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Empowerment of Farmers in Diversification of Local Food

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Abstract: Food security must be realized equitably by utilizing local resources, institutions, and culture. Food security that is developed based on the strength of local resources will create food self-sufficiency. This research aimed to analyze the level of empowerment of farmers, analyze the factors that influence the level of farmer empowerment, and analyze the constraints faced by farmers in realizing food diversification. The research results can be used in designing farmer empowerment strategies. Field data collection has been conducted for three months, from February to April 2021. The research location is in Pandeglang Regency, Banten Province because it is the corn, cassava, and sweet potato production center. The research sample amounted to 90 farmers. Smart PLS 3.0 is applied in data analysis. Research results showed that: Empowerment of farmers in Pandeglang Regency is moderate; factors influencing farmer empowerment are factors of farmers' perception and intensity of empowerment; and the constraints faced by farmers in realizing local food diversification are the availability of raw materials for sweet potato, cassava, and corn, which is still very volatile.

Keywords: empowerment, diversification, local food.

在當地食品多樣化方面賦予農民權力

摘要: 必須通過利用當地資源、制度和文化來公平地實現糧食安全。基於當地資源優勢發展的糧食安全將創造糧食自給自足。本研究的目的是分析農民賦權水平；分析了影響農民賦權水平的因素；分析了農民在實現糧食多樣化方面面臨的製約因素。研究結果可用於設計農民賦權策略。實地數據收集已經進行了三個月，從 2 月到 2021 年 4 月。研究地點位於萬丹省 潘德朗攝政，因為它是玉米、木薯和甘藷生產的中心。研究樣本達 90 名農民。 智能公共服务系统 3.0 應用於數據分析。研究結果表明： 潘德朗縣農民賦權適中；影響農民賦權的因素是農民對賦權的認知和強度的因素；農民在實現當地食品多樣化方面面臨的製約因素是甘藷、木薯和玉米的原料供應仍然非常不穩定。

关键词： 賦權、多樣化、當地食品。

1. Introduction

Food security is a condition of meeting food needs in terms of quantity, quality, safety, equity, and affordability by all levels of society [1]. Food is a basic need that must be consumed every day. Food for every household is a must and a shared responsibility between the government and the community. Food for every household is a must and a shared responsibility between the government and the community. Food security that is developed based on the strength of local resources will create food independence, which will give birth to healthy, active, and competitive individuals as indicators of food security [2-4].

Realizing national food security based on food self-sufficiency has become the government's commitment

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to domestic economic and agricultural development. Food security is built based on local resources, institutions, and culture, which aims to increase the diversity of production and consumption of local food that is nutritious and safe for consumption by the community. In the Strategic Plan of the Ministry of Agriculture 2010-2014, it is stated that there are 11 basic problems in the agricultural sector, namely: (1) increasing environmental damage and global climate change; (2) availability of infrastructure, infrastructure, land, and water; (3) status and area of land ownership (9.55 million households < 0.5 ha); (4) weak national seed and nursery system; (5) limited access of farmers to capital and still high-interest rates for farming; (6) weak capacity and institutions of farmers and extension workers; (7) food security and energy security are still vulnerable; (8) food diversification has not been implemented properly; (9) low farmer exchange rate (NTP); (10) inter-sectoral integration is not yet integrated with supporting agricultural development; and (11) less than optimal performance and services of the agricultural bureaucracy [5]. Related to these problems, it is necessary to empower farmers that lead to the use of local food.

The government issued Presidential Regulation concerning Policies for Accelerating Diversification of Food Consumption Based on Local Resources. However, the impact of the COVID-19 pandemic in the agricultural sector has changed consumption patterns quite significantly. However, being a farmer continues to produce is a priority in agricultural development. For this reason, during the COVID-19 pandemic, farmers must have the capacity to improve food security. Achievement of corn, cassava, and sweet potato farmers' capacity can be achieved, among other things, with an awareness approach through the implementation of agriculture extension [6-8].

