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Cultural Analysis of Sweet Potato Farming for Food Development in Lamongan Regency, Indonesia

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Abstract: Sweet potatoes have an excellent opportunity to develop food consumption diversification programs based on local resources, carbohydrate sources, sources of various nutrients, industrial raw materials and animal feed, and different processed products. This study aims to analyze the development of food socially and culturally. The research was conducted using a survey method in Kalitengah District, Lamongan, Indonesia. Sampling was done purposively in 4 sweet potato center villages, with 165 farmer respondents. Data analysis uses descriptive analysis. The results of the study show that the age of sweet potato farmers is relatively old, an average of 53 years, while the education level of farmers is low, with 75.80% having a primary school education. 75.80% of farmers have over 30 years of experience cultivating sweet potatoes, and everything has been done culturally for generations. Farmers consume sweet potatoes that have not yet become a culture, which is 74.50%. A recommendation for valuable improvements is to train farmers on fertilizers and storage facilities. Efforts to develop sweet potato cultivation will be instrumental in policy making. In the future, it is hoped that the community will be able to improve the culture of consuming sweet potatoes.

Keywords: Cultural; Development; Farming; Food; Social; Sweet Potato

Introduction

Sweet potato is a source of carbohydrate containing minerals and vitamins A and C that can be developed to meet the basic food needs of the community so as to reduce overdependence on rice. Sweet potato is an indigenous food crop grown on marginal soils and unfavorable climates, making it ideal for low-input agriculture and meeting a more comprehensive range of nutritional needs (Bonsi et al., 2014). Bioethanol can be produced from plant-based raw materials containing starch, including cassava, sweet corn, potato molasses, and sago (Ridwan et al., 2023). Sweet potatoes have the potential to be a natural coloring for food. Garlic skin yields a crimson extract, dragon fruit skin yields purple sweet potato skin, and an orange extract yields a deep red extract (Lismaya et al., 2024). The extraction results are as follows: purple cabbage yields purple sweet potato peel, a purplish pink, produces a faded brown. Onion skin produces a yellowish red, and red apple skin generates a red extract (Nugrahani & Listyarini, 2023). Porang is not a fundamental item for the economic development of districts; rather, cassava and sweet potato remain the primary agricultural products. (Rengganis et al., 2023). Purple sweet potato and postpartum exercise vary in their effects on lowering TFU in postpartum women, with a p-value of 0.006. It is anticipated that a decoction of purple sweet potato leaves may diminish TFU in postpartum women (Alyensi et al., 2023). The rising calcium chloride concentration during stiffening, without an edible coating or with edible coatings of sweet potato starch and cassava starch, does not significantly change the weight loss of tomatoes (Garnida et al., 2022).

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Sweet potatoes can substitute staple foods with high nutritional content and calories, which are helpful in health. Staple meals comprise sokko, corn porridge limestone, banana rice, sweet potato rice, and banana sokko (Syamsuri et al., 2023). Biofortified crops hold great promise for combating hidden hunger micronutrient deficiencies, highlighting the importance of sensory and cultural attributes in consumption among smallholder farmers and households. Biofortified crops are indigenous food crops grown on marginal soils and in adverse climatic conditions, making them ideal for low-input agriculture (Hummel et al., 2018). Sweet potatoes have the potential to diversify local food consumption. Sweet potatoes can supply carbohydrates and various nutrients and produce multiple processed foods. Processed products made from sweet potatoes can be used in different countries. Sweet potatoes can also be grown as a source of animal feed and industrial raw materials. The variety of sweet potatoes of Cilembu may be cultivated on atypical land in this region by addressing the limiting conditions (Sanny et al., 2023).

Lamongan Regency has the potential for agricultural land resources. SP3 and SP16 genotypes have been discovered as the most stable, with good yield and sweetness in multiple places. These two unique genotypes are indicated for West Java, Indonesia, as prospective new honey sweet potato cultivars (Karuniawan et al., 2021). The tuber weight, yield index, anthocyanin accumulation, and glucose content were significantly higher in the highland crops than in the lowland plants, which grew under relatively more elevated temperatures. Potassium treatments resulted in substantial changes in anthocyanin content, production, and glucose production (Sulistiani et al., 2020).

