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The Hidden Harvest: Unlocking Efficiency in East Java's Farming Sector

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Abstract
The agricultural sector is crucial for meeting global food and nutritional needs, with East Java Province in Indonesia having the highest yields and being the safest sector from the pandemic. To maximize land area, land efficiency is essential, using superior seed varieties, chemical fertilizers, efficient irrigation systems, and modern agricultural tools. This research focuses on the agricultural community in Trawas Mojokerto and the efficiency of agricultural land in Duyung Village. Most farmers use sickles, hoes, animals, simple machines, and tractors for agriculture. A survey of 100 farmers in Duyung Village revealed that 44 people use sickles as traditional tools, while 23 use livestock for ploughing. Tractors are used for efficiency and energy savings but are rarely used due to lack of counseling from government institutions. Technological tools are used for specific soil types and must be rented before use. The majority of farmers need counseling to learn about the latest tools, and government assistance is lacking. The study also found that 68.9% of farmers do not use printed rice seeds, while 31.1% use them. Long rice seeds are preferred due to their quality and resistance to pests. The majority of farmers use direct soil irrigation systems, which vary in soil fertility levels. Fertilizer use varies, with 77.8% using urea and 20% using compost and urea. The Duyung Village community is efficient in land management, with most farmers understanding the importance of efficiency.

Keywords: ***Agriculture, Farmer, Food, Society***

Abstrak
Sektor pertanian sangat penting untuk memenuhi kebutuhan pangan dan gizi global, dengan Provinsi Jawa Timur di Indonesia memiliki hasil tertinggi dan menjadi sektor teraman dari pandemi. Untuk memaksimalkan luas lahan, efisiensi lahan sangat penting, menggunakan varietas benih unggul, pupuk kimia, sistem irigasi yang efisien, dan alat pertanian modern. Penelitian ini berfokus pada komunitas pertanian di Trawas Mojokerto dan efisiensi lahan pertanian di Desa Duyung. Sebagian besar petani menggunakan sabit, cangkul, hewan, mesin sederhana, dan traktor untuk pertanian. Sebuah survei terhadap 100 petani di Desa Duyung mengungkapkan bahwa 44 orang menggunakan sabit sebagai alat tradisional, sementara 23 orang menggunakan ternak untuk membajak. Traktor digunakan untuk efisiensi dan penghematan energi tetapi jarang digunakan karena kurangnya penyuluhan dari lembaga pemerintah. Alat teknologi digunakan untuk jenis tanah tertentu dan harus disewa sebelum digunakan. Mayoritas petani membutuhkan bimbingan untuk mempelajari alat-alat terbaru, dan bantuan pemerintah kurang memadai. Studi tersebut juga menemukan bahwa 68,9% petani tidak menggunakan benih padi cetakan, sementara 31,1% menggunakannya. Benih padi panjang lebih disukai karena kualitasnya dan ketahanannya terhadap hama. Mayoritas petani menggunakan sistem irigasi tanah langsung, yang bervariasi dalam tingkat kesuburan tanah. Penggunaan pupuk bervariasi, dengan 77,8% menggunakan urea dan 20% menggunakan kompos dan urea. Komunitas Desa Duyung efisien dalam pengelolaan lahan, dengan sebagian besar petani memahami pentingnya efisiensi.

Kata Kunci : ***Pertanian, Petani, Makanan, Masyarakat***

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Introduction

The agricultural sector plays an essential role in supplying the food and nutritional needs of the global community (Quaralia, 2022). Globally the area of agricultural land has increased significantly along with the growth in world population (Hertel, 2011). Based on a report issued by Our World Data, the area of agricultural land globally has increased by 1.24 percent or 1.63 billion hectares in 2020 (Rizaty, 2022). An increase in the amount of land has also occurred in Indonesia, namely by 10.61 million hectares (BPS, 2022). This makes Indonesia nicknamed an agricultural country (Ali, 2017), meaning that most of the population works in the agricultural sector. In an agrarian country, the agricultural sector has a crucial role in efforts to meet basic needs (Ayun et al., 2020). Besides that, the agricultural sector also plays a role in improving the social, economic and trade sectors (Kusumaningrum, 2019). In East Java Province, the area of agricultural land reaches 1.2 million hectares or the equivalent of 25.41 percent of the total area of East Java (Wahed, 2015). East Java's yields are the highest in Indonesia (Setiawan & Fitriana, 2022). Based on a report published by the Indonesian Ministry of Agriculture, agricultural commodities in East Java Province are the safest sector from the impact of the pandemic (Ahmad et al., 2020). This can positively impact the socioeconomic sector of people working in the agricultural sector, in this case, farmers (Romadhona et al., 2022). The National Land Agency provides different reports on the amount of agricultural land in Indonesia (Tjitrawati et al., 2024). The report contains the depreciation of agricultural land in various regions in Indonesia, which also significantly impacts national crop production (Yanwardhana, 2022).

Given these problems, a strategy is needed to maximise the existing land area through efficiency. In general, the definition of land efficiency is a way of processing agricultural land that farmers carry out by utilising narrow land but trying as much as possible to produce a bigger harvest than before (Hernoko et al., 2022). By utilising superior seed varieties, using chemical fertilisers that can speed up and increase crop yields, using irrigation systems that are more effective and efficient to irrigate the land, and using more modern agricultural tools to cultivate the land. Such as the use of tractors make it easier for farmers because tractors are faster for ploughing agricultural land, so managed land becomes faster for planting (Suhariono et al., 2022).

Thus it is necessary to analyse the land efficiency process, which is very important to observe because it significantly impacts the number of yields. According to Yujiro Hayami and Masao Kikuchi, Efficient land management is how farmers use narrow land to produce maximum yields (Hayami& Kikuchi, 1987). Land efficiency is different from saving methods. Discussing the ratio of minimal inputs in land efficiency can produce maximum output (Hayami & Kikuchi, 1987). In this reserahc was conrned to the condition of the agricultural community in Trawas Mojokerto and the efficiency processing agricultural land in Duyung Village.

Methods

This research uses a descriptive research type with a qualitative approach. There are several stages used in this research. The first stage is the purposive determination of the research location as the research site in Duyung Village, Trawas, Mojokerto. The consideration taken in establishing Duyung Village, Trawas, Mojokerto is has argicultural potential. Second, the total of people working as farmer and landlord. The second stage is data collection, conducted through observation to identify the eficienty land among Duyung community. In addition to observation, the data collected from observations and FGDs are transcribed, then classified and identified based on themes, and finally analyzed.

Theoretical Framework

This study explores the social dynamics among farmers, bureaucrats, and intermediaries in shaping the system used in Duyung village. The concept of land processing efficiency is defined as the accuracy of methods in executing tasks appropriately without wasting time, energy, or resources. Efficiency is based on the ratio of input to output or cost to profit. The Hayami and Kikuchi Framework (compensation structure) is used to analyze the wage distribution systems among farmers in Duyung village. Modernity, including commercialization, population pressure, and technology advancements, has impacted rural communities in Asia, leading to the dismantling of village communication institutions. Two models of wage distribution systems have developed: the *bawon* system, which allows collective participation in harvest and wage sharing, and the *tebasan* system, introduced post-1970, which implements a quota for the

number of harvesting farmers. Hayami and Kikuchi's book "The Village Economy Dilemma" examines institutional changes in the village through the lens of economic theory, focusing primarily on the challenges encountered by farmers and agricultural workers in Java. The institutional reform in question pertains to mutual help activities, akin to the *bawon* system, emphasizing solidarity among neighbors. In the 1970s, the system transitioned to the *tebasan* system (Hayami & Kikuchi, 1987).

Results and Discussion

Agricultural Land Processing Efficiency

Table 1. Land Processing Instruments

Tools	Freq		%		100%
	N	Y	N	Y	
Sickle	0	45	0	100	100
Hoe	1	44	2.2	97.7	100
Animal	22	23	48.9	51.1	100
Basic tools	27	18	60	40	100
Trackor	25	25	55.6	44.4	100

N = 45

Source: questionnaire no 10/ coding no 8 – 12

From the results of our research in Duyung village, it was found that 45 or 100% used sickles, 44 people or 97.7% used hoes, 23 people or 51.1% used animals, 18 people or 40% used single-handed machines and 20 people or 44.4% use a tractor. Out of 100 respondents, 44 people used sickles because it is indeed one of the traditional tools that have not been replaced, and sickles are relatively cheap and very easy to obtain. For several reasons, such as not working like harvesters and only working as farmers planting, one farmer does not use a sickle.

As many as 23 people used livestock as ploughing tools for several reasons, such as not wanting to spend money on renting a tractor and owning livestock. Still, there were also reasons that livestock could be more efficient than using the latest tools or technology, such as tractors or short engines. Twenty-two people do not use livestock because they think using a tractor saves energy, and so on. Most of the respondents use tractors because they have received counselling from the central and regional governments.

As many as 20 people use a tractor as a tool for ploughing their land for reasons of efficiency and to save energy. However, for instant and efficient results in terms of processing, a tractor will be an option. How optimal is it that tractors are rarely used. Also, farmers are thinking again about using a tractor or buying a tractor because some farmers have yet to receive counselling from various private or government institutions. This lack of distribution in terms of counselling also causes farmers to refrain from using tractors. According to analysis, technological tools are used only for the type of soil to be planted.

Furthermore, the machine that will be used must be rented before use.

Furthermore, those who rent are usually from farmers or land owners who will need machines, so the tools and technology of each Farmer or individual are different and causes differences in productivity and arable land levels.

Table 2. Knowledge of Instruments Processing Agricultural land

Knowledge	Freq		%		%
	N	Y	N	Y	
Self	7	38	15.6	84.4	100
Socialization	31	14	68.9	31.1	100
Government Assistance	31	14	68.9	31.1	100

N = 45

Source: questionnaire no 11/coding 13-15

From the results of the research we conducted in Duyung Village, it was known that there were 45 respondents. Seven respondents, or 15.6%, needed to learn the tool. Here you can see the need for more performance of government institutions or the private sector engaged in agriculture to assist in conducting Counselling. There were 38 respondents, or 84.4% themselves, who knew the tool. This can prove that in the global era and telecommunications and information, progress causes the community or farmers in Duyung village to seek information about the latest or most up-to-date tools or technology in agricultural matters so that the role of institutions engaged in agricultural matters, especially from the government directly shows their lack of role in terms of counselling and notifications about what technology is up-to-

date and suitable for use by Farmers in Duyung Village.

Thirty-one respondents, or 68.9%, needed counselling to learn about the tool. With the data we have obtained, it can be concluded that agricultural institutions from the government mainly look hands-off and have the impression of letting the community or farmers who need the latest information, especially in terms of agriculture, can be started from counselling, subsidies or government programs that are said to "help" farmers. There are 14 respondents, or 31.1%, of counselling to find out about these tools. Based on the data that we have obtained in the field can be interpreted that some farmers receive counselling. Still, it is not evenly distributed and expansive in providing assistance-counselling, subsidy, and other help. There were 31 respondents, or 68.9%, who needed government assistance to find out about these tools.

Furthermore, from the data we got from the field regarding government assistance to know about these tools, it was still lacking because the data obtained was quite large, namely, 31 respondents from 45 respondents and from here, the lack of coordination from government agencies caused farmers to feel at a loss because they are not activated in terms of counselling. There were 14 respondents, or 31.1%, of government assistance to find out about this tool. Based on the above regarding respondents who received government assistance, there were only 14 respondents. It can be interpreted that the government still needs to perform better, as evidenced by several communities or farmers who feel assistance from the government. This can be a criticism of the government due to inadequate assistance. Only some feel that it makes the government seem selective in assisting the community, mainly farmers.

From the statement above, it can be analysed that, in agriculture, the tools often used in this dugong village are sickles, hoes, animals, singkal machines and Traktor, which they sometimes either cannot use or, if they do not own they can obtain by renting. The informant also used a disassembly system by hoeing bury repeatedly, both in fertilising and planting, on the sweet potato systems known by parents, so it can be concluded that the majority know about the introduction of the latest tools or technology through themselves and only a few receive counselling and assistance from the government.

Table 3. Plant Varieties

Varieties	Freq		%		100%
	N	Y	N	Y	
Durian	29	16	64.4	35.6	100
Chilli	30	15	66.7	33.3	100
Ginger	30	15	66.7	33.3	100
Cassava	26	19	57.8	42.7	100
Groundnut	24	21	53.3	46.7	100
Corn	15	30	33.3	66.7	100
Cassava	26	19	57.8	42.2	100
Paddy	10	35	22.2	77.8	100

N = 45

Source: questionnaire no 12/ coding 16-23

From the results of our research in Duyung Village, it was found that there were 29respondents or 64.4% who do not plant durian and 16 respondents or 35.6% who plant durian. From the data we got, it can be concluded that Duyung Village, known as a Durian-producing village, is no longer valid. This proves that durian is not attractive to farmers or cultivators. Farmers lost quite a lot. Therefore, many began to move or change in terms of planting. There were 30 respondents, or 66.7%, who did not plant cayenne pepper, and 15 or 33.3%, who planted cayenne pepper. From the data we collected regarding the cultivation of chillies, there are still more people who choose not to plant because perhaps the price of cayenne pepper is often unstable, and this will also impact farmers. There were 30 respondents, or 66.7%, who did not plant ginger, and 15 or 33.3%, who planted ginger. From the data we get, it still needs to be improved in terms of quantity. Farmers who plant ginger may be due to many things, such as uncertain prices.

There were 26 respondents, or 57.8%, who did not plant cassava, and 19 or 42.2%, who planted cassava. From the data we obtained in the field, it can be concluded that many farmers do not plant cassava because farmers may prefer easy to sell in the market and have exorbitant prices. There were 24 respondents, or 53.3%, who did not plant peanuts, and 21 respondents or 46.7%, who planted peanuts. Based on the data we got in our field lectures,

the planting of peanuts did not experience too extreme a difference, so Peanuts are only used as an option to be planted. There were 15 respondents, or 33.3%, who did not plant corn, and 30 or 66.7%, who planted corn. From the data we got in the field, it can be concluded that many people plant corn because corn has relatively stable prices. There were 26 respondents, or 57.8%, who did not plant cassava, and 19 or 42.2%, who planted cassava. Based on the data above, many farmers in Duyung Village do not plant cassava due to many things, maybe because they experienced a price crash last year or two years ago, which caused many farmers to go bankrupt. Ten respondents, or 22.2%, did not plant rice, and 35 respondents, or 77.8%, planted rice. Based on the data we got, farmers in Duyung Village still make rice a priority for planting because rice also has a role as a Basic staple food and needs that must be met in Duyung Village. So that when a collapse or crisis occurs, the Duyung Village residents can still eat or survive.

Table 4. Rice Seeds

Paddy Varieties	Freq		%		100%
	N	Y	N	Y	
64	22	23	48.9	51.1	100
64 SS	21	24	46.7	53.3	100
Bramu	11	34	24.4	74.6	100
Printil	31	14	68.9	31.1	100

N = 45

Source: questionnaire no 13coding 24-27

From the results of our research in Duyung Village, it was found that 31 respondents or 68.9% did not use printed rice seeds and 14 respondents or 31.1% used printed rice seeds. The people of Duyung Village, especially farmers, still believe in seeds that must be adapted to conditions. Weather or disease that is attacking, and only a few seeds can survive pests or diseases that attack.

Furthermore, according to the data obtained, some farmers in Duyung Village still use Printile Seeds because the yields are also good and disease resistant. There were 22 respondents, or 48.9%, who did not use rice seeds 64 and 23 respondents, or 51.1%, who used rice seeds 64. According to the data obtained, there were indeed more who used rice seeds 64 than those who did not use rice seeds 64 because there are still many who believe in the results and quality provided by 64 rice seeds. There were 21 respondents, or 46.7%, who did not use 64 SS rice seeds, and 24 respondents or 53.3%, who used 64 SS rice seeds. From the data, We found that the 64 ss rice seeds are still the favourite of the farmers in Duyung Village because they are known to be disease, pest resistant and the yields obtained are also quite good and meet standards for self-consumption or sale.

Furthermore, there are 11 respondents, or 68.9%, who do not use rice seeds long, and 34 respondents or 75.6%, who use rice seeds we longFrom the data we have explicitly obtained for rice seeds crave indeed the most widely used and best known than the other seeds. Moreover, the quality of the Rice Seeds I crave is one of the best because it is neither disease resistant nor pests and quality that is maintained. Based on the quote from the informant above, it can be concluded that according to the informant, plant seeds each. The planting season has changed because the seeds they are looking for seeds that are resistant to diseases or pests attacking plants in the Duyung village. The informant said that besides the seeds, there are also fertilisers that must be suitable and of good quality.

Table 5. Obtain Plant Seeds

Paddy Varieties	Freq		%		100%
	N	Y	N	Y	
Plant Shop	7	38	15.6	84.4	100
Government Subsidies	30	15	66.7	33.3	100

N = 45

Source: questionnaire no 14/coding no 28 and 29

From the results of our research in Duyung Village, it was found that there were 30 respondents or 66.7% who did not receive subsidised seeds from the government. There were 15 respondents, or 33.3%, received subsidised seeds from the government. From the data we have obtained in the field, it can be concluded that many need to be touched by government programs, more specifically, get subsidies that are appropriate and suitable for each farmer or the condition of the land to be worked on land owned by farmers. There were 7 respondents, or 15.6%, who did not buy seeds

from shops, and 38 respondents or 84.4%, who bought seeds from shops. shop. Farmers in Duyung village buy seeds at the shop because it shortens the time and is much more efficient and cheap enough to buy seeds at the shop.

Table 6. Irrigation System

System	Freq	**%**
Land	31	68.9
Plombiran	12	26.7
Pipe	2	4.4
Total	45	100

N = 45

Source: questionnaire no 15/ coding no 30

From the results of the research we got in Duyung Village, it was found that there were 31 respondents or 68.9% who used an irrigation system from the ground. Many factors have already caused Duyung Village farmers to have an irrigation system. Through ditches or soil, efficiency is undeniably the most efficient because it does not require costs to install irrigation systems such as cement or pipes, which have quite an enormous cost. Twelve respondents, or 26.7%, used cement-based irrigation systems.

In contrast, farmers who used cement-based irrigation systems did have a system that was the most suitable for some of the farmers' arable land. Two respondents, or 4.4%, used an irrigation system from PVC pipes. While only a few farmers use irrigation systems based on pipes or gutters because most of the land is far from ditch or soil irrigation systems like others who usually use these systems. Based on the quote from the informant above, it can be concluded that according to the informant, the irrigation system owned by the informant is a system that is channelled using ditches and soil, but also not a few use rainfed and also a paralon system or what is called an irrigation system through pipes and also according to the ditch irrigation system informant from Soil is the most frequently used. Furthermore, From our analysis results, farmers here use direct soil irrigation systems flowing from sewage directly to agricultural land does not make it difficult for farmers in terms of irrigation systems. However, there is also a pipe to drain water from the gutter to agricultural land whose land or land is above the gutter or one level above the gutter so that the variety of irrigation systems causes the soil fertility level also to be different.

Table 7. Land Area

Area m^2	Freq	**%**
>501 m^2	29	64.4
500 m^2	7	15.6
<499 m^2	9	20
Total	45	100

N = 45

Source: questionnaire no 16 / coding no 31

From the results of the research we conducted in Duyung Village, it was found that there were 29 respondents or 64.4% who owned or worked on land with an area of >501m.^{2}. Indeed, the majority of farmers in Duyung village have quite a large area of land because the main occupation in Duyung village is farmers, so there is still quite a lot of arable land there. Nine respondents, or 20%, own or work on land with an area <499m^2. Most respondents with a land area of 500 m2 usually have side jobs to fulfil their daily lives. There are seven respondents, or 15.6%, who own land or work on the land with an area of 500m^2.based on the data obtained regarding a land area equal to half a hectare and those were indeed farmers there-maximized so that it is as efficient as possible so that farmers can make ends meet and not depend on side jobs.

Table 8. Plant Fertilizer

Type	Freq	**%**
Compost	1	2.2
Urea	35	77.8
Mixed C+U	9	20
Total	45	100

N = 45

Source: questionnaire no 17/coding no 32

From the results of the research we did, it was known that there were 45 respondents. There was one respondent, or 2.2%, using compost. Based on the above data, it can be concluded that the farmers in Duyung village do not believe in compost, so there is only one respondent due to the lack of compatibility of the compost with the land there. There were 35 respondents, or 77.8% using urea fertiliser. Based on the above data, urea fertiliser is still a mainstay and favourite of the Farmers over

there, maybe because the quality and results from Urea are still reliable.

There were nine respondents, or 20% using compost and urea. Based on the data above, some farmers believe that mixing compost and urea is possible due to good results and is guaranteed by using a mixture of compost and urea. Chemicals alone can cause the soil to become arid and, over time, will cause a loss of fertility. From the respondents' answers, it can be analysed that the fertilisers used are urea and compost. That is, people often use both and divide it into half and then mix the two fertilisers to increase the quality of crop yields. The fertiliser was also obtained from those in Duyung Village. It can be concluded that by the difference in fertiliser use, it can be concluded that the fertility level of each land is also different.

Table 9. Quantity Fertilizer

Used Quantity	Freq	**%**
<10 kg	4	9.9
10 kg	7	15.5
>10 kg	34	75.5
Total	45	100

N= 45

Source: questionnaire no 18/ coding no 33

From the results of the research we did, it was known that there were 45 respondents. Four respondents, or 9.9%, use fertilisers <10 kg. Based on the data obtained, it can be concluded that only a handful of people or farmers use less than 10 kg of fertiliser because the land they cultivate is small, so they only need it as needed. There were seven respondents, or 15.5% using 10kg of fertiliser. Based on the data obtained, only seven people used 10 kg of fertiliser, which was adjusted to the existing land. There were 34 respondents, or 75.5% using fertiliser>10kg. Based on existing data, most people or farmers own large areas of land that require a relatively large amount of fertiliser to meet soil fertility. Fertilisers are essential in increasing soil fertility and the quality and quantity of crop yields. so that it can be concluded that the amount of fertiliser used in agriculture varies and is adjusted to the land you want to work on. Do not forget that the more it follows the proportions, the more quality and quantity the yields will be, do not forget to usage Insufficient fertiliser will result in crop yields, not in line with expectations. Moreover, if excessive fertiliser causes infertility or crop failure, the application must follow the proportions.

Table 10. Agricultural Land Processing Efficiency

Efficiency	Freq	**%**
High	15	33.3
Middle	17	37.78
Low	13	38.89
Total	45	100

N = 45

Source: total scoring that has been categorised

The data above shows that 15 of our respondents or 33.3% are in the high category in efficiency processing the land. so the people there are quite advanced because it is quite high in terms of land management efficiency. At the same time, 17 of our respondents were included in the medium category processing land or about 37.78%. Based on the data above, land management efficiency is moderate from all the respondents obtained. For respondents who fall into the low category in processing the land, there are 13 respondents with a percentage of 28.89%. Based on the data above, there is still quite a variety in the efficiency of land management. However, according to the data obtained by the Duyung Village community, it is efficient in terms of land management. Hence, most of the people working as farmers understand the importance of land management efficiency. From the statement above, we can analyse that the DTH and fresh green tourist attractions in Duyung Village are not active agricultural land which is often used for growing plants. However, only as fields are covered with durians, which are also private property, the informants estimate that there are still many agricultural lands in the village. The existence of these tourist attractions does not interfere with agricultural land, even the workers, both men and women, are still active as farmers there besides that, farmers also have side jobs.

Policy on Land Efficiency

The agricultural land efficiency strategy in East Java seeks to enhance agricultural production by optimizing land usage without the expansion of additional agricultural zones (Rejekiningrum et al., 2022). This phase encompasses the use of contemporary technology, crop diversification, enhanced irrigation management, and the empowerment of farmers via training (Pandey et al., 2024). This strategy emphasizes regulating land use change, promoting organic fertilizers, and fostering sustainable agricultural systems to preserve environmental equilibrium and enhance regional food security. The agricultural land efficiency strategy in East Java aims to tackle the issue of land scarcity resulting from the growing demand for land conversion for non-agricultural use, including housing, industry, and infrastructure (Mulyani et al., 2022). The goal of this strategy is to get more use out of agricultural land by doing things like using modern technology to make farming more intensive, mapping land zoning based on how well it fits with different ecosystems, and improving climate-smart farming methods.

The East Java government promotes agribusiness innovations, the adoption of sustainable planting systems such as intercropping and crop rotation, and enhances farmers' access to superior seeds, eco-friendly fertilizers, and agricultural machinery (*alsintan*) (Huang, 2023). Local governments, universities, and businesses work together to make this strategy more effective by creating an agricultural ecosystem that is driven by technology and connecting agricultural goods to local and global supply chains. This plan includes stricter rules to keep arable land from being turned into other uses, rewards for farmers who switch to more environmentally friendly farming methods, and better management of water resources by upgrading irrigation systems. This method aims for East Java to sustain its strategic role as a national food hub while safeguarding the environment for future generations.

East Java's agricultural land efficiency program is a planned response to how the country's growing needs are putting more and more stress on land resources, especially in rural areas that are important for food security. This strategy prioritizes the intense, efficient, and sustainable use of land while also taking into account environmental conservation and the well-being of farmers.