Realizing national food security based on food self-sufficiency has become the government's commitment to domestic economic and agricultural development. Food security is built based on local resources, institutions, and culture, which aims to increase the diversity of production and consumption of local food that is nutritious and safe for consumption by the community. Food security is built based on the following principles: (a) food security takes into account the dimensions of consumption and production; (b) sufficient and equitable food is available for all Indonesian people to meet the needs of a healthy and productive life; (c) efforts to diversify food consumption occur if people's incomes increase and food products are valued according to their economic value; (d) diversification of food production, especially flours, adjusted to the potential of regional food production; (e) development of new large-scale economic food production centers outside Java; and (f) increased productivity through increased research and development activities, particularly for seeds and post-harvest technology.

The results of a study by the Ministry of the Environment, as cited by the Center for Food Availability and Insecurity, state that Indonesia has at least 100 species of grain plants, tubers, and sago, flour, and sugar producers a source of carbohydrates. However, only a few types of food sources of carbohydrates are widely known and used for intensive consumption, such as rice, corn, cassava, sweet potato, sago, and others. Some of these foods have been replaced by rice and wheat [9]. Various local foods such as corn, tubers, and sago have broad prospects of being developed to substitute rice and processed into prestigious foods. Moreover, farmers have yet to anticipate changes in consumer tastes, such as preferences for organic products with minimal chemical residues. Empowerment building is possible when supported by farmers' ability to establish synergic partnerships, including initiating communication, interacting, and working together with other farmers. These efforts are a crucial process in changing experiences and ideas and transforming non-formal education and perceptions. Being adept at cooperating with other groups and organizations is believed to overcome problems arising from limited capital and technology, decreased product quality, and marketing challenges. This study seeks to analyze farmers' level of empowerment, analyze the factors that influence the level of farmer empowerment, and analyze the constraints farmers face in realizing food diversification.

2. Research Method

This study was designed with a quantitative research approach with a survey method. The authors collected data using a questionnaire as a research instrument and FGD. The research location was chosen intentionally, considering that the research location is a production center for corn, sweet potatoes, and cassava in Pandeglang Regency, Banten Province. From each, the three central districts of these commodities were selected sub-district. The district selected for Pandeglang Regency is District Munjul for the corn plant center, District Angsana for the cassava plant center, and Menes District for the plant centers sweet potato. The research sample taken was 90 farmers spread over three sub-districts. Two villages were taken from each sub-district, and 30 samples from each sub-district were taken. The types of data in this study are primary data and secondary data. Data scale is ordinal data with primary data source collected by spreading the list in-depth interviews and questions. Data secondary obtained from literature studies that support research.

The variables used in this study are X1 (perception) has five measured indicators: X1.1 Relative advantage, X1.2 complexity, X1.3 Suitability, X1.4 Easy to try,

and X1.5 Easy to observe. The variable X2 (supporting factor) has five measured indicators: X2.1 Support for government policies, X2.2 Support for farmer leaders, X2.3 Support for infrastructure facilities and infrastructure, X2.4 Institutional support, and X2.5 Market information support. The variable X3 (intensity of empowerment) has five measured indicators: X3.1 Technical ability, X3.2 Innovative behavior, X3.3 Farmer Involvement, X3.4 Resources, and X3.5 Collaborating. Variable Y1 (Empowerment) has five indicators measured: Y1.1 Ability to obtain information, Y1.2 Ability to make decisions, Y1.3 ability to manage finances, Y1.4 ability to partner, and Y1.5 ability to adapt. Variable Y2 (Independence) has three indicators measured: Y1.1 Competitiveness, Y1.2 Filtering Power, and Y1.3 Pairing Power. Data analysis using Partial Least Square (PLS) with Smart PLS software version 3.0. PLS is a Structural Equation Modeling (SEM) equation model with an approach based on variance or component-based structural equation modeling. PLS is a powerful analytical method because it is not based on many assumptions. The data also does not have a multivariate normal distribution (indicators with categorical, ordinal, interval to ratio scales can be used in the same model). The sample does not have to be large [10]. The limitation of this study is that the research sample is limited to farmers who cultivate maize, potatoes, and sweet potatoes.

