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Socioeconomic Traces of Nutmeg Farmers in Liliboi: Between Tradition and Modern Challenges

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Abstract

This study aims to assess the socio-economic conditions and management systems of nutmeg cultivation in Liliboi Village, West Leihitu District, Central Maluku Regency. Nutmeg is an important commodity in Ambon Island, and most villagers depend on this crop for their livelihoods. This study used a qualitative descriptive method, involving 30 nutmeg farmers who were randomly selected as respondents. Primary data were collected through direct interviews, while secondary data were obtained from relevant official references. Data were analyzed using score distribution and assessment scale categories. The findings indicate that the socio-economic conditions in Liliboi Village are quite adequate. The nutmeg cultivation management system is still traditional and hereditary. The change from collective land ownership to individual ownership has an impact on farmers' production and income. This study concludes that although the socio-economic conditions of nutmeg farmers in Liliboi Village are relatively good, they still rely on traditional methods. Changes in land ownership structures affect the way nutmeg is managed and encourage diversification of agricultural activities, which contributes to farmers' income.

Keywords: Socio-Economic Conditions, Nutmeg Cultivation, Liliboi Village, Farmers' Education Level, Access to Market Information.

Abstrak

Studi ini bertujuan untuk menilai kondisi sosial-ekonomi dan sistem manajemen budidaya pala di Desa Liliboi, Kecamatan Leihitu Barat, Kabupaten Maluku Tengah. Pala merupakan komoditas penting di Pulau Ambon, dan sebagian besar penduduk desa bergantung pada tanaman ini untuk mata pencaharian mereka. Penelitian ini menggunakan metode deskriptif kualitatif, melibatkan 30 petani pala yang dipilih secara acak sebagai responden. Data primer dikumpulkan melalui wawancara langsung, sedangkan data sekunder diperoleh dari referensi resmi yang relevan. Data dianalisis menggunakan distribusi skor dan kategori skala penilaian. Temuan menunjukkan bahwa kondisi sosial-ekonomi di Desa Liliboi cukup memadai. Sistem manajemen budidaya pala masih bersifat tradisional dan turun-temurun. Perubahan dari kepemilikan tanah secara kolektif menjadi kepemilikan individu berdampak pada produksi dan pendapatan petani. Studi ini menyimpulkan bahwa meskipun kondisi sosial-ekonomi petani pala di Desa Liliboi relatif baik, mereka masih bergantung pada metode tradisional. Perubahan dalam struktur kepemilikan tanah mempengaruhi cara pengelolaan pala dan mendorong diversifikasi kegiatan pertanian, yang berkontribusi pada pendapatan petani.

Keyword: Kondisi Sosial-Ekonomi, Budidaya Pala, Desa Liliboi, Tingkat Pendidikan Petani, Akses Informasi Pasar.

INTRODUCTION

Nutmeg (*Myristica fragrans*) is one of the plantation commodities that has high economic value and a strategic role in international trade (Ayo et al., 2018; Ekeke et al., 2021; Jain et al., 2024). Indonesia, as one of the world's main producers of nutmeg, has exported this commodity to various countries to meet

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the demand of the food, cosmetics, and pharmaceutical industries. Among the nutmeg producing regions that have high commodities and production, Maluku Province is known as one of the main centers that has long been part of the global supply chain. The superior quality of nutmeg from Maluku makes it a leading export commodity that contributes foreign exchange and supports the regional economy (Adams et al., 2021; Darshan et al., 2017).

Nutmeg also historically has strong roots in the history of world trade. Since the 15th century, spices from the Maluku Islands, especially nutmeg and cloves, have been the main target of European traders. The arrival of the Portuguese, Dutch, and other colonial nations to eastern Indonesia cannot be separated from the appeal of this commodity. Nutmeg is not just an ordinary agricultural product, but has formed trade routes, power conflicts, and social changes that have left their mark on local history to this day (Manocha et al., 2023; Ngaiwi et al., 2023). This historical legacy is still reflected in the economic and cultural patterns of people who depend on spice commodities for their livelihoods.

Figure 1. Indonesia Nutmeg Production and Export

Source: Data proceed

Figure 1 show In the period 2015 to 2021, the trend of Indonesian nutmeg production and exports showed a relatively stable pattern with an increasing tendency. National production was recorded to have increased from around 16,000 tons in 2015 to around 17,200 tons in 2021. Export volume also grew from 9,500 tons to more than 10,000 tons in the same period. Although it had decreased in 2020 due to the disruption of the global pandemic, export figures recovered the following year.

More than 60 percent of Indonesia's nutmeg production is allocated to the export market on average. These data show that nutmeg is not just a domestic commodity, but has become an important part of the global supply chain. This strategic position confirms nutmeg as one of Indonesia's leading export commodities, especially from major producing regions such as Maluku. This fact emphasizes the need for serious attention to the social and economic conditions of nutmeg farmers, who are the main

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actors behind the availability of this strategic commodity in the international market, they are the foundation that supports the production chain, but are often in a vulnerable economic position.