This policy mostly encompasses the following approaches: Enhancement of Marginal Lands: Converting unproductive land into arable land by land management, conservation practices, and the use of suitable technologies. Agricultural intensification means increasing crop yields without expanding the farming area. We can achieve this by enhancing the efficiency of agricultural inputs, such as the use of improved seeds, fertilizer, and pesticides, and by utilizing the Internet of Things (IoT) to monitor weather and soil conditions. Commodity diversification means growing high-value economic crops that are well-suited to the local soil and climate in order to make farmers more money and lower their risk of crop failure. Enforcing strict rules and supervision of land use change is necessary to prevent the conversion of technically irrigated rice fields into non-agricultural areas. Incentive programs for areas that maintain farming should complement this. Modernizing and digitizing irrigation systems to enhance water distribution efficiency and groundwater basin management, ensuring water supply for the agricultural sector throughout the dry season. Empowerment of Farmers: Ongoing training for farmers in sustainable agricultural methods, access to agricultural financing facilities, and collaborative projects with the commercial sector to improve the competitiveness of agricultural goods. Advancement of Technology and Innovation: Encouraging agricultural research and innovation to create new technologies that are better for the environment, such as biotechnology to make crops more resistant to pests and climate change and agricultural automation to make work easier.

This strategy seeks to establish a more adaptable agricultural system to global concerns, such as climate change and the rising food demand, via collaboration among local governments, universities, research institutes, commercial entities, and farming communities. East Java is anticipated to exemplify the execution of sustainable agriculture that fulfills local demands while enhancing Indonesia's

status as a significant participant in the global agribusiness arena.

Regulations on agricultural land efficiency in Indonesia often emphasize the best use of land resources to enhance food security, boost productivity, and avert unregulated land conversion. The following rules pertain to the efficiency of agricultural land:

1. Law No. 41 of 2009 for the Protection of Sustainable Agricultural Land for Food (PLP2B) (Angga, 2024)
   This legislation governs the safeguarding of agricultural land to avert its conversion to non-agricultural use. Essentially:
   The government must provide sustainable agricultural land for food production (LP2B) (Darman, 2018)
   Sanctions exist for entities that unlawfully convert agricultural land. Landowners who maintain their property for agricultural use receive incentives.
2. Government Regulation No. 1 of 2011 on the Designation and Conversion of Sustainable Agricultural Land for Food Production (Darman, 2018)
   This PP serves as the implementing rule for Law No. 41 of 2009, providing more detailed regulations on:
   The process involves creating sustainable agricultural land for food production. The procedure for land use change requires explicit permission. The conservation of agricultural land quality is crucial to enhance production.
3. Law No. 26 of 2007, about spatial planning (Prihandono, 2010)
   This legislation underscores the significance of national spatial planning, particularly the safeguarding of arable land against unregulated urban development. Every area is required to govern land use zones, including agricultural zones.
4. Presidential Instruction No. 5 of 2011 on the Preservation of Sustainable Agricultural Land for Food Production (Suhadi et al., 2023)
   This presidential directive seeks to guarantee that all stakeholders, including local governments, preserve the sustainability of agricultural land and avert land conversion.
5. Minister of Agriculture Regulation No. 07/Permentan/OT.140/2/2009 (Intiastuti, 2011)
   This ministerial regulation establishes the criteria and processes for designating sustainable food land. The emphasis is on how regions designate important territories for food requirements.

Conclusion

In Duyung Village, land management is divided into simple and modern tools. Traditional agricultural tools include Sickles, Hoes, and the plough system, while modern tools include tractors. Around 20 people use tractors for efficient ploughing, but 25 do not due to high costs and unoptimal results. Technological tools can shorten working time in fields, but they are only used for specific soil types and must be rented before use. This varies among farmers and individuals, leading to differences in productivity levels. Rice is a priority for planting in Duyung Village, as it is the basis for staple food and needs. The irrigation system affects soil fertility, but the Duyung Village community is generally efficient in land management. The DTH and fresh green tourist attractions in Duyung Village are not active agricultural land, but fields covered with durians, private property, suggest that there is still much land agriculture in the village. Both men and women are active farmers, and farmers also have side jobs. Overall, Duyung Village's land management is efficient, with farmers understanding the importance of land management efficiency.

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