1 \]  

(1)
\[ U_2 = n_1n_2 + \frac{n_1(n_1+1)}{2} - R_2 \]  

Information:
- \( n_1 \) = number of samples 1
- \( n_2 \) = number of samples 2
- \( R_1 \) = number of steps in sample 1
- \( R_2 \) = number of levels in sample 2

3. Results and Discussion

Community empowerment are elements that enable people to survive and in a dynamic sense develop themselves and achieve progress. Empowering the community is an effort to increase the dignity of the people who are not able to escape from the trap of poverty and underdevelopment.

Table 1. Average distribution and results of different tests of soybean farmers in Carita and Panimbang Districts based on indicators of farmer empowerment

| Empowerment of farmers | Category          | Percentage (%) | U-Test  |
|------------------------|-------------------|----------------|---------|
|                        |                   | Carita        | Panimbang | Total |
| Technical ability      | Less fortunate    | 7.40          | 33.80    | 20.60 |
|                        | Quite capable     | 23.10         | 34.30    | 28.70 |
|                        | Able              | 49.50         | 28.20    | 38.90 |
|                        | Very capable      | 19.90         | 3.70     | 11.80 |
| Average                |                   | 2.82          | 2.02     | 2.42  |
| Ability to overcome problems | Less fortunate | 18.50        | 21.30    | 19.90 |
|                        | Quite capable     | 48.10         | 49.50    | 48.80 |
|                        | Able              | 26.40         | 25.00    | 25.70 |
|                        | Very capable      | 6.90          | 4.20     | 5.60  |
| Average                |                   | 2.22          | 2.12     | 2.17  |
| Planning ability       | Less fortunate    | 4.20          | 17.60    | 10.90 |
|                        | Quite capable     | 48.60         | 47.20    | 47.90 |
|                        | Able              | 45.80         | 33.80    | 39.80 |
|                        | Very capable      | 1.40          | 1.40     | 1.40  |
| Average                |                   | 2.44          | 2.19     | 2.32  |
| Adaptability           | Less fortunate    | 6.00          | 46.80    | 26.40 |
|                        | Quite capable     | 39.80         | 36.60    | 38.20 |
|                        | Able              | 50.90         | 15.30    | 33.10 |
|                        | Very capable      | 3.20          | 1.40     | 2.30  |
| Average                |                   | 2.51          | 1.710    | 2.11  |

Empowering is enabling and empowering the community [5]. The empowerment of farmers in this study is measured by the ability of technical abilities, ability to overcome problems, planning ability, adaptability. The empowerment of soybean farmers is used as information on soybean farmers in Carita and Panimbang Districts. Based on the results of the Mann Whitney difference test there are differences in the empowerment of soybean farmers in Carita District with soybean farmers in Panimbang District.

3.1. Technical ability

Technical capability is the capability of farmers related to the technical management of soybean farming which includes: the ability to rotate varieties, the ability to maintain plants in the form of balanced fertilization and integrated pest control, to the ability to manage irrigation. In addition, the technical ability to apply the principles of environmentally friendly farming is also an important part.
Understanding of balanced fertilization, use of chemical pesticides, intermittent irrigation, utilization of straw as organic fertilizer as well as the replacement of soybean seeds can be understood by farmers, namely the level of error in answering low statements. This is because farmers have always listened to information on integrated crop management technology and in fact most have been applied in farming activities.

Based on Table 1, there are significant differences between the technical capabilities possessed by farmers in Carita and Panimbang Districts. It appears that the percentage of respondents who have technical capabilities in Carita District is better than Kedele farmers in Panimbang District. This is indicated by the presentation value of the technical capabilities of farmers in Carita District in the category of being able to manage soybean farming technically with a value of 49.5 percent while the tennis ability of soybean cultivation in Panimbang District is quite capable with a value of 34.3 percent. The average technical capability of soybean farmers in Carita District is higher than that of farmers in Panimbang District.