3. Results and Discussion

3.1. The Level of Empowerment

The level of empowerment is the ability of farmers in the form of linkages with individual personal abilities in the form of perceptions of their abilities and environment, actions, and collective abilities to achieve goals and the ability to survive the problems in carrying out agricultural resource management activities to meet their daily needs. The level of empowerment is measured using five indicators, namely: the ability to obtain information, the ability to make decisions, the ability to manage finances, the ability to partner, and the ability to adapt.

Community empowerment is the element that enables the community to survive and, in a dynamic sense, develop themselves and achieve progress. Empowering the community is an effort to increase the dignity of the layers of society that are unable to escape the trap of poverty and underdevelopment in their current condition. In other words, empowering is enabling and empowering the community [11]. The empowerment of corn, cassava, and sweet potato farmers is presented in Figure 1. It can be seen that the level of empowerment of farmers is moderate in their ability to make decisions to plant corn, sweet potato, and cassava. The results of this study are in line with the results of previous studies [12], that capacity of farmers, in general, is the medium category.

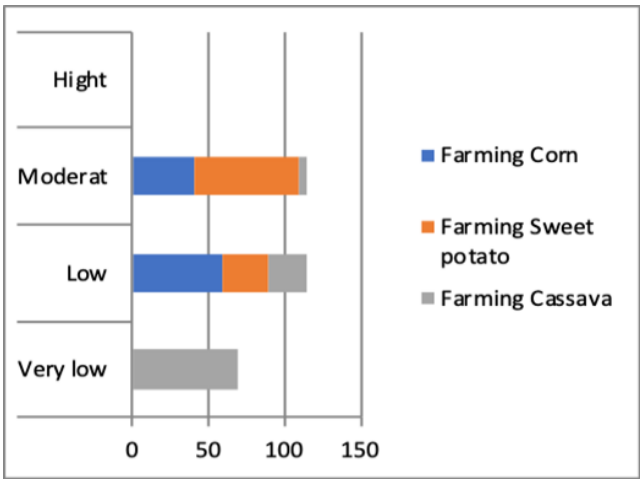

Fig. 1 Empowerment level of corn, cassava, and sweet potato farmers

3.1.1. Level of Ability to Get Information

The aspect of the ability of farmers to get information on farming corn, sweet potatoes, and cassava in this study is classified as moderate because there are less information and assistance programs for non-rice food crops than information on rice plants. The ability of farmers to obtain useful market information for farming from agricultural extension agents, mass media, TV, and the internet is still low.

3.1.2. Level of Decision-Making Ability

In this study, the ability of farmers to make decisions is moderate, seen from the way they find problems and needs (seeds and fertilizers) in farming corn, sweet potatoes, and cassava, look for alternatives to solve problems and meet needs (seeds and fertilizers). How to find the presence of pest problems in his farm, determine the right choice of control methods to overcome pest problems in his farm according to Integrated Pest Control (IPM) principles, and solve the problems faced in his farming.

3.1.3. Level of Ability to Manage Finances

The ability to manage finances in this study was classified as moderate in their ability to plan corn, sweet potato, and cassava farming, such as keeping simple bookkeeping for farming and calculating and taking risks in developing farming and applying new technologies. The ability to manage farmers' finances is classified as moderate because generally, the corn, sweet potato, and cassava farming yields are immediately used up for their family's consumption needs.

3.1.4. Partnering Ability Level

The level of ability to collaborate with corn, sweet potato, and cassava farmers is moderate. This is because farmers cooperate with other farmers in the group, improve their farming, cooperate with members of other farmer groups outside their farmer group, establish cooperation with institutions providing production facilities, establish cooperation with

marketing institutions for their farming products, and establish equal mutually beneficial cooperation. Collaborating with corn, sweet potato, and cassava, farmers generally sell corn, sweet potato, and cassava farming results.

3.1.5. Level of Adaptability

The adaptability of corn, sweet potato, and cassava farmers is moderate. The ability of farmers to adapt in the face of changes in agricultural technology (land cultivation, nurseries, and planting), in pest and disease control, post-harvest, consumer demand where consumers seek higher quality products, and changes in agricultural technology. The ability of farmers to adapt to corn, sweet potato, and cassava plants, which are relatively new compared to planting rice, is still relatively moderate.

3.2. Factors that Affect Farmer Empowerment

Based on the results of data processing using smart PLS, the model equation is obtained as follows: Y1 = 0.547X1 + 0.216X3, R1 = 41.5% Y2 = 0.748Y1 = 83% Y1. This means that the higher the farmer perception and empowerment intensity factors, the higher the empowerment of corn farmers, cassava, and sweet potato. The two variables simultaneously affect the empowerment of farmers by 0.415. In other words, the model can explain 41.5% of the data diversity, while the rest (58.5%) is formed by unknown variables (not included in the model) and errors. Y2 - the empowerment of farmers directly affects the independence of farmers, amounting to 0.830. In other words, the model can explain 83.0% of the data diversity, while the rest (17.0%) is formed by unknown variables (not included in the model) and errors. The higher the empowerment of farmers, the higher the independence of corn, cassava, and sweet potato farmers. Farmers' perception factors, supporting factors, and intensity factors empowerment indirectly through the empowerment of farmers affect the independence of farmers.

Path coefficient evaluation is used to show how strong the effect or influence of the independent variable (independent) is on the dependent variable (dependent variable). The Path Coefficient test will show how strong the influence of the independent variable is on the dependent variable.

Based on the results of data processing using Smart PLS, the factors that indirectly influence the independence of corn, sweet potato, and cassava farmers through the mediating variable of farmer empowerment are the perception factor (relative advantage, complexity, suitability, and ease of trial) and the empowerment intensity factor (human resources and cooperation). Perception factors directly affect farmer empowerment. The perception of farmers on the relative advantages of cultivating corn, cassava, and sweet potatoes provides a relative advantage where farming capital used to grow corn, cassava, and sweet potatoes does not require large capital. The selling price of corn, cassava, and sweet potatoes is quite profitable for farmers, and the yields of these three crops are high. Based on the perception of corn, sweet potato, and cassava farmers in terms of complexity in farming the three commodities, it is perceived that the cultivation of these three commodities is easy (not complicated), and these three crops can be planted continuously. Based on the perception of suitability, farmers perceive that from the three commodities, the land in Pandeglang Regency, especially the Angsana, Munjul, and Menes Sub-districts, is suitable for planting corn, sweet potato, and cassava. In addition, the farmers there are used to farming these three commodities. Based on the farmer's perception, the three crop commodities are easy to cultivate because there is no need for procedural planting.

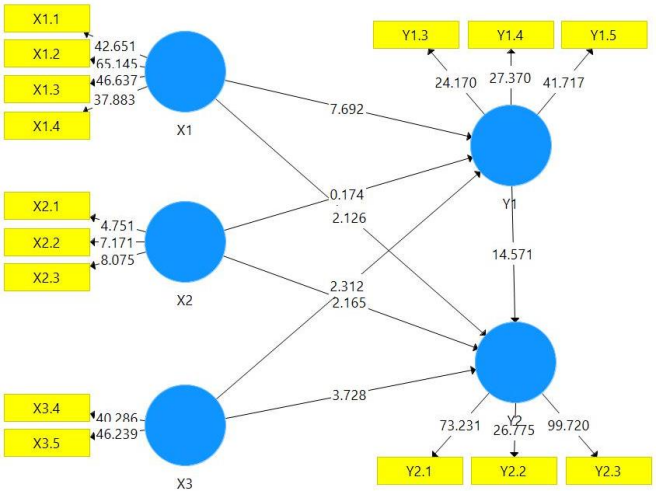

Figure 2 Inner model

The empowerment intensity factor affects farmer empowerment. The indicators reflect the intensity of empowerment on the level of empowerment of the farmers of the three commodities: the ability of resources and the ability to cooperate. This means that the right intensity of empowerment will increase the empowerment of corn, sweet potato, and cassava farmers in supporting food diversification by increasing farmer resources by increasing the extension of these three commodities with extension materials on cultivation and post-harvest and marketing. To increase the empowerment of farmers in their ability to cooperate with fellow farmers in farmer groups, extension workers must facilitate cooperation with other farmer groups, cooperation with partners, and cooperation with the government and the business world. The results of the Smart PLS analysis show that the coefficient of the influence of the intensity of empowerment is positive. This means that the higher the intensity of farmer empowerment, the higher the level of farmer empowerment. The results of this study are in line with previous research that intensive empowerment has a positive impact on farmers [11, 13].

3.3. Obstacles Faced By Farmers in Realizing Local Food Diversification

Constraints on the availability of sweet potato raw materials are still very volatile because they depend on cropping patterns and harvest seasons. Sweet potatoes cannot be planted continuously in one year because they are susceptible to pest attack by boleng (*Cylas Formicarius*), which harms the appearance and taste of the product. This fluctuating condition affects the price of tubers, which can reach Rp. 1,000 - Rp. 2,000/kg at harvest time and Rp 3,000 - Rp 4,000/kg at the non-harvest season. This will affect the selling price of the product and the continuity of the sweet potato processing business. Therefore, several strategies are needed to ensure the supply and price of raw materials whose fluctuations are not too sharp, including planting high-yielding varieties with high yield potential (> 25 t/ha) and according to their intended use with appropriate cultivation techniques, especially in rural areas. - Areas of sweet potato production centers, arranging planting schedules and harvesting times according to local seasons and cropping patterns, as well as proper post-harvest handling to maintain the physical and chemical quality of tubers before they are processed into various products. This can be done with the strategy of owning a garden and/or partnering with farmers/farmer groups around the business location so that the planting and harvesting schedule and the quality of raw materials are easier to manage and control. Processed business actors also need to be observant in choosing the products to be produced based on the availability of raw materials and facilities owned. Producing preparations from fresh tubers and sweet potato paste is more profitable because the yield of the product is high but requires continuous availability of raw materials because fresh tubers do not last long to be stored.

For this reason, the supply of raw materials must be guaranteed and the uniformity of types or varieties and their quality. This business also requires temporary storage space for fresh tubers and a freezer for pasta. Meanwhile, for intermediate products (flour), dried mustard can be stored as a reserve of raw materials, which can then be processed into flour when the availability of fresh tubers is limited. Price fluctuations also need to be considered because when the price of tubers is more than Rp. 2,000/kg, with a flour yield of 25 percent, the price of flour becomes more than Rp. 8,000/kg (not including processing costs), so it will not be easy to compete with wheat flour, whose prices range from Rp. between IDR 6,000 – 8,500/kg. [14, 15] stated that the price of sweet potato flour, which is suitable to be marketed as a substitute for wheat, is a maximum of 75 percent of the price of wheat. Therefore, flour processing is feasible at harvest time, where the price of fresh tubers is relatively low [16]. Real support for government policies in favor of industries made from local food raw materials from upstream to downstream be very much needed to develop sweet potato-based agroindustry. Information on the availability of various processed sweet potato products also needs to be disseminated to consumers as users and artisans or industry as producers to erase the image of sweet potato, which is still considered inferior. Women farmer groups and artisans can be trained to become food producers from sweet potatoes, assisted in obtaining distribution permits from the health office, and partnered with large industries or souvenir supermarkets for marketing. Local government policy to serve non-rice and non-wheat food at every official meeting and activity, competition to create menus made from local ingredients, implementation of the 'One day no rice' program which received appreciation for the city of Depok [17], seed assistance, capital, equipment, and booths at local and national exhibitions will spur the development of processing and marketing of sweet potato products produced by local producers.

Food diversification aims to meet the diverse and growing tastes of consumers so that there are always alternatives and menu refreshments. Thus, market saturation will be more diverse, thus providing more alternatives for the community in processing and consuming agricultural products. Cassava has been widely used as a variety of food products, both ready-to-eat, and ready-to-eat food. The problem is, in general, people actually already know how to process cassava, but the lack of interest, prestige, and habitual factors make cassava still less popular. There are several ways of processing cassava using both simple and modern methods. It is hoped that various ways can increase public interest in starting to look at food products from cassava in order to reduce dependence on rice. Food diversification is an effort to develop agriculture and is one of the main pillars of food security. Food diversification supports a balanced, healthy, and nutritious consumption pattern, supported by diversification or new food products. Currently, food diversification is directed at creating new products to replace or substitute wheat. Generally, the corn grown by farmers in Pandeglang Regency is corn for livestock. As for planting corn for consumption until harvesting young, corn (soleng) has been sold by farmers. Only a few farmers grow corn for consumption until the corn is ready for harvest. Most farmers sell the harvested young corn, so it is necessary to provide counseling on corn cultivation for consumption until post-harvest. Thus, it is hoped that there will be various ways to increase public interest in starting to look at food products from corn in order to reduce dependence on rice.