Superior food agriculture in the Lamongan Regency is directed to crop commodities, such as rice, sorghum, corn, soybeans, peanuts, green beans, yams, and sweet potatoes. Rice is not only a staple food but also the primary source of income for most rural people (Isnawan et al., 2020). This development is based on the Lamongan Regency strategy plan for 2016 - 2021. The center of sweet potato production in Lamongan Regency is in Kalitengah District. Sweet potato production in Kalitengah District amounted to 2,460 tons and 21.9 tons/ha productivity. However, until now, analysis of the social and culture of the sweet potato farming business has rarely been done. In addition, sweet potato production in Lamongan Regency even decreased. Farmers' output can be increased by a wiser and higher allocation of labor, animal labor, cow dung, Urea, and Monophosphate (Awal et al., 2007). The most pressing issue is the constant seed shortage. Other factors included a lack of funds. The subsector's most severe issues are unpredicted weather and pest/insect infestation (Mmasa et al., 2012). Ceratocystis fimbriata is also present in sweet potatoes (Asharo et al., 2024; Paul et al., 2018).

Social factors in the farming business include the farmers' age, education, experience, and characteristics. The investigation revealed several socio-cultural and economic transformations in the village community's way of life (Prayoga et al., 2019). Farmers employed the methods of chopping and burning for land clearance due to their cost-effectiveness and simplicity. At the same time, at harvest, the residual debris was reintegrated into the soil as compost to enhance its fertility (Diniyati & Achmad, 2020). Aside from forage, the predominant sorts of plants cultivated are food crops and horticultural species (Sulistijo & Rosnah, 2022). The agricultural industry possesses distinct features, attitudes, mindsets, behaviors, and complexities. The farm sector's makeup varies by country, resulting in obstacles to communication and business processes in international agribusiness (Hulshof, 2022). Various technological, demographic, and economic adaptation processes place ongoing financial pressure on agricultural production units, exacerbating socioeconomic disparities (Pongratz, 1990). Agricultural Information Systems offer numerous benefits to farmers in making informed decisions on land, labor, livestock, and crop management (Strang, 2019).

The Cultural factors in the farming business include the habit of trying to plant sweet potatoes. It is better to try to farm sweet potatoes followed by consuming sweet potato crops, such as the practice of spouses farming separate plots managed by the individual. Men's obligation to provide staple food crops for household consumption (based on religious and cultural norms) allowed women to cultivate sweet potatoes for the market, defying the widely held belief that commercialization disadvantages women (David, 2015). Research on the cultural aspects of tobacco production in Temanggung reveals a wealth of noble qualities (Imron et al., 2020). Agriculture, enriched with valuable natural and cultural resources, catalyzes rural development, which can be effectively achieved if rural communities diligently adopt and implement self-sufficient and sustainable agricultural practices (Khamung & Program, 2015). The integration of culture with natural resources can bolster agritourism by augmenting the authenticity of the location ethno-, emphasizing its uniqueness, conveying its attributes, nurturing local creativity, promoting innovation, increasing its appeal, and streamlining marketing efforts (Suryani et al., 2024).

Most research on sweet potato farming is related to financial and social factors. However, examining its relationship with cultural aspects is still rare, so this research is essential. The novelty of this research is that cultural elements must be considered to develop sweet

potato farming. Therefore, this study aims to analyze the financial, social, and cultural aspects of sweet potato farming and determine whether it is profitable and worth working on in terms of food development.

Method

Research Design

The research was conducted using qualitative methods to analyze social and cultural factors.

Population and Samples

The survey approach was used to perform this study for three months in Kalitengan District, Lamongan Regency, East Java, Indonesia. The research object was sweet potato farmers in Kalitengah District, Lamongan, Indonesia. Sampling was done using a purposive method of 165 farmers in 4 sweet potato center villages. Farmers cultivated sweet potatoes in Sugihwaras, Canditunggal, Kuluran, and Kediren villages, with 33, 28, 69, and 35 respondents, respectively.

