Local Corn Cultivation Decision Analysis Using Social Capital Among Madurese Farmers

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Abstract

For decades, Madurese farmers have kept cultivating the slight and soft texture of local corn instead of the new hybrid corn. Farmers' preferences for locally grown Madurese corn are essential in sustaining rural communities' financial and nutritional stability. This study investigated how farmers' socioeconomic status, the added value of local corn and the economic environment may influence their decision to cultivate local or hybrid corn and how their decision will affect food security. From 228,496 corn farmers from Bangkalan, Sampang, Pamekasan and Sumenep districts, we used 400 farmers as respondents. SEM-PLS was employed as the method of analysis. This research found that the farmers' socioeconomic status plays significant role in their hybrid corn cultivation decisions. However, most Madurese corn farmers prefer to cultivate local corn because of the economic environment and its value added. Lastly, local food security is built upon farmer cultivation decisions to grow local Madurese corn and their social capital. The results of this study can be input for the Regional Government, especially the Department of Agriculture and Plantations, in implementing a better inclusive and sustainable empowerment program for local corn farmers, as well as increasing farmers' access to production facilities, sustainable utilization training, low-cost financing and markets in outside the area.

Keywords: *Cultivation Decisions, Local Crop, Corn, Social Capital, Farmers' Socioeconomic Status, Madura*

1. Introduction

One of the key agricultural commodities sought in the pursuit of food self-sufficiency is corn which may be used as four different products, such as food, feed, fuel and industrial raw materials (fiber). Corn is currently considered a key commodity on a national scale. The Ministry of Agriculture stated that East Java has the most potential to produce corn, with a land area of 1.19 million hectares, allowing it to produce 5.73 tons of corn (around 21.5% of the total national corn production). Based on the percentage of Indonesia's total corn cultivation area, East Java is the largest corn-producing province in Indonesia, with around 1,215,354 hectares. In 2020, output grew to 6.34 million tons from 1.25 million hectares of productive land. About a third (360,000 hectares) is located on Madura Island.

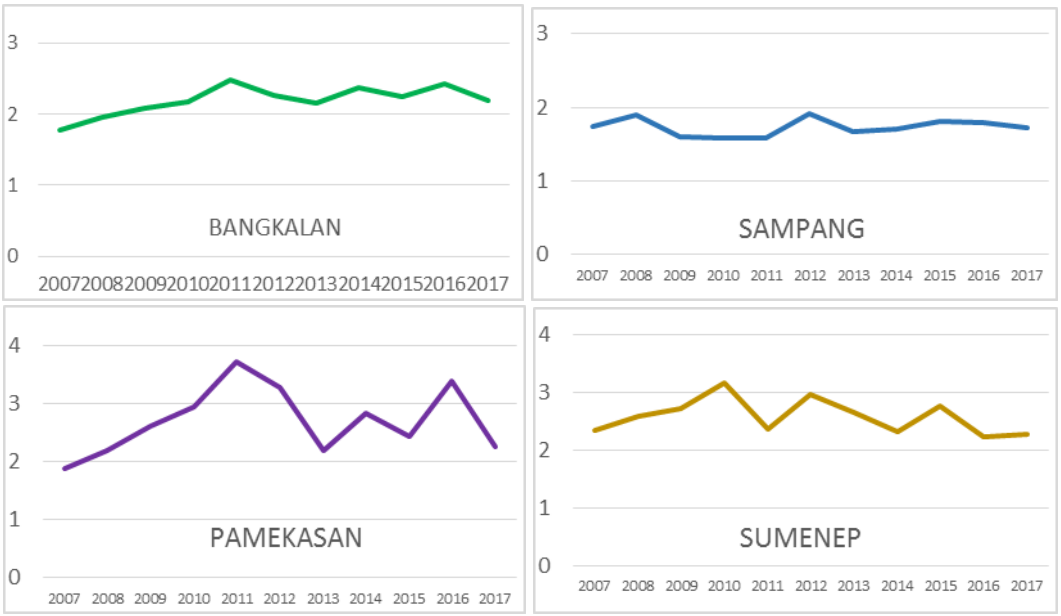

Figure 1. Total corn harvest in 4 districts in Madura (in tonnes/ha)

Problematically, the productivity of corn growers in Madura is only about 2.2 tons per hectare [1]. In reality, Madura's agroecosystem has potential for corn cultivation. As seen in the table above, corn output in Madura has fluctuated and decreased over the last five years. The Agricultural Extension Center has shown that choosing indigenous corn varieties is the main challenge faced by farmers in Madura. Despite their apparent benefits, farmers need to be faster to adopt hybrid corn and other improved corn varieties. Farmers still utilize local Madurese corn types despite the Agricultural Counseling Center's efforts to encourage them to switch to hybrids. There needs to be better best practices among many farmers growing Madurese corn [2]. Significant disparities exist between hybrid corn output and locally grown corn.

Their current decision to grow local corn affects the future of farmers, their families and the environment. Their cultivation choices will be affected by their own values and experiences as well as those of the wider community. Many farms' output falls short of their potential because their owners opt to grow local corn rather than the more productive hybrid varieties. They can mitigate their risk exposure by investing in their social networks. They approach or counteract these risks from a wide range of vantage points.

The reason why farmers choose to grow corn is boiled down to the farmer's circumstances, including his or her socioeconomic standing. Farmers' socioeconomic standing is the primary determinant of whether or not they buy regionally grown corn. Koundouri [3] reported that farmers slowly adopt commercially profitable new cultivars. Farmers are motivated to crop because of their reasons for doing so. Corn cultivation requires in-depth farming knowledge and significant socioeconomic aspects to maintain or improve productivity. The agricultural products and the socioeconomic variables are distinct from the influencing socioeconomic factors. Farmers' choices are influenced by socioeconomic characteristics such as age, education, experience, land area, seeds and both levels [4].

The economic benefit is the second element that causes farmers to favor locally grown corn. Their acceptance of the features contained in a commodity is directly tied to the considerations of the Madurese community when making it a staple diet. People prefer sweet foods that are also tender, juicy and peppery. This reason is related to the fact that most Madurese prefer locally grown corn, so any efforts to increase food diversity and ensure the food security of Madurese households will succeed only if the new corn commodity shares nearly all the same characteristics as the local corn commodity. The efforts to enhance the quality of local grain commodities must also take into account the Madurese people's preferences. Attributes associated with a product are thought to play a role in consumer decision [5].

The state of the economy is a third consideration when farmers decide to buy local grain. Farmers believe that growing local corn is more profitable from both a technical and monetary standpoint. It is also suitable with the land characteristics. It is simple to grasp and put into practice. It is straightforward to test and evaluate and economic considerations back it. Indicators of the economic environment, such as the availability of production facilities, market guarantees, price guarantees and credit availability for farmers, can be used to assess the extent to which the economic environment encourages or discourages farmers from growing corn in their region. Farmers believe they can always count on getting a reasonable price when selling their harvest.

Fourth, farmers' motivation to use local grain is an important consideration. The perseverance of farmers who continue to plant local Madurese corn despite the availability of numerous hybrid corn options with higher productivity values than local corn makes the motivations of these farmers an intriguing topic for investigation. Growers in the area have good reason to focus on raising corn.

Maslow's Hierarchy of Requirements Theory provides a framework for understanding the five indicators of motivation used in this analysis: physiological requirements, safety needs, social needs, esteem needs and self-actualization needs.

The following information suggests that the farming practiced by the Madurese community is still primarily subsistence in nature, with the primary goal of providing for one's immediate family. Given the vast and expanding corn-growing acreage in Madura, it is safe to say that the region's soil is well-suited to the crop. This commodity, however, needs to be more dependable to raise the Madurese people's standard of living because it is a local corn variety with inferior output. This study investigates how farmers' socioeconomic standing, the value of agriculture, the economic climate and their motivation all play a role in their preference for locally grown corn.