4. Conclusion

Overall, the level of empowerment of corn, sweet potato, and cassava farmers is moderate. The factors

that influence farmer empowerment are the farmer's perception factor and the empowerment intensity factor. The obstacles faced by farmers in realizing local food diversification are the availability of raw materials for sweet potato, cassava, and corn, which is still very volatile because it depends on the cropping pattern and harvest season, cannot be planted continuously in one year because it is vulnerable to pest attacks. Prices fluctuate, there is no uniformity of type or variety and quality, and it requires storage space for harvested produce.

The novelty of this research is that farmer empowerment cannot be separated from the support of agricultural infrastructure, especially in fostering a sense of trust and the level of farmers' perception of a program.

References

[1] PURWANINGSIH, N. *Faktor-Faktor yang Mempengaruhi Adopsi Inovasi Pola Kemitraan Agribisnis Sayuran di Jawa Bara*. Institut Pertanian Bogor, 2016.

[2] SUMARYANTO. Diversifikasi Sebagai Salah Satu Pilar Ketahanan Pangan. *Forum Penelitian Agro Ekonomi*, 2009, 27(2): 93-108.

[3] PRADIANA, Y.H.W. Analisis Ketersediaan Pangan dan Kinerja Penyuluh Pertanian dalam Penyediaan Pangan di Kota Bogor. *Forum Penelitian Agro Ekonomi*, 2014, 12(1): 43–58.

[4] AGUSTINA. Analisis Ketahanan Pangan Rumah Tangga Berdasarkan Proporsi Pengeluaran Pangan dan Konsumsi Energi. *Jurnal Agrisep*, 2015, 16(1): 20–34.

[5] KEMENTERIAN, P. *Rencana Strategis Kementerian Pertanian Tahun 2010-2014*. Jakarta: Kepala Puslitbang Tanaman Pangan, 2009.

[6] YANFIKA, H. Factors affecting fishery processing capacity levels. *Journal of Physics: Conference Series*, 2020, 1796: 460–465.

[7] HARYANTO, Y. *Penguatan Kapasitas dan Kemandirian Tokoh Petani Maju sebagai Penyuluh Swadaya*. Bogor (ID): Institut Pertanian Bogor, 2018.

[8] FATCHIYA, A. Tingkat Kapasitas Pembudidaya Ikan dalam Mengelola Usaha Aquakultur secara Berkelanjutan. *Penyuluhan*, 2010, 6(1): 11–18.

[9] ARIANI DAN ASHARI, M. Arah, Kendala dan Pentignya Diversifikasi Konsumsi Pangan di Indonesia. *Forum Penelitian Agro Ekonomi*, 2003, 21(2).

[10] GHOZALI, I., and LATAN, H. *Partial Least Squares Konsep, Teknik dan Aplikasi Menggunakan Program Smart PLS untuk Penelitian Empiris*. Semarang: Universitas Diponegoro, 2012.

[11] MULYANINGSIH, A., SUHERNA, G., GUNAWAN, and HARYANTO, Y. Empowerment Strategy of Rice Farmers in Banten Province. *International Journal of Environmental Science and Technology*, 2020, 9(12): 77–81.

[12] HERAWATI, H., HUBEIS, A.V., AMANAH, S., and FATCHIYA, A. Kapasitas Petani Padi Sawah Irigasi Teknis Dalam Menerapkan Prinsip Pertanian Ramah Lingkungan Di Sulawesi Tengah. *Jurnal Pengkajian dan Pengembangan Teknologi Pertanian*, 2018, 20(2): 155.