The complaints of farmers in the application of environmentally friendly innovations are in the use of organic fertilizers and vegetable pesticides. This innovation requires an outpouring of labor and time to make it because there is not much available compared to the use of chemical fertilizers and pesticides. The management of soybean farming in both sub-districts in Pandeglang Regency has been using conventional technology, such as planting soybean seeds at close distances, flooded irrigation, and using poor quality seeds. This was done based on the assumption that the technology had been carried out for generations and the results could be enough to support their lives so far.

3.2. Ability to overcome problems
The ability to overcome problems is an individual's ability which is also very important for farmers. The many problems in farming that are faced are often a burden and can interfere with farming activities. This individual ability, is the ability possessed by each individual, including farmers. The ability to overcome farming problems includes: (1) the ability to overcome scarcity of production facilities; (2) the ability to make organic fertilizers with available ingredients; (3) the ability to jointly control in one stretch; and (4) the ability to cooperate in cleaning irrigation channels independently. It can be seen in Table 1 that the level of ability to overcome problems in soybean farming in the total Carita Subdistrict reaches 2.22 percent, or more when compared to the number of respondents in Panimbang sub-district of 2.12 percent.

The results of the real difference test showed that there were significant differences between the ability to overcome the problems that were owned by farmers in Carita District and farmers in Panimbang District in the aspect of soybean farming. Common problems in aspects of soybean cultivation are more in handling pests and diseases, water management and balanced fertilization. Water problems are caused more by the availability of water and the frequent improvement of irrigation so that water closures occur. Some of these problems occur in both sub-districts. This certainly interferes with farming activities, so that effective and efficient use of water through intermittent irrigation systems can help farmers.

It can be seen in Table 1 that soybean farmers in both sub-districts were quite able to overcome the problem. However, there are significant differences between soybean farmers in Carita District and soybean farmers in Panimbang Subdistrict, where farmers in Panimbang sub-district are better able to overcome problems than farmers in Carita District. The farmers’ understanding of the concepts of soybean management, such as: the function of providing organic material (manure or compost) to the land, the benefits of conducting varieties rotation and the use of superior seeds, the benefits of intermittent irrigation, the use of decomposers and vegetable pesticides and fertilization balanced and specific locations classified as soybean farmers in Carita District are classified as capable of managing soybean farming technically. The existence of a good understanding of these concepts, it turns out, has not been fully implemented in managing the farm. The management of farming by most soybean farmers is still done conventionally and relies on habits originating from their parents.
3.3. Planning ability
Planning capability is a personal ability related to regular and planned farming efforts, ranging from land management, breeding, planting, maintenance, harvesting to post-harvest handling. All of them are intended to be well planned, so that they can obtain optimal results. Planning capabilities in this study include: (1) planning of farmland area; (2) financing planning; (3) farming records; and (4) taking into account the risks faced.

Table 1 shows that the average planning ability score is quite good in both Carita District and Panimbang District, but there are differences where farmers in Carita District are more capable than farmers in Panimbang District. Farming planning capabilities are influenced by individuals or personal, so generally very minimal is done in farming activities. Knowledge of planning generally can only be obtained from non-formal education activities such as: training, mentoring or other activities. Farmers generally do not do farming planning or farming records. His farming activities are generally based on habits. This shows that the level of ability of farmers, especially related to farming planning capabilities is still very low. These conditions can be obstacles in an effort to increase production.

3.4. Adaptability
Adaptation ability is the ability of each individual farmer to adapt to the environment. The adaptation ability is very important in farming activities, considering that agricultural activities are very dependent on natural conditions, such as climate, season and other natural conditions. The average score of adaptability of farmers in Carita Subdistrict is higher than that of petabi in Panimbang District (Table 1). Farmers in Carita sub-district are able to adapt to the environment while farmers in Panimbang sub-district are less able to adapt to the environment. Environmental adaptability becomes capital in farming activities, so that production results can be optimized. This is in line with [17] that the ability of farmers to know, master, understand and implement the technical principles of farming management will increase the independence and success of farmers.

Adaptation ability of farmers in Carita Subdistrict is the ability to overcome the attack of plant pests. The reason for farmers who are difficult to adapt is that they are accustomed to cultivating soybean plants conventionally and feel that they will find it difficult to try ways that are environmentally friendly, with perceptions of being busy, complicated and having no time.

Adaptation actions taken by farmers if there is a crop failure, ideally utilizing savings from the proceeds in the following planting seasons. But most farmers do not have savings to anticipate such an emergency. Most then rely on loans from other parties as a source of farming funding and the cost of daily living. This action certainly has further consequences, namely the emergence of debt, especially if the loan is flowering. This will be a new burden if farmers cannot pay it off. Adaptation actions carried out by respondent farmers still require costs. The condition of lack of farming capital that occurs in respondent farmers, especially if they experience crop failure, makes adaptation actions not optimal. One of them is the scale of farming that is managed to be minimized from the scale of previous farming. This implies the risk of production that is not optimal in the following season. The conventional adaptation actions taken by these respondents have also not been able to guarantee the return of lost business capital and the accumulation of income. In the long term, of course this can have an impact on the socio-economic conditions of farmers and their families.

Adaptation to the use of superior seeds was addressed by most farmers in both districts with captive breeding of local farmers and exchanging seeds among fellow farmers. Farmers replant their seeds 2-3 times, then replace or make a rotation of varieties to break the cycle of pest disease. For farmers who do not get superior seeds directly from Balai Benih exchange seeds so that they can plant superior seeds in the next planting season.

3.5. Level of Empowerment of Soybean Farmers
The level of empowerment is the ability possessed by farmers in the form of a connection of individual personal abilities in the form of perceptions of technical abilities in soybean farming, problem solving abilities, planning ability, and adaptability. Helpless farmers are farmers who have the ability to get...
technical management in kelede farming, are able to overcome problems faced in farming, are able to plan farming management, and are able to adapt to soybean farming.

Community empowerment are elements that enable people to survive and in a dynamic sense develop themselves and achieve progress. Empowering the community is an effort to increase the dignity of the people who are not able to escape from the trap of poverty and underdevelopment. In other words, empowering is enabling and empowering the community [5].

![Level of Empowerment](image)

**Figure 1.** The level of empowerment of soybean farmers

Based on Figure 1 it can be seen that the level of empowerment of soybean farmers in Carita and Panimbang Districts is quite high. However, the empowerment of farmers in Carita District is higher than the empowerment of soybean farmers in Panimbang District. This is because soybean plants are plants that are generally still relatively new applied in Pandeglang Regency. Where Pandeglang Regency is generally the main crop is rice. Marketing soybean plants still have difficulties compared to rice plants. However, soybean plants have good prospects because generally the people of Banten Province favor processed products from soybeans, namely tofu and tempeh. For this reason, soybean farmers need to increase their empowerment with extension activities.

**Conclusion**
The level of empowerment of eco-friendly soybean farmers is quite high both farmers in Carita District and farmers in Panimbang District. However, there are differences where soybean farmers in Carita Subdistrict are from the aspect of technical ability, problem solving ability, planning ability and adaptability in managing soybean farming.

**Recommendation**
It is necessary to increase the empowerment of soybean farmers that are environmentally friendly by providing counseling to soybean farmers so that farmers can apply the cultivation of soybean crops that are environmentally friendly so that soybean production increases while maintaining natural sustainability.

**References**
[1] Anantanyu S. 2012. Model partisipasi petani lahan kering dalam konservasi lahan. Jurnal
Ekonomi Pembangunan 13(2): 218-234. Surakarta.

[2] Bungin B. 2006. *Metodologi Penelitian Kuantitatif – Komunikasi, Ekonomi, dan Kebijakan Publik serta Ilmu-Ilmu Sosial lainnya*. Jakarta: Prenada Media Grup.

[3] Fatchiya A. 2010. Tingkat kapasitas pembudi daya ikan dalam mengelola usaha aquakultur secara berkelanjutan. *Jurnal Penyuluhan*. 6(1): 11 – 18.

[4] Hesti L, Hamid A, Suyatno A. 2014. Evaluasi penerapan teknologi pada program Sekolah Lapangan Pengelolaan Tanaman Terpadu (SLPTT) Padi di Kecamatan Benua Kayong Kabupaten Ketapang. *Jurnal Litbang Pertanian*. 20(3): 101-112.

[5] Hendratmoko C, Marsudi, Hidup. 2010. Analisis tingkat keberdayaan sosial ekonomi nelayan tangkap di Kabupaten Cilacap. *Jurnal Dinamika Sosial Ekonomi* 6 (1): 1-17.

[6] Hermanto. 2009. Reorientasi kebijakan pertanian dalam perspektif pembangunan berwawasan lingkungan. *Jurnal Analisis Kebijakan Pertanian*. 7(12): 369 - 383.

[7] Irawan B. 2006. Fenomena anomali iklim El nino dan La nina: Kecenderungan jangka panjang dan pengaruhnya terhadap produksi pangan. Bogor: Pusat Analisis Sosial Ekonomi dan Kebijakan Pertanian. *Forum Penelitian Agro Ekonomi (FAE)*. 24 (1): 28-45.

[8] Istiantoro, Bambang AN, Soeprobowowati TR. 2013. Analisis faktor-faktor sosial ekonomi yang mempengaruhi pengendalian hama dan penyakit padi sawah ditinjau dari sistem pertanian berkelanjutan. *Jurnal Ekosains*. 5(2): 16-20.

[9] Kerlinger FN, Lee HB. 2000. *Foundation of Behavioral Research*. Second edition. London: Holt, Rinehart and Winston. Inc.

[10] Las IK, Subagyono, Setiyanto AP. 2006. Isu dan pengelolaan lingkungan dalam revitalisasi pertanian. *Jurnal Litbang Pertanian*. 25 (3): 106-114

[11] Muhidin, Leomo S. 2008. Sistem produksi padi ramah lingkungan. *Jurnal WartaWiptek*. 16 (1): 14-21.

[12] Neuman LW. 2006. *Social Research Methods Qualitative and Quantitative Approaches*. Boston: Pearson

[13] Pirngadi K. 2009. Peran Bahan Organik dalam Peningkatan Produksi Padi Berkelanjutan Mendukung Ketahanan Pangan Nasional. *Jurnal Pengembangan Inovasi Pertanian*. 2(1): 48 – 64.

[14] Ruhimat IS. 2014. Model peningkatan kapasitas petani dalam pengelolaan hutan rakyat: Studi di Desa Rangrang, Kalimantan Selatan. *Jurnal Penelitian Kehutanan Wallacea* 4(1): 11 – 21.

[15] Saptana, Ashari. 2007. Pembangunan pertanian berkelanjutan melalui kemitraan usaha. *Jurnal Litbang Pertanian*. 26(4): 123 – 130.

[16] Setiawan I. 2012. Dinamika Pemberdayaan Petani: Sebuah Refleksi dan Generalisasi di Jawa Barat. Bandung (ID): Widya Padjajaran.

[17] Suprayitno AR, Sumardjo, Gani DS, Sugihen BG. 2012. Motivasi dan partisipasi dalam pengelolaan hutan kemiri di Kabupaten Maros Provinsi Sulawesi Selatan. *Jurnal Penyuluhan*. 8(2): 149-169.

[18] Yumi, Sumardjo, Darwis SG, Sugihen BG. 2012. Model pengembangan pembelajaran petani dalam pengelolaan hutan rakyat lestari (Kasus di Kabupaten Gunung Kidul, Provinsi Daerah Istimewa Yogyakarta dan Wonogiri, Provinsi Jawa Tengah). *Jurnal Penyuluhan*. 8(2): 17 – 27.

[19] Yunita, Sugihen BG, Asngari PS, Susanto D, Amanah S. 2012. Strategi peningkatan kapasitas rumah tangga petani padi sawah lebih menuju ketahanan pangan rumah tangga (Kasus di Kabupaten Ogan Ilir dan Ogan Komering Ilir, Sumatera Selatan). *Jurnal Penyuluhan*. 8(2): 10-16.