2. Literature Review

2.1. Cultivation Decision

Decision-making is defined as "the act of selecting one potential action from among several others in order to produce an intended outcome" [6]. There are three fundamental components to this definition. To begin, deciding is choosing one thing over another. Second, deciding is more than just picking one option from a list. Third, the definition of "desired result" refers to aims or objectives that arise from the deliberative process that leads to a choice [7]. Decision-making is selecting a preferred option or plan of action from a set of possibilities using previously established criteria or techniques [8]. Sometimes, people need clarification on planning and decision-making. All choices are predetermined. In most agricultural households, the patriarchal male makes major life decisions [9]. However, Galbraith [10] argued that a man's status in the household is mainly defined by his ability to provide financially for his family. The four steps of the innovation choice process are the introduction, the persuasion, the decision and the confirmation [11]. In light of the previous, it seems reasonable to conclude that decision-making involves picking among available options to get the desired outcome. Deciding involves following a problem's trail from its origins through its diagnosis to its possible solutions [12]. From the previous definitions, it is clear that decision-making involves selecting the most appropriate solution from a set of feasible possibilities.

2.2. Farmers' Socioeconomic Status

Social status is a social situation that is constantly changing as a result of social activities. Social interactions cause social processes to occur. Social interaction as a dynamic reciprocal relationship involving relationships between individuals, human groups and humans and also human groups [13]. While the economic state is a condition or reality that the five human senses see or feel about the condition of parents and their ability to meet their demands, the economic challenges that parents or nuclear families confront are the attempts of the parents or family to meet their demands in order to reach success. Physical (material) wants and spiritual (spiritual) needs are at stake.

Socioeconomic status is a person's prestige based on his place in society and his effort to meet his wants or the circumstances that explain that position. Property-based families in society, among others, might represent a person's social standing. The willingness of customers to accept the traits inherent in society is closely tied to the community's consideration of making commodities the central dietary element. People generally choose food with a sweet flavour and a soft, supple and spicy texture. This condition also exists in Madura in terms of the Madurese people's preference for local corn varieties, so efforts to diversify food to achieve family food security will be successful if the corn commodity introduced has nearly the same characteristics as the locally owned corn commodity. Furthermore, attempts to increase the quality of local corn commodities must be tailored to the Madurese people's desired characteristics.

The preceding explanation is an added benefit for cultivating local Madurese corn, allowing corn farming to be successful [14]. Farming profits are crucial in terms of motivation to farm [15]. Corn is grown in this area due to the availability of land potential in the form of loose, fertile soil and sufficient water. Aside from the relatively consistent price compared to rice plants, the care method is more straightforward and more resistant to dangers and attacks from pests and diseases. Corn is a plantation commodity that has become a part of Madura's culture. The qualities associated with a product are one of the elements that impact consumer decisions when purchasing a product [5].

2.3. Corn Cultivation Added Value

Social status is a social situation that is constantly changing as a result of social activities. Social interactions cause social processes to occur. Social interaction as a dynamic reciprocal relationship involving relationships between individuals, humans and human groups [13]. While the economic state is a condition or reality that the five human senses see or feel about the condition of parents and their ability to meet their demands, the economic challenges that parents or nuclear families confront are the attempts of the parents or family to meet their demands in order to reach success. Physical (material) wants and spiritual (spiritual) needs are at stake. According to the above definition of socioeconomic status, socioeconomic status is a person's prestige based on his place in society, his effort to meet his wants, or the circumstances that explain that position. Property-based families in society, among others, might represent a person's social standing.

2.4. Economic Environment

There is no way for farmers to improve their industry on their own. That is why outsiders need to pitch in, whether through mentoring and business development or through incentives that push farmers to embrace change. Intensive forms include ensuring farmers can always get the materials they need to produce their crops in sufficient amounts, at affordable prices, that are easily accessible and that can be taken into account when planning and executing their work. Farmers in Madura are influenced by the economy when deciding to cultivate local grain [16].

Other incentives include assurances of continued access to information technology, product promotion and debt financing that does not place an undue financial strain on farmers. Regulations that protect farmers' rights and policies that offer farmers freedom of action in improving their farming companies are just as important as the incentives farmers need to accomplish farming modernization [15]. Farmers' economic conditions are identified as a critical element in welfare and operate as influencing variables regarding household food security [17].

2.5. Food Security

A state of food security exists when all people, at all times and places, have access to the food they require and desire to maintain an adequate and nutritious diet and way of life. Availability, accessibility, use and stability are the four cornerstones of the food security concept. There are different tiers of food security, including the national, regional and international levels, as well as the province, district, and local levels [18]. Indonesian Law Number 18 of 2012 defines food security in Indonesia as the availability of food that is sufficient in quantity and quality, safe, diverse, nutritious, equitable, affordable and does not conflict with the religion, beliefs, and culture of the community so that people can lead healthy, active and productive lives sustainably.

The three primary pillars of food security are the availability, access and consumption of food [19]. Indicators of food security for small farming families are (i) the availability and adequacy of food to meet household consumption demands, as defined by FAO and Indonesian Law Number 12 of 2012 concerning food, (ii) Food availability and affordability, or how easily and cheaply farm households can obtain food through their own production or purchasing, (iii) Food quality or how much animal and vegetable protein farm households consume. When people in a community do not have to worry about whether or not they will have access to nutritious food that's also affordable, safe and distributed fairly, they are not experiencing food security. Producing food is crucial in agriculture because it is one of humanity's most fundamental requirements. Consumption issues in relation to human needs will continue to be a major factor in Indonesia's economic growth [20].

2.6. Social Capital

Social capital refers to the beneficial and financially rewarding relationships between people and organizations in society, whether official or informal. Social capital has two interconnected facets: the structural and the character facets. Social capital has two interconnected facets: the structural and the character facets. Groups and institutions provide a convenient framework for assessing structural characteristics. In the neighbourhood club sense. The configurational values of (a) the number of associations joined, (b) the level of participation in associations and (c) the benefits of associations are, respectively, (1) very low, (2) low, (3) high and (4) very high, whereas the values of (a) the level of trust, (b) the level of solidarity, and (c) the moral values are, respectively, (1) very low, (2) low, (3) high and (4) very high.

3. Research Method

The Madura districts of Bangkalan, Sampang, Pamekasan and Sumenep were selected for this quantitative study because they have the greatest potential for increasing local grain output in East Java by 30%. Using the Slovin method, we can estimate that there are 400 active corn farmers out of a total population of 228,496. Data analysis was performed using a SEM-PLS approach.