At the local level, especially in Liliboi Village, Leihitu Barat District, Central Maluku Regency, nutmeg remains the backbone of the community's economy. Most of the population depends on the results of nutmeg gardens that have been passed down from generation to generation. Nutmeg is not only the main source of income, but also has strong symbolic and social values in the daily lives of villagers. Garden management, harvest cycles, and sales of harvests are part of the routine activities that form the social and economic structure of the Liliboi community. A study of the socio-economic conditions of nutmeg farmers in the village is important for understanding local dynamics as well as the challenges they face in maintaining the sustainability of their farming efforts.Lilibooi Village is one of the villages in Leihitu Barat District, Central Maluku Regency, which is known for its nutmeg production. According to BPS data from 2018, the area of nutmeg in Lilibooi only reached 6 hectares, with a yield of 12 tons, making it the third largest nutmeg cultivation area in Leihitu Barat. Meanwhile, Lilibooi's production of 12 tons places it as the second highest nutmeg producing village among the five villages in the district. Nutmeg plants in Lilibooi are a legacy from their ancestors, but many new farmers have also started cultivating nutmeg. Nutmeg management still follows methods passed down from generation to generation. Farmers usually plant without following modern planting patterns or rotation systems, and to fertilize the soil, they prefer natural materials such as homemade compost or kitchen ash. The harvesting and post-harvest processes are also carried out manually. Nutmeg seeds are dried in the sun without tools to ensure that the water content meets standards. To sell their harvest, farmers still rely on local collectors, without much access to wider markets or a more organized distribution chain.

Today's challenges make this system start to feel inadequate. The global market, for example, has much higher demands: uniform quality, neat packaging, to certifications such as organic or fair trade, and these factors are difficult to meet if everything is still done the old way. Agricultural technology also continues to develop—from drip irrigation, data-based fertilization, to modern tools for post-harvest. This technology has not yet reached many Liliboi farmers due to limited costs, information, and training. In addition, climate change also adds to the burden: unpredictable rainy and dry seasons and rising temperatures make plants more susceptible to pests and diseases, which have so far only been controlled manually without modern pesticides. This condition shows the gap between farming methods that still rely on tradition and the challenges of a changing world. An approach is needed that does not force sudden modernization, but slowly aligns innovation with local wisdom, farmers can maintain traditional values while strengthening their resilience to face the future.

In recent years, nutmeg farmers in various producing regions—including Maluku—have faced economic pressure due to unstable selling prices. The price of dried nutmeg, for example, can range from IDR 60,000 to IDR 120,000 per kilogram depending on the season, quality, and market demand (BPS, 2021). These fluctuations often do not favor farmers, especially during the main harvest, when prices tend to plummet due to abundant supply but not balanced by good distribution management, and this instability makes farmers' income uncertain, making it difficult for them to plan household finances and invest in farming businesses (Ogunmefun & Achike, 2017).

Another problem is limited market access, many farmers in villages like Liliboi do not have direct access to export markets or processing industries. They often sell their harvests to local middlemen or collectors who come directly to the plantation or village. This dependency creates a long distribution chain and reduces the selling value of nutmeg products received by farmers. A study by (Tangonyire & Akuriba,

2021) shows that more than 70% of nutmeg farmers sell their products through intermediaries due to limited market information and transportation facilities.

This condition is exacerbated by the lack of technological intervention in the production and post-harvest processes. Most farmers still use traditional methods for harvesting, drying, and storage. This has an impact on product quality and competitiveness in the international market which increasingly demands high quality standards. Research by (Lazaridou et al., 2019) found that the low adoption of agricultural technology in correlated with the lack of technical assistance and limited access to training or information on agricultural innovations. Access to capital is also a crucial issue. Most farmers do not have collateral to access formal credit from banks or financial institutions. They rely on informal loans with high interest rates or a long-term loss-making ijon trading system. Data from the Ministry of Agriculture (2022) in (Mishra et al., 2022)shows that only around 18% of spice farmers in Indonesia have access to formal financing, this condition makes it difficult for farmers to increase their business scale or invest in more efficient equipment. All of these problems show that although nutmeg has strategic value in the global market, the position of farmers as primary producers is still weak in the existing agribusiness system, and this inequality highlights the urgency of reforms in the distribution system, pricing policies, technology support, and access to financing to create a fairer balance between the upstream and downstream of the nutmeg industry (Akinola, 2017; Islam et al., 2014; Mwololo et al., 2019).

Social issues are an important aspect in understanding the dynamics of nutmeg farmers' lives, especially in areas such as Liliboi Village. One of the main problems is the low level of formal education among farmers. Many farmers only have elementary or junior high school education. Data from the Central Statistics Agency (BPS) of Maluku Province in 2021 noted that more than 60% of farmers in the Central Maluku region only have junior high school education. This condition has a direct impact on the limited understanding of modern farming management, financial records, and access to government programs based on digital administration. Research by (Mogaka et al., 2021; Ullah et al., 2020) emphasized that low levels of education are an obstacle to the adoption of agricultural innovation and the use of new technologies in the spice sector.

The role of the family in nutmeg farming also shows the typical characteristics of a traditional agrarian society, where farming activities are carried out collectively by all members of the household (Achichi et al., 2023; Adesope et al., 2012). Husbands, wives, and even children are involved in the process from nutmeg tree maintenance, harvesting, to processing the results, this condition creates a work system based on family solidarity, but on the other hand, the involvement of children in garden work is often a substitute for formal education, reinforcing the cycle of low education between generations. A study by (Masudkar et al., 2017) shows that in many farming households, farming is a family affair as a whole, which unfortunately often sacrifices children's access to education and study time.

Access to information and social networks is also a significant challenge. Many farmers do not have adequate information on market prices, efficient cultivation techniques, or assistance programs from the government or NGOs. Reliance on information from middlemen or fellow farmers limits choices in economic decision-making. Research by (Modirwa, 2019) shows that this information isolation is exacerbated by the lack of active farmer groups or support institutions in remote villages. The existence of social networks and institutions plays a major role in strengthening farmers' bargaining position in the market and encouraging more inclusive socio-economic transformation. Social problems such as low education, dependence on families as the main workforce, and limited access to information show that strengthening human capacity is a crucial aspect in nutmeg agricultural development, and without improvements in this area, efforts to increase farmer productivity and welfare will be slow, hampered by

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long-standing structural constraints (Anigbogu et al., 2015; Chandra et al., 2023; Pérez Urdiales et al., 2016).

Although nutmeg has been a major commodity that has supported the lives of the people of Liliboi for generations, the development of the times has presented new challenges that cannot be ignored. Climate change, global market pressures, and limited access to modern technology are dynamics that need to be analyzed not only from an economic perspective, but also from a social and structural perspective. This article utilizes theoretical frameworks from rural sociology and agrarian economics to read more deeply into how nutmeg farmers respond to these changes. This approach is important for understanding the attachment of rural communities to traditional practices, as well as the structural limitations faced in accessing wider resources and markets. Thus, the analysis not only explains the current conditions, but also opens up space for understanding the ongoing socio-economic transformation (Pandey, 2017a; Sujianto et al., 2024).

This research is motivated by the high relevance of nutmeg plants as a superior regional commodity. The main objective of this study is to understand how nutmeg plants are managed by local communities and how this impacts their social and economic conditions. The focus of the study includes aspects of household income, education level, and livelihood patterns of nutmeg farmers in Liliboi Village. This study aims to provide data that can be used as a basis for formulating policies that are more supportive of improving farmer welfare and optimizing local agricultural potential. The results of this study are expected to reflect the reality faced by farmers in the field, including the needs, aspirations, and obstacles they experience in managing nutmeg farming businesses by involving direct participation from the community.

RESEARCH METHOD

This study uses a qualitative descriptive approach to examine the socio-economic conditions and nutmeg cultivation systems in Liliboi Village, West Leihitu District, Central Maluku Regency. A total of 30 farmers were randomly selected considering variations in age, experience, and educational background to ensure diverse representation. Data were collected through semi-structured interviews and field observations. Interviews were conducted with farmers to capture cultivation practices, challenges faced, and social dynamics that occur among them. Field observations were conducted to directly observe agricultural conditions and social interactions that occur in the field. Secondary data from BPS and local government documents were used to complement primary data and provide a broader context regarding the socio-economic conditions in Liliboi Village.

The data analysis process in this study was carried out thematically to gain a deeper understanding of nutmeg cultivation practices, socio-economic conditions, and challenges faced by farmers in Liliboi. Data collected through interviews and field observations were recorded and sorted based on main themes such as nutmeg cultivation practices, diversification of agricultural activities, economic challenges, and social aspects in farmers' lives. Furthermore, the grouped data were arranged into larger categories to find patterns of relationships between social, economic, and technical factors in nutmeg farming management. In this way, it can be seen how these factors are interrelated and influence the existing cultivation system in the village. Finally, the patterns that emerged were analyzed to provide a deeper understanding of how the interaction between social, economic, and technical factors shapes the farming system in Liliboi, the results of which are used to describe the dynamics of the farming community comprehensively and provide recommendations for the development of better and more sustainable agricultural policies. This thematic analysis approach is expected to produce a holistic picture of the socio-economic conditions and

agricultural practices in Liliboi, which in turn can be a reference in formulating more effective agricultural policies that are in accordance with local needs.

RESULTS AND DISCUSSION

Social Conditions

The social conditions of nutmeg farmers in Liliboi Village reflect close community ties and high solidarity. Relations between residents are built on the values of family and togetherness, which are reflected in the practice of mutual cooperation and other collective activities. For example, when the harvest season arrives, farmers help each other pick and process nutmeg fruit without compensation, simply because of the awareness of the importance of cooperation. Social activities such as traditional meetings, community service, and community discussions are also routinely carried out, becoming a means to strengthen social relations while discussing the agricultural problems they face (Ahmad et al., 2023; Anjum et al., 2020).

Liliboi Village, located in the coastal area of Ambon Island, has a wealth of natural resources that are quite diverse. In addition to depending on the sea for a living, the community also manages gardens as an important part of their livelihood. Nutmeg cultivation is one of the main activities that is passed down from generation to generation. Knowledge about planting times, maintenance techniques, to harvesting and processing methods is usually taught informally from parents to their children, this system makes nutmeg farming have a strong cultural dimension, not just an economic activity.

Behind these strong social ties, farmers still face quite serious structural obstacles. One of them is limited access to market information. Most farmers do not know the selling price of nutmeg at the large collector level or the national market, so their bargaining position is low. They also rarely get information about export opportunities, agricultural assistance, or technical training that can increase productivity. The lack of assistance from the government and related institutions means that farmers have to rely on old knowledge and informal networks, which are not always sufficient in facing the challenges of modern agriculture. The gap between the great natural potential and the limited structural support is the main challenge for nutmeg farmers in Liliboi. Although they have a spirit of togetherness and long experience in farming, without adequate access to information and policy support, it is difficult for them to improve their standard of living sustainably, and strengthening social capacity must be balanced with concrete economic empowerment and consistent institutional support.

Resident

Liliboi Village, located in Leihitu Barat District, Central Maluku Regency, is a coastal community with a population of around 2,353 people. The composition of the population is relatively balanced between men and women, with 1,158 men (49.21%) and 1,195 women (50.79%), and this proportion shows a stable gender distribution and does not show dominance of one group. This balance can also provide an initial picture of the potential for a fairly even workforce between men and women, especially in key sectors such as agriculture and fisheries.

The majority of Liliboi Village residents are indigenous and Christian, who have settled there for generations. Their attachment to the land, environment, and community makes the social structure of this village quite strong and cohesive. This fact is reflected in the role of local culture and traditions that are still very much alive and influence many aspects of life, from land management to social interaction patterns. The culture of mutual cooperation and customary meetings are still preserved, creating a social climate

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that supports collective work in agricultural activities, especially in nutmeg cultivation. For more details, see the following table 1:

Table 1. Total population by gender in Lilibooi Country

Gender	Number of people	Percentage (%)
Man	1.158	49.21
Woman	1.195	50.79
Total	2.353	100.00

Source: West Leihitu District in Figures 2018

The economy of the Liliboi Village community depends mainly on agriculture and fisheries. The agricultural sector, especially nutmeg cultivation, is the mainstay because this area is one of the potential spice producers in Maluku. Meanwhile, fisheries are complementary, considering the geographical position of the village which is on the coast and has direct access to the sea. The combination of these two sectors makes the village's economic structure quite dynamic, although it is still dominated by a small family business system and traditional production methods.

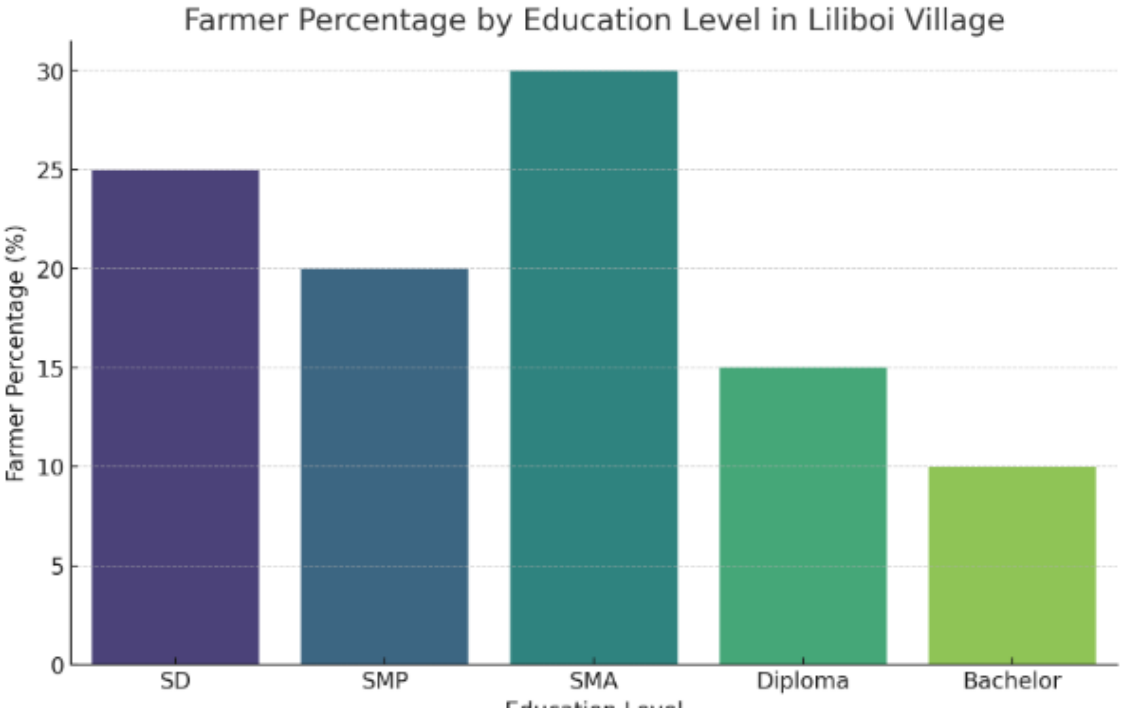

Figure 2. Farmer Percentage by Education Level in Liliboi Village

Source: data prcoceed

Figure 2 show These population data also provide initial clues to the productive capacity of the community if analyzed more deeply. With more than two thousand residents, Liliboi has sufficient human resources for local economic development, provided they are supported by training, market access, and appropriate policies. A balanced gender distribution also opens up opportunities to involve women in nutmeg-based agricultural or entrepreneurship programs. The absence of productive age data in this report is one limitation that needs to be considered. Additional information such as education level, number of active workers, and employment status would be very helpful in developing a more targeted economic empowerment strategy. Nevertheless, the available data still provides an important initial picture of the demographic structure and socio-economic potential of this village.

Figure 3. Quantitative analysis of farmer data

Source: data proceed

Figure 3 show Assessment of the socio-economic conditions of nutmeg farmers in Liliboi can be done through three main indicators, namely education level, average household income, and access to basic services. First, in terms of education, most heads of nutmeg farmer families in Liliboi have a formal educational background up to junior high school (SMP) level, with a proportion of around 62% based on the results of a 2024 field survey. Meanwhile, only around 15% continue to senior high school (SMA) or college. This level of education indicates limitations in access to further education, but is sufficient to support traditional farming activities.

The second factor is the income aspect, the average household income of nutmeg farmers in this area ranges from IDR 1,500,000 to IDR 2,500,000 per month. This income mostly comes from the sale of dried nutmeg, with additional income from subsistence farming activities or other seasonal work. Although this amount is relatively low when compared to the minimum wage standard for Maluku province which in 2024 is IDR 2,800,000 per month, in the context of rural living costs and subsistence consumption patterns, this income is considered sufficient to meet basic daily needs.

The third aspect in terms of access to basic services, the majority of Liliboi residents have access to electricity and clean water, although the distribution is not yet completely even across the hamlet. There are also basic education facilities (elementary and junior high schools) in the village, as well as one Assistant Health Center (Pustu) that serves the health needs of the community. However, for advanced health services, the community still has to travel about 45 minutes to the center of Ambon city. These three indicators, when viewed as a whole, show that despite some limitations, the socio-economic conditions of

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nutmeg farmers in Liliboi can be categorized as quite good, especially when compared to other villages with similar geographical conditions and accessibility. Increasing access to advanced education and more comprehensive health services remains an important need to support the long-term welfare of the community.

The average land area per farmer was recorded at 1.22 hectares, which is almost the same as the initial value of 1.2 hectares, indicating that most farmers manage land of similar size. In terms of yield, the average yield per hectare remained consistent at 400 kg, in line with the initial estimate. Although yield per farmer varies, it depends on the size of land they manage. Around 60% of farmers adopted business diversification, such as raising chickens or goats, which proved to be a common practice. This diversification not only helped increase their income but also served as a strategy to reduce the risk arising from the uncertainty of nutmeg harvests, as seen in the pie chart depicting the spread of this practice.

Livelihood

The majority of people in Liliboi depend on the agricultural sector for their livelihood. Around 56.70 percent of the population work as farmers, reflecting the high dependence on agricultural activities. Agriculture is the main source of income as well as part of daily life patterns. Mainstay commodities include nutmeg, cloves, fruits, and vegetables. Nutmeg has the most prominent economic value and contributes greatly to household income. Agricultural land in Liliboi is relatively fertile and suitable for various types of plants. This condition provides a great opportunity for the community to increase harvest yields and improve their standard of living. Farming practices are passed down from generation to generation, forming a distinctive cultural pattern. Farming is not only about the economy, but also social identity.

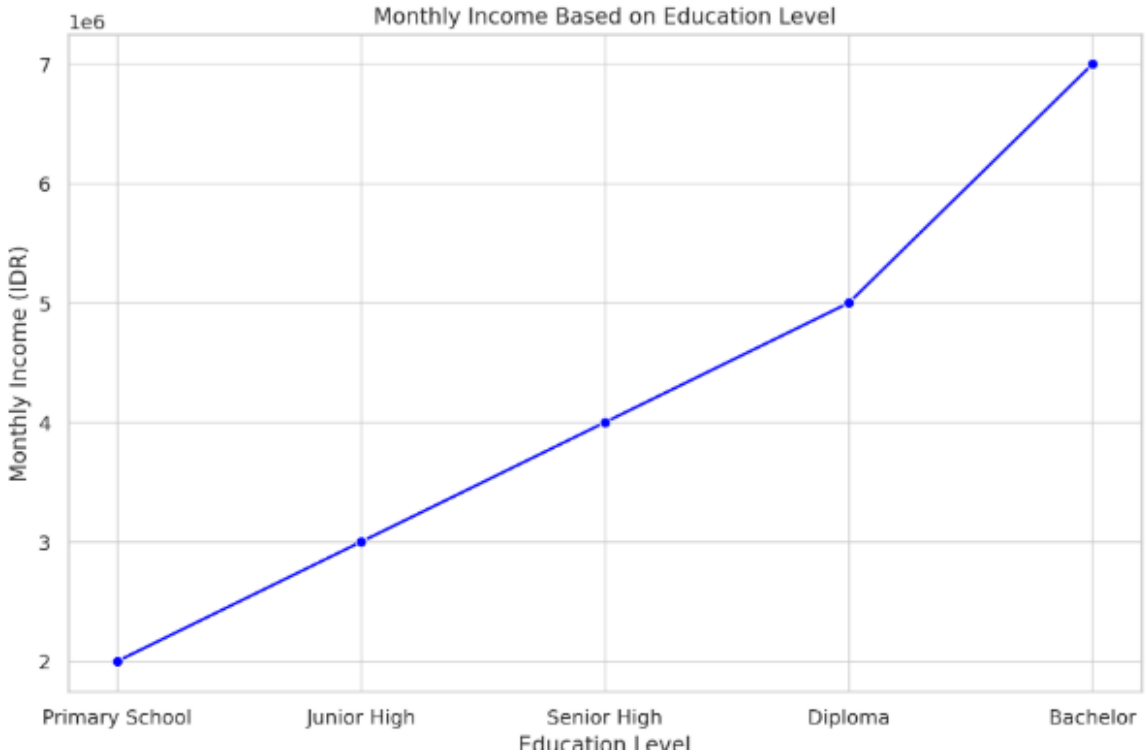

Figure 4. Monthly Income Based on Education Level

Source: data proceed

This data visualization illustrates the relationship between education, experience, access to information, and farmer income in Liliboi Village. It can be seen that most farmers have a high school education, while the number of farmers with a bachelor's degree is very small. Although the number is small, farmers with higher education tend to have a higher monthly income. The graph also shows that the higher the farming experience, the higher the income earned, although the education factor also plays an important role. Access to market information has a significant impact and the easier it is for farmers to access market information, the higher their income. This data simply shows that education, experience, and information are the keys to improving farmer welfare.

Supporting facilities such as cooperatives and public transportation also influence the smooth running of economic activities. Local cooperatives help meet the daily needs of residents, although their management is not yet optimal. Access to transportation such as buses facilitates mobility, both to sell crops to the city and for education and health purposes. A sufficient population and strong natural potential give Liliboi a strategic position in local economic development. Challenges remain, especially in increasing human resource capacity and efficient resource management. Training support, market access, and institutional development are key so that agricultural potential can truly be optimized and provide greater benefits for community welfare (Ha et al., 2023; Musafiri et al., 2022):

Table 2. Population based on occupation in Lilibooi Country

Work	Number of people)	Percentage (%)
Civil Servant	110	19.67
Farmer	317	56.70
Fisherman	10	1.78
Private	122	21.82
Total	559	100.00

Source: Lilibooi Country Government Office, 2016

Data from the Liliboi Village Government Office in 2016 in table 2 showed that of the total 559 residents recorded as having permanent jobs, the majority—56.70% or 317 people—worked as farmers. This figure reinforces the picture that the agricultural sector, especially the cultivation of nutmeg and other local commodities, is the backbone of the village economy. The high proportion of farmers also shows that people's livelihoods are still very dependent on natural conditions and seasonal planting patterns, which of course carries the risk of income uncertainty.

The private sector ranks second with 122 people or 21.82%. This group most likely includes informal workers, daily laborers, small traders, and other local services. They play a complementary role in the village economic structure which is still based on agriculture. Meanwhile, the number of civil servants (PNS) was recorded at 110 people (19.67%), which reflects the existence of a community group with a fixed and relatively stable income. The existence of PNS also influences the dynamics of the local economy, because they generally have better purchasing power and wider access to information.

The number of fishermen is only 10 people or 1.78%, even though Liliboi is a coastal area, and this shows that fisheries are not the dominant sector in the village, or it could also reflect the limitations of fishing equipment, knowledge, or marine infrastructure. The potential of the sea that has not been optimally developed could be a gap for alternative economic development if supported by appropriate training and investment. This employment structure shows that Liliboi's economy is highly dependent on the primary sector, especially agriculture. The inequality in job distribution is also clearly visible: more than half of the population works in one sector, while other sectors have not developed equally. This shows the importance of economic diversification and increasing capacity in the non-agricultural sector, either

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through entrepreneurship training, strengthening cooperatives, or developing processed industries based on agricultural and marine products.

Economic Conditions

The results of the interview showed that the monthly income of nutmeg farmers in Liliboi Village is in the range of IDR 2,000,000 to IDR 3,500,000, depending on the harvest season and the selling price in the market. This income is not fixed, because it is greatly influenced by seasonal factors and the dynamics of commodity prices that often change. When the harvest is abundant and the market price is stable, farmers can earn higher incomes, when the harvest decreases or the price drops, their income also drops drastically.

The majority of farmers rely on selling nutmeg seeds as their main source of income, because this is the part that has the highest selling value in the market. However, some farmers have begun to utilize other parts of the plant, such as nutmeg fruit flesh, to be sold as sweets or local processed ingredients. This effort is a strategy for diversifying income so as not to rely on just one commodity. Although its value is not as large as nutmeg seeds, the use of other parts of the nutmeg fruit shows that there is an initiative from the community to increase the economic value of their garden produce.

Farmers still face a number of obstacles that affect their welfare. One of the main challenges is the fluctuation of market prices, which are difficult to predict and often not in favor of farmers. Prices can change in a matter of weeks depending on demand and supply, and dependence on middlemen keeps farmers in a weak bargaining position. High production costs, such as for garden maintenance, post-harvest processing, and transportation to the market, erode a large part of their income. The net profit received by farmers does not always reflect the volume of production they produce. This condition emphasizes that farmers' income is not only determined by the harvest, but also by the market structure, operational costs, and the extent to which they have control over the distribution chain (Beharielal et al., 2022; Mittal & Mehar, 2016). Without interventions such as strengthening cooperatives, access to price information, and efficiency of production costs, the welfare of nutmeg farmers will remain vulnerable.

Nutmeg Cultivation Practices

Liliboi Village shows that nutmeg cultivation is still carried out traditionally, reflecting local wisdom that has been passed down from generation to generation. Farmers rely on their own experiences in caring for plants, from planting to harvesting. Many of them choose to use organic fertilizers and natural pesticides made from local materials such as crop residues and kitchen waste. This approach is not only cheaper and more accessible, but also maintains soil fertility and environmental sustainability around their gardens.

Although awareness of the importance of sustainable agriculture has grown, the reality is that not all farmers can completely abandon chemicals. In certain conditions, especially when dealing with pests or when the harvest needs to be achieved quickly, chemical pesticides are still used. Economic pressures and market needs often put farmers in a difficult position—they know the risks, but there are few options. The use of these chemicals has long-term impacts, ranging from health problems for farmers who are frequently exposed, to the potential for residues in the crops consumed by the community.

Observations show a great opportunity to increase productivity without sacrificing the environment. Modern agricultural technology could actually be the solution. For example, efficient irrigation techniques can help save water and maintain soil moisture—an increasingly important issue amidst the threat of climate change. So too can the selection of superior nutmeg seeds that are more

disease-resistant and more productive, or the use of data and sensors to determine when is the best time to water or fertilize. Such innovations could make Liliboi farming more resilient and profitable without losing its traditional roots. Improving Liliboi farming practices does not mean completely replacing the old, but combining local knowledge with new technology. With this approach, farmers can preserve their ancestral heritage while remaining competitive in the modern market and maintaining sustainability for the future.

Data-driven technologies offer farmers a huge opportunity to improve the way they manage their gardens. Digital applications designed specifically for agriculture, for example, can provide real-time information about soil conditions, water needs, and the best time to harvest. With this kind of information, farmers can make more accurate decisions—when to water, when to fertilize, and when to harvest for maximum yields. No longer relying solely on habits or weather predictions, but on concrete data that supports every step.

For this technology to be truly utilized, training is key. Farmers need to be equipped with new knowledge—not just about how to plant, but also how to read data, understand crop cycles scientifically, and apply safer and more effective pest control techniques. Training programs should not only focus on technical aspects, but also include business management, such as cost planning, harvest recording, and marketing strategies, farmers will be better prepared for market changes and be able to manage their gardens like a business.

Support from research institutions and universities can also encourage agricultural innovation at the village level. Collaboration in the form of field research, workshops, or seminars allows farmers to interact directly with experts. They can learn new techniques, try out superior crop varieties, or even participate in pilot projects. This interaction is not just one-way—farmers can also share their experiences in the field, including the obstacles they face, and more relevant solutions can be born, because they are based on the realities and needs of farmers themselves.

Research Result

The social and economic conditions of nutmeg farmers in Liliboi Village are influenced by several main factors, including education level, farming experience, and access to information. Farmers with better education tend to be more likely to adopt modern farming practices and understand new ways to increase productivity. They are also quicker to find opportunities, such as access to assistance, training, or market price information. This finding is consistent with previous research showing a relationship between education, adaptability, and increased farmer income. Social strength within the community also plays a big role. Farmers in Liliboi live in a supportive social environment, with mutual cooperation being an important part of daily activities, such as clearing land, harvesting, and building village facilities. Regular meetings to discuss various issues, including agriculture, strengthen social networks that create a sense of togetherness and collective responsibility in maintaining farming efforts.

Access to market information remains a major problem. Many farmers do not yet know accurate market prices or are not directly connected to end buyers, so they still rely on middlemen who take advantage of this ignorance, this keeps farmers' bargaining position low even though they produce quality products. Other studies have also shown that access to market information, such as price trends and seasonal demand, contributes to farmers' ability to obtain better selling prices. Without sufficient information, farmers in Liliboi are at risk of remaining trapped in a passive position in the distribution chain. They work hard, but get low economic value. Expanding access to more equitable and fair

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information, in addition to strengthening social and technical aspects, is an important step to promote sustainable farmer welfare.

Variations in nutmeg farmers' incomes indicate their dependence on crop yields and fluctuating market prices. Frequent price changes lead to income uncertainty, which is consistent with previous research findings that farmers often face high economic risks. This uncertainty not only affects their current welfare but can also affect their investment decisions for the future, such as land development, purchasing inputs, and improving agricultural infrastructure. Support from the government and related institutions is essential to provide training and better access to market information, and these programs can help farmers plan their farming efforts more effectively, reducing the risks they face (Nkonki-Mandleni et al., 2019; Yousafzai et al., 2022).

Traditional nutmeg cultivation practices show potential for increased productivity. Previous studies have shown that the application of modern agricultural technology, such as the use of superior varieties, efficient irrigation techniques, and better pest management, can increase yields and farmer incomes, training and mentoring programs for farmers are needed to improve cultivation practices and farm management. This training should not only cover technical knowledge, but also managerial aspects, such as financial planning and product marketing.

Based on the research conducted involving 30 respondents, it was found that nutmeg processing is still done traditionally by farmers and their family members. The following are some steps in managing nutmeg plants explained in the document:

Table 3. Steps in nutmeg plant management

Step	Detail
Land Preparation	Farmers clear primary forests based on their ability. Trees are left to dry before being burned. Simple tools like machetes, hoes, and crowbars are used for land processing. However, farmers have started using grass cutting machines to ease land clearing, reducing work time from three days to just one hour per hectare.
Plant Maintenance	Maintenance includes pest and disease control. Farmers in Lilibooi use mechanical methods, such as smoking around plants to control pests and cutting infected branches to prevent disease spread. Smoking is also considered effective in supporting the flowering process of nutmeg plants.
Harvesting	Harvesting occurs when the nutmeg fruit turns orange-brown, the mace is red, and the seed is black-brown. Farmers use sacks to gather the fruits and machetes to pick them from the trees. Harvesting is done without outside labor, only involving family members.
Post-Harvest	After harvesting, the seed and mace are separated and sun-dried. In the rainy season, farmers use bamboo racks for drying. This process is still done traditionally.
Socio-Economic Condition	The community in Lilibooi has a good socio-economic condition, with a growing population and potential natural resources. While nutmeg farming is still traditional, farmers have started adopting modern technology, such as grass cutting machines and pesticides, to improve their agricultural output.

Source: data proceed

Nutmeg farming practices are mostly traditional, but there are efforts to improve efficiency and yield by incorporating some modern techniques. To prepare the land, farmers clear primary forests based on their abilities, leaving the cut trees to dry before burning them. While simple tools like machetes, hoes, and crowbars are still used, some farmers have started using grass-cutting machines to speed up the process, reducing the time required from three days to just one hour per hectare. When it comes to plant care, farmers in Lilibooi focus on managing pests and diseases using mechanical methods. They use smoke around the plants to control pests and cut away infected branches to stop the spread of disease. The use of

smoke also helps with the flowering process of the nutmeg plants, reflecting an understanding of how certain practices benefit plant growth. Harvesting is done when the nutmeg fruit has turned orange-brown, the mace is red, and the seed is black-brown. Farmers gather the fruits using sacks and machetes to pick them from the trees, this process is carried out by family members, without the need for external labor, highlighting the community-based nature of the farming practice.

The seeds and mace are separated and sun-dried. During the rainy season, farmers use bamboo racks to dry the produce, a method that has been passed down through generations. Although traditional, this post-harvest process ensures the proper preservation of the crops. The community in Lilibooi benefits from a favorable socio-economic environment, with abundant natural resources and a growing population. While the farming practices mostly remain traditional, there is a shift toward using modern technologies such as grass-cutting machines and pesticides to improve productivity. This blend of traditional methods with modern advancements reflects the farmers' ongoing efforts to enhance their practices and improve their livelihoods (Anang & Zakariah, 2022; Tafesse et al., 2023).

Nutmeg farming is primarily managed through traditional practices that reflect the community's local wisdom. While these methods have proven effective in sustaining production, farmers face significant challenges, particularly low productivity, which is largely due to limited knowledge and access to modern technology. According to (Waldman et al., 2021), suboptimal management can lead to yields that are insufficient to meet the livelihood needs of farmers. Similarly, other studies such as those by (Krishnakumar & Chowdappa, 2017) and (Alegbeleye, 2018) have also highlighted how traditional farming methods contribute to lower productivity levels and financial instability among farmers in similar regions.

Field findings show that most nutmeg farmers in Liliboi still maintain the management system that has been passed down from generation to generation, both in cultivation techniques and in the harvest distribution scheme. This practice reflects what rural sociology theory calls the persistence of local social structures, where community values and traditions are the mainstays in economic decision-making, this situation also reflects the form of structural dependence of farmers on local collectors, which shows limited access to fairer and more profitable markets (Menggala & Damme, 2021; Vuković et al., 2023a).

When viewed through the framework of economic dualism, farmers in Liliboi are in a traditional sector that is separated from the more rapid modernization in urban areas. This causes a gap in both productivity and economic benefits. In many cases, even though farmers have strong local knowledge, they remain economically vulnerable due to inadequate support systems, including access to technology, capital, and market information.

The findings show that the nutmeg management system in Liliboi is still heavily influenced by local traditions and knowledge that have been passed down from generation to generation. Cultivation practices are carried out manually, without the use of mechanical tools or modern irrigation systems. Fertilization still uses natural organic materials such as compost and ash, while post-harvest processing such as drying and peeling of nutmeg seeds is carried out by drying them in the sun, without the help of water content testers or automatic dryers. This practice reflects a form of moral economy in rural communities as described by rural sociology theory, where economic decisions are often not based solely on market efficiency, but on shared values, family heritage, and community sustainability.

The position of nutmeg farmers in Liliboi also reflects a form of structural inequality as explained in agrarian economic theory. Most farmers rely on traditional buying and selling systems through local collectors, who often set prices below market standards. They do not have direct access to regional or export markets, and are not involved in value-added supply chains that allow for increased income, and

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this condition shows how an unequal market structure creates dependence of small farmers on more dominant economic actors.

Modern challenges such as international quality standards, demand for certified products, and the need for production efficiency are not easily adopted in traditional farming systems. Farmers often experience limitations in accessing training, market information, and the latest agricultural technology. This reinforces the dichotomy between traditional and modern agricultural sectors as explained by Boeke in the theory of economic dualism, which states that rural communities in developing countries are often trapped in subsistence farming systems that are not competitive in the global market. Climate change adds to the complexity of the problem. Unpredictable changes in weather patterns cause unstable harvests. Nutmeg plants, which are very sensitive to rainfall and temperature, experience declining quality and are vulnerable to pests, these problems can be overcome with adaptive agricultural technology and environmentally friendly pesticides, the response to these climate challenges is still limited to local knowledge that is increasingly inadequate to deal with rapidly changing ecological dynamics (Odubo et al., 2024a; Setiya et al., 2017a).

The socio-economic conditions in Lilibooi show that most farmers possess basic to secondary education. The lack of training and limited access to information on modern farming techniques significantly impedes productivity improvements, this finding is consistent with research by (Usman et al., 2020), who argued that enhancing the knowledge and skills of farmers is essential to improving agricultural yields. A study by (Odubo et al., 2024b; Setiya et al., 2017b) suggested that education alone does not always result in higher productivity unless coupled with hands-on training and access to technology, a factor that is missing in Lilibooi.

Statements about the existence of diversification in agricultural activities among nutmeg farmers in Liliboi indicate an important adaptive strategy to deal with economic challenges and uncertainty of agricultural output. Field findings show that diversification is carried out in several forms that are quite typical in the context of rural agriculture in Indonesia. One of the most common forms is the practice of intercropping, where nutmeg is planted with other commodities such as cloves, coconuts, and bananas. This strategy not only increases the efficiency of land use but also functions as a form of risk mitigation against price fluctuations and crop failures. Research by (Sujianto et al., 2024) in Sulawesi also shows that the intercropping system significantly contributes to the stability of farmers' incomes in agroforestry areas.

Diversification is also carried out through small-scale livestock farming, such as raising free-range chickens or goats. This activity is generally intended as an economic reserve that can be accessed at any time, for example during the lean season or for urgent needs. A study by (Arifah et al., 2023) in Maluku noted that the integration of livestock into traditional agricultural systems is one of the survival strategies of smallholder households in dealing with economic pressures. Another form of diversification that is starting to develop is the cultivation of seasonal commodities such as vegetables or other horticultural crops, especially among farmers who have more adequate access to water and land, and this is in line with the findings of research by (Anripa et al., 2023) and (Purba et al., 2021) which shows that farmers with higher levels of farming diversification tend to have more stable household incomes, even though their production scale is relatively small.

The continued reliance on traditional methods for pest and disease management underscores the need for intervention in the form of training and extension services. Adopting more effective, environmentally friendly pesticides could significantly enhance crop quality and reduce losses due to pest attacks. According to (Vuković et al., 2023b), incorporating modern technology into nutmeg cultivation

can improve product quality and make it more competitive in the global market. Some studies such as those by (Pandey, 2017b; Sikundla et al., 2018), caution that the overuse of pesticides without proper guidance can lead to negative environmental consequences, highlighting the need for balanced and informed approaches.

CONCLUSION

This study provides valuable insights into the social and economic conditions of nutmeg farmers in Liliboi. While challenges such as limited access to information and price fluctuations persist, the potential for improving farmers' well-being is significant. To address these challenges, local governments and agricultural support institutions must focus on concrete interventions. First, enhancing access to market information and providing training programs for farmers can improve decision-making and productivity. Local governments can equip farmers with the skills to adopt more efficient and sustainable methods by offering education on modern agricultural practices. Facilitating access to agricultural technology will enable farmers to increase their yields and income. Strengthening social networks and establishing communication channels for market trends will give farmers a competitive advantage in selling their products. Policy efforts should also focus on creating a robust support system that promotes the diversification of agricultural activities, thus reducing the risks associated with price fluctuations. In conclusion, a collaborative effort involving the government, agricultural institutions, and local communities is essential for sustainably improving the livelihoods of nutmeg farmers in Liliboi.

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