[13] HARYANTO, Y., ANWARUDIN, O., and YUNIARTI, W. Progressive Farmers as Catalyst for Regeneration in Rural Areas: Through Farmer to Farmer Extension Approach. *Plant Archives*, 2021, 21(1): 867-874

[14] HERIYANTO, and WINARTO. Pemberdayaan Tepung Ubijalar Sebagai Bahan Baku Industri Pangan. *Pemberdayaan Tepung Ubijalar Sebagai Substitusi Terigu dan Potensi Kacang-kacangan Untuk Pengayaan Kualitas Pangan*, 1999.

[15] THAMRIN, M., and MARDHIYAH, A. Analisis Usahatani Ubi Kayu. *Jurnal Agrium*, 2013, 18(1): 57–64.

[16] HARDOKO, L., HENDARTO, and SIREGAR, T.M. Pemanfaatan Ubi Jalar Ungu sebagai Pengganti Tepung Terigu dan Sumber Antiosidan. *Jurnal Teknologi dan Industri Pangan*, 2010, 21(1): 25–32.

[17] ASTONO, B. *Diversifikasi Pangan: Gerakan dari Kantin Balai Kota Depok*. Kompas, 2013.

参考文:

[1] PURWANINGSIH, N. 影響採用西爪哇蔬菜農業企業合作模式創新的因素。茂物農業大學，2016。

[2] 蘇馬安托。多樣化是糧食安全的支柱之一。農業經濟研究論壇，2009，27(2)：93-108。

[3] PRADIANA, Y.H.W. 茂物市糧食供應農業推廣官員的糧食供應情況和績效分析。農業經濟研究論壇，2014，12(1)：43-58。

[4] AGUSTINA。基於食物支出和能源消耗比例的家庭糧食安全分析。阿格里塞普雜誌，2015，16（1）：20-34。

[5] KEMENTERIAN, P. 农业部战略规划 2010-2014。雅加达：粮食作物研发中心负责人，2009。

[6] YANFIKA, H. 影響漁業加工能力水平的因素。物理學雜誌：會議系列，2020，1796：460-465。

[7] HARYANTO, Y. 加強先進農民領導作為自助推廣人員的能力和獨立性。茂物：茂物農業大學，2018。

[8] FATCHIYA, A. 魚類養殖者以可持續方式管理水產養殖業務的能力水平。諮詢，2010，6（1）：11-18。

[9] ARIANI, 和 ASHARI, M. 印度尼西亞食品消費多樣化的方向、限制和重要性。農業經濟研究論壇，2003，21(2)。

[10] GHOZALI, I., 和 LATAN, H. 使用智能 公共服务系统程序進行實證研究的偏最小二乘概念、技術和應用。三寶壟：迪波尼哥羅大學，2012。

[11] MULYANINGSIH, A.、SUHERNA, G.、GUNAWAN, 和 HARYANTO, Y. 萬丹省稻農賦權戰略。國際環境科學與技術雜誌，2020，9(12)：77–81。

[12] HERAWATI, H., HUBEIS, A.V., AMANAH, S., 和 FATCHIYA, A. 中蘇拉威西省稻農技術灌溉應用環保農業原則的能力。農業技術評價與發展學報, 2018, 20(2): 155.

[13] HARYANTO, Y., ANWARUDIN, O., 和 YUNIARTI, W. 農村地區再生的催化劑：通過農民到農民的推廣方法。植物檔案, 2021, 21(1): 867-874
[14] HERIYANTO, 和 WINARTO。增強紅薯粉作為食品工業原料的能力。增強紅薯粉作為小麥替代品的能力和豆類在提高食品質量方面的潛力，1999 年。
[15] THAMRIN, M., 和 MARDHIYAH, A. 木薯種植分析。農業雜誌，2013，18（1）：57-64。
[16] HARDOKO, L.、HENDARTO, 和 SIREGAR, T.M. 紫甘藷作為小麥粉替代品和抗氧化劑來源的利用。食品技術與工業雜誌，2010 年，21(1)：25-32。
[17] ASTONO, B. 食物多樣化：來自德波市政廳食堂的運動。指南針，2013 年。