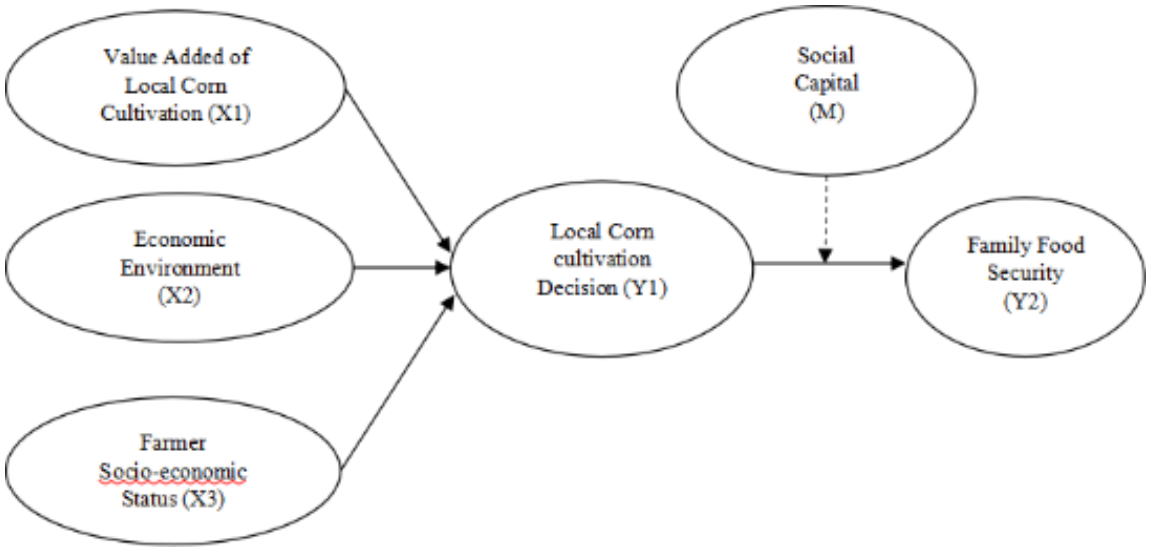

Figure 2. Research Framework

4. Result

4.1. Direct Effect

The first result is the correlation of farmers' socioeconomic status which negatively influences local corn cultivation decisions, with p = 0.014 (<0.05) and Original Sample value = -0.219. The second is corn cultivation's added value which positively influences local corn cultivation decisions, with p = 0.047 (<0.05) and OS = 0.217. The third is economic environment which negatively affects local corn cultivation decisions, with p-value = 0.000 (<0.05) and OS value = -0.181. The last is the local corn cultivation decisions which is positively influences food security, with p = 0.023 (<0.05) and OS = 0.114.

Table 1. Direct Effect

Variable Correlation	Original Sample (OSS)	Standard Deviation (STDEV)	P Values
SE Status > Cultivation Decision	-0,219	0,089	0,014
Value Added > Cultivation Decision	0,127	0,063	0,047
Economic Environment > Cultivation Decision	-0,181	0,037	0,000
Cultivation Decision > Food Security	0,114	0,050	0,023

4.2. Moderation Effect

Table 2. Moderation Effect

Variable Correlation	Original Sample (O)	Standard Deviation (STDEV)	P Values
Cultivation Decision > Social Capital > Food Security	0,078	0,022	0,000

The moderation effect in this research is the social capital of Madura corn farmers which strengthens the influence of cultivation decisions on fulfilling family food security, with p-values = 0.000 (<0.05) and OS values = 0.078.

5. Discussion

5.1. The Influence of Socioeconomic Status of Farmers on Local Corn Cultivation Decisions in Madura

The analysis results show that the higher the farmer's socioeconomic status, the less favourable it is for them to cultivate local corn (p = 0.014 and OS value = -0.219). Income, education, health and asset ownership are all indications of a farmer's socioeconomic status, which is a proxy for the farmer's standard of living. Typically, farmers who are considered to be of high socioeconomic status have more resources at their disposal, as well as higher incomes, levels of education and health. Farmers with higher socioeconomic status typically have greater access to agricultural knowledge and tools. If farmers had more access to agricultural data and tools, they might grow more economically viable crops. This advantage broadens the options available to farmers, allowing them to select plants with higher profit potential.

Hybrid corn appeals more to the industry since it can be used as animal feed or as an ingredient, despite local corn having more benefits, such as resilience to pests, faster harvest, a better selling price and compatibility with Madura macroclimate. Hybrid corn may have a lower selling price but can produce twice as much harvest, increasing profits. However, farmers from more affluent backgrounds tend to have more money on hand. It permits them to cultivate more expensive food crops like hybrid rice and corn. A farmer's motivation to farm is directly tied to his ability to profit [15].

As mentioned earlier, the account accords other findings [21]. It demonstrates that one's age, income, education level, family size, land availability and number of children all play crucial roles in this choice. Farmers' decisions to engage in farming in the study area were influenced by price, farmer income, age, education level, farming experience, total coverage, area and land level and urbanization [22].

5.2. The Influence of Corn Cultivation Added Value on Local Corn Cultivation Decisions in Madura

The study demonstrates that the local corn cultivation decision rises with the crop's value added. (p = 0.047, OS = 0.217). This result demonstrates that customer acceptance of features in a commodity is directly tied to whether or not such attributes are present in the product in question (in this case, corn). Sweet flavours and tender foods are popular among Madurese. When milled, Madura corn generates a moderate amount of powder. Farmers have been growing hybrid corn for a while, but most consumers still prefer their regional varieties. The presence of hybrid corn varieties must maintain the importance of regionally-adapted variants. It is evidenced by the fact that year after year, demand for locally grown corn exceeds supply. Attributes associated with a product are thought to play a role in consumer choice [5].

Local Madura corn is valued for its flavour, texture, size and affordability. When comparing local and hybrid corn, the sweetness of the former is the first quality consumers notice. Consumers' openness to a product's characteristics is directly tied to the community's interest in making that product a staple food. People tend to favour foods that are sweet, mild in flavour and easy to chew. The Madurese suffer from the same problem when they buy corn. When taken together with the research concept relating to the rational reasons for farmers' decisions to plant local corn, these findings are consistent with Max Weber's Theory of Reasoned Action. Farmers see local corn as profitable from an economic and technical standpoint, in addition to its attributes. In addition to meeting family food security needs, most farmers in Madura opt to grow local corn.

5.3. The Influence of Economic Environment on Local Corn Cultivation Decisions in Madura

The analysis indicates that the local corn cultivation decision decreases when the economic environment improves (p-value = 0.000 and OS value = -0.181). This result demonstrates that the economic environment profoundly impacts farmers' cultivation decisions. Agricultural financing, input suppliers and market guarantees contribute to farmers' economic surroundings. Farmers who believe that cultivating corn in their region is not economically viable. The broader economic climate can influence farmers' motivations and ability to engage in organic rice farming. Indicators of the economic environment include access to production inputs, market guarantees, price assurances, and loans for farmers. Market guarantees have the most significant impact on the economy of the three metrics.

As a cultural norm, locals put away their harvests of corn to sell at a later period. The price has risen in this market because there is just a limited amount available. Local corn is durable and can be preserved for up to a year. Farmers in Madurai often sell their surplus corn in local markets when they're struggling financially rather than storing it for future use. Typically, only 20% - 30% of the harvest is sold within a short period and even that is to cover production costs. On the other hand, hybrid corn can be sold to businesses after being harvested.

This study follows the Reasoned Theory, which examines the factors influencing farmers' decisions to grow different types of corn to ensure their families' continued access to nutritious food. In this study, farmers' willingness to act demonstrates their willingness to put considerable effort in a particular direction, suggesting that they are more likely to follow through on their stated intentions. According to theory of planned behaviour, people's confidence in their ability to realize this behavior, in this case, access to markets and price stability is influenced by their beliefs about the availability of resources [23].

5.4. The Influence of Local Corn Cultivation Decisions on Food Security in Madura

The analysis demonstrates that if more farmers decide to cultivate local corn, the greater the food security becomes ($p = 0.023$ and OS = 0.114). This result demonstrates how local corn cultivation decision shapes food security. The sweet flavour and softness are all qualities that people appreciate in their meals. Local corn varieties have this quality, so any efforts to increase food diversity in Madurai so that more families can eat safely will succeed, provided the new corn product shares these preferred qualities. Families' food security is directly tied to farmers' decisions to cultivate local corn. Despite recent improvements, native corn is still less productive than hybrid varieties. There are downsides to the Madurese farmers' decision to keep growing corn. ncertainty in the choice of inputs is a significant factor in all forms of production [24].

5.5. Social Capital Moderation on the Local corn Cultivation Decision Effect on Food Security.

Research shows that farmers are more likely to cultivate local corn in order to maintain their food security because of their high level of social capital ($p = 0.023$ and OS = 0,078). This result shows a potential danger attached to the decision to cultivate corn in Madura. Families' food security depends critically on farmers' choices to grow local corn. Despite recent improvements, native corn is still less productive than hybrid varieties. Farmers feel economic pressure because farming families invest more social capital to cut costs than to increase income. Economic techniques such as increasing income, decreasing expenditures and using savings or selling assets are employed. The risks farmers face when choosing to plant local corn are detailed in this paper; these risks can be mitigated in several ways, including using social capital. Farmers are given this social capital in the hopes that they will use it to achieve their aims, such as providing for their families dietary requirements.

The farmer's decision to grow Madurese native corn yielded this result, consistent with Rational Choice Theory. In light of their decision to buy local corn, this belief becomes a theory that explains the desires that push individuals to engage in behaviour that is defined by the attitudes that impact it, notwithstanding the risks involved. According to Lewin's theory [25], a behavioural relationship model was developed, which states that behaviour is a consequence of personal or individual qualities and the environment.

This study's findings are consistent with this model. In this research, we see that individual qualities, such as socioeconomic position, added value and motivation of farmers, interact with environmental factors to determine behaviour, in this case, the decision to cultivate corn locally through social capital.

6. Conclusions

The higher the farmer's socioeconomic status, the less favourable it is for them to cultivate local corn. The local corn cultivation decision increases with the crop's value added. The local corn cultivation decision decreases when the economic environment improves. The more farmers decide to cultivate local corn, the greater their food security becomes. Farmers are more likely to cultivate local corn in order to maintain their food security because of their high level of social capital.

The Regional Government, especially the Department of Agriculture and Food Crops, is expected to actively increase the empowerment of local corn farmers through Strengthening stakeholder engagement to better conduct local corn farmer empowerment programmes in a sustainable and inclusive manner, boosting communication between farmers, extension workers, academic specialists and researchers to get them more involved in the learning process through counselling and participatory training, expanding farmers' access to production facilities and training in their sustainable usage, facilitating their access to cheap funding and access to markets beyond the region for their products.

Facilitated by extension workers or community facilitators, farmer groups allow farmers to network with one another and discuss issues, solutions and public opinion. Farmers should prioritize planting seeds with the highest predicted return on investment when making decisions. The Agricultural Extension Agency hopes to see greater participation from farmer groups in planning and holding meetings.

References

[1] *A. Amzeri, "Seleksi satu tongkol satu baris (ear to row selection) pada tanaman jagung (Zea mays L.)", Rekayasa. vol. 12, no 1,* ***(2019)****, pp. 18-23.*

[2] *I. Y. Sugiarti and A. A. Hayati, "Media Pop Up Book Kearifan Lokal Cirebon Dalam Pembelajaran Sosial (Studi Kasus Mahasiswa PGSD Tingkat I Universitas Swadaya Gunung Jati)", Caruban: Jurnal Ilmiah Ilmu Pendidikan Dasar, vol. 2, no. 2,* ***(2019)****, pp. 133-145.*

[3] *P. Koundouri, P. K. Rault, V. Pergamali., V. Skiani and I. Souliotis, "Development of an integrated methodology for the sustainable environmental and socio-economic management of river ecosystems", Science of the total environment, vol. 540,* ***(2016)****, pp. 90-100.*

[4] *S. L. Neonbota and S. J. Kune, "Faktor-faktor yang mempengaruhi usahatani padi sawah di Desa Haekto, Kecamatan Noemuti Timur", Agrimor, vol. 1, no. 03, **(2016)**, pp. 32-35.*

[5] *L. G. Schiffman and L. L. Kanuk, "Consumer Behavior (8th Edition)", Wisconsin: Prentice Hall.. **(2000)**.*

[6] *F. Eisenführ, M. Weber and T. Langer, "Rational decision making", Springer, **(2010)**.*

[7] *F. C. Lunenburg, "The decision making process", National Forum of Educational Administration & Supervision Journal, vol. 27, no. 4, **(2010)**, pp. 1-12.*

[8] *Y. Wang, G. Ruhe, "The cognitive process of decision making", International Journal of Cognitive Informatics and Natural Intelligence (IJCINI), vol. 1, no. 2, **(2007)**, pp. 73-85.*

[9] *T. Mardikanto and P. Soebianto, "Pemberdayaan Masyarakat Dalam Persepektif Kebijakan", Alfabeta, Bandung, **(2013)**.*

[10] *J. K. Galbraith, "Inequality and instability: A study of the world economy just before the great crisis", Oxford University Press, New York, **(2012)**.*

[11] *Rogers E. M., and F. F. Shoemaker, "Communication of Innovations: A Cross-Cultural Approach", The Free Press, New York, **(1971)**.*

[12] *I. Fahmi, "Pengantar ilmu kepemimpinan", Raja Grafindo Persada, Depok, **(2018)**.*

[13] *Abdulsyani, "Sosiologi Skematika, Teori, dan Terapan", Bumi Aksara, Jakarta, **(2007)**.*

[14] *H. Sunanta, "Budidaya Mendong", Kanisius, Yogyakarta, **(2000)**.*

[15] *M. R. Hernanto, "Implementasi Peraturan Daerah No. 3 Tahun 2007 Tentang Ruang Terbuka Hijau di Kota Surabaya", Undergraduate Thesis, Universitas Airlangga, **(2013)**.*

[16] *H. Susanto, T. Soedarto, H. Hendrarini. "Decision Analysis of Farmers for Local Corn in Madura (Case Study of Local Corn Farmers in Sumenep Regency)", Proceedings of the 3rd International Conference on Agriculture, **(2023)**, pp. 220-227.*

[17] *H. Hendrarini, E. S. Rahayu, Kusnandar, R. J. Sunarsono, T. Soedarto, "The influence of ihsan attitude and economic condition on farmer household food security", IOP Conference Series: Earth and Environmental Science, vol. 142, **(2018)**, pp. 1-5.*

[18] *A. D. Jones, F. M. Ngure, G. H. Pelto and S. L. Young, "What are we assessing when we measure food security? A compendium and review of current metrics", Advances in Nutrition, vol. 4, no. 5, **(2013)**, pp. 481-505.*

[19] *U. Chung, S. Gbegbelegbe, B. Shiferaw, R. Robertson, J. I. Yun, K. Tesfaye, G. Hoogenboom, K. Sonder, "Modeling the effect of a heat wave on maize production in the USA and its implications on food security in the developing world", Weather and Climate Extremes, vol. 5-6, **(2014)**, pp. 67-77.*

[20] *E. S. Karsin, "Peranan Pangan dan Gizi dalam Pembangunan dalam Pengantar Pangan dan Gizi", Penebar Swadaya, Jakarta, **(2004)**.*

[21] *G. D. Santika and W. F. Mahmudy, "Penentuan Pemasok Bahan Baku Menggunakan Fuzzy Inference System Tsukamoto", Seminar Nasional Sistem Informasi Indonesia (SESINDO), Surabaya, Indonesia,* ***(2015)****, pp. 267-274.*

[22] *K. F. Siregar, "Faktor–Faktor yang Mempengaruhi Keputusan Petani untuk Melakukan Usahatani Kedelai (Studi Kasus: Kecamatan Beringin, Kabupaten Deli Serdang)", Pos-Graduate Thesis, Universitas Sumatera Utara,* ***(2015)****.*

[23] *I. Ajzen, "Attitudes, Personality and Behaviour", McGraw-Hill Education, United Kingdom,* ***(2005)****.*

[24] *R. E. Just and R. D. Pope, "On the Relationship of Input Decisions and Risk," CUDARE Working Papers 198209, University of California, Berkeley, Department of Agricultural and Resource Economics,* ***(1976)****, pp. 1-30.*

[25] *K. Lewin, "Field Theory In Social Science: Selected Theoretical papers," Harper and Row,* ***(1951)****.*