Tools

Survey results, interviews, and secondary data were used in this study for qualitative and quantitative analysis.

Data Analysis Method

A descriptive analysis of social and cultural factors was carried out. Descriptive statistics were employed to examine the characteristics of farmers and farms and production restrictions (Adeyonu et al., 2019)).

Result and Discussion

Socioeconomic Characteristics of the Farmers

The socioeconomic characteristics of farmers included age, education, farming experience, number of family members, land area, and side job (Table 1). The results indicated that the majority of respondents (70.30%) were between 41-60 years old, the average age of the respondent farmers was 53 years, the majority (100%) were male, and 75.80% did not graduate from elementary school. The majority (75.80%) had over 30 years of experience in farming, 57.60% and 42.40% had 1-3 and 4-6 family members, respectively, and 43.00% and 39.40% had side livestock and ponds, respectively, for side businesses. The level of education was low; not completing and finishing elementary school was 75.80%. The adoption rate of technology for male farmers (23.70%) was higher than for female farmers (18.30%) at 42.40%.

Table 1. Respondent Farmer Characteristics in Lamongan, Indonesia Planting Period 2022

Age of respondent farmers	Frequency	Percentage (%)
20 – 40	10	6.06
41 – 60	116	70.30
>60	39	23.70
Total	165	100.00
Education of Farmer Respondents		
Not/ Completed Elementary School	125	75.70
Not/ Completed Junior High School	26	15.80
Not graduated / Senior High School	14	8.50
Total	165	100.00
Farming Experience		
10 -- 20 years	23	13.90
21 - 30 years	45	27.30
>30 years	97	75.80
Total	165	100.00
Number of Members in the Family		
1 – 3	95	57.60
4 – 6	70	42.40
> 7	0	0.00
Total	165	100.00
Another job		
Pond	65	39.40
Livestock	71	43.00
Traders	19	11.50
Buruh	10	6.10
Total	165	100.00

Socioeconomic Analysis of the Farmers

Sweet potato farmers were, on average, 53 years old. Farmer's age is closely related to the ability of farmers to farm (Yusuf & Wuyah, 2015). The research period was considered while calculating the productive age (Anggraeni et al., 2021). As a result, social influences had an impact on sweet potato farming. Sweet potato types were chosen based on various factors, plant varieties, microclimatic conditions in farmer fields, and availability of agricultural extension services (Zawedde et al., 2014)). Sweet potato growers with more outstanding education and excellent farming experience, small families, and access to credit were more efficient in their cultivation. Sweet potato farming success is influenced by age and gender, the number of family members, microclimate conditions, and the availability of agricultural extension agents (Ohajianya et al., 2014).

Farmers with lower levels of education have less complex understandings and are less receptive to innovation. Farmers' educational attainment is linked to technology and agriculture, impacting their thoughts, attitudes, and conduct. Education level influences sweet potato farming. Sweet potato farming is recommended to be mechanized, and subsidized fertilizers and other

agricultural inputs are given to female farmers. Sweet potato farmers must adopt modern and sound farming practices to increase yields and encourage more women in sweet potato production (Amengor et al., 2016). At P0.01, education level, land area, and price differ significantly (Olagunju, 2007). Education, access to counseling, credit, and membership in farmer cooperatives have a positive and significant effect on economic efficiency. Innovative institutional arrangements that improve farmer extension and training and increase access to credit will increase sweet potato production efficiency (Gbigbi & Theophilus, 2011). Education, farm size, and farming experience affect output (Ahmad et al., 2014).

The experience of farmers cultivating sweet potato farming over 30 years was 58.80%, with the intensity of planting twice a year. Their experience in developing agriculture is a determining factor for thriving agriculture. The more experience sweet potato growers have, the more skillful and cautious they are while selecting technology. Smallholders' low level of education requires more straightforward ways of disseminating agricultural information. Fertilizer training should be given to avoid continuous planting without adding fertilizer (Jepkemboi et al., 2016).

The number of family members influences farmers' decision-making in thinking, behaving, and assisting with farming tasks. The MIB20 (control) variety demonstrated excellent stability and low interaction effects in eight agricultural contexts (Thiyagu et al., 2013). Sensory and cultural factors might influence acceptance and consumption in households with children.

This feature could help biofortified crops have a more significant impact in the future by lowering Vitamin A deficiency by consuming these nutrient-dense plants (Hummel et al., 2018). The high beta-carotene is naturally contained in many sweet potato varieties. The progress of biofortified citrus sweet potato breeding (OSP) has been much faster than other vital ingredients high in vitamin A. Nearly 3 million households have been reached with OSP. The main factors influencing OSP are livestock investment, the five main approaches, and efforts to expand the government and other stakeholders in the region (Low et al., 2017). Orange Flesh Sweet Potato (OFS) flour has the potential at a 25% replacement rate in soy-enriched roasted corn flour formulations. Orange Flesh Sweet Potato is a beneficial element that can boost the amount of beta-carotene or vitamin A in such compositions. Orange Flesh Sweet Potato will aid in the reduction of vitamin A deficiency (VAD) in Ghana and other countries suffering from similar issues. Mothers can use the OFS orange sweet potato flour as an entry point to improve traditional food processing (Bonsi et al., 2014).

Sweet Potato Farming Characteristics

Sweet potato farming is defined by land acreage, ownership status, association membership, farming capital, sweet potato cultivars, and farmer-side employment (Table 2). Small farmers accounted for 49.10% of the respondents in Lamongan Regency, with land areas ranging from 0.11 to 0.20 hectares. The land owned by farmers was limited depending on how much their parents gave to them. The land was 100% percent self-owned in terms of ownership. Participation in farmer groups is another farming trait. Farmers can share information about sweet potato cultivation activities through the farmer group. All farmers who responded to the survey were part of farmer groups. Other problems are scarcity, erratic weather, and insect pest attacks, the most critical challenges faced by sweet potato farming (Mmasa et al., 2012).

Table 2. Sweet Potato Farming Characteristics in Lamongan, Indonesia Planting Periode 2022

Land area	Frequency	Percentage (%)
0.01 - 0.10	46	27.90
0.11 - 0.20	81	49.10
0.21 - 0.30	32	19.40
0.30 - 040	4	2.40
0.41 - 0.50	2	1.20
Total	165	100.00
Ownership of land		
One's own	165	100.00
Rent	0	0.00
Total	165	100.00
Membership in a farmer group		
Join the Farmer's Association	165	100.00
Not Belonging to Farmer Organizations	0	0.00
Total	165	100.00
Capital for Agriculture		
Owner's equity	132	80.00
Borrow money from a bank	0	0.00
Borrow a family	33	20.00
Total	165	100.00
Sweet potatoes variety		
Purple	104	63.00
Red	33	20.00
White	8	4.90
Yellow	20	12.10
Total	165	100.00
Sweet potato growing culture		
Growing sweet potatoes	165	100.00
Not growing sweet potatoes	0	0.00
Total	165	100.00
Sweet potato consumption Culture		
Consuming sweet potatoes	42	25.50
Not consuming sweet potatoes	123	74.50
Total	165	100.00

The respondents planted 63.03% purple, 20.00% red, 12.10% yellow, and 4.85% white sweet potatoes.

They grew more purple sweet potatoes due to their high price compared to other colors, sweet taste, high demand, and resistance to pockmark disease. The institution's role, the frequency of participation of extension workers, and the farmer's age are some of the criteria needed in the training.

Most respondents were over 30 years old, or 75.80%, with an average age of 53- 53-year-old farmers who were physically capable of managing their farms to generate. The degree of education significantly impacts farming and is directly linked to managers and workers in the industry. Farmers' knowledge influenced their ability to absorb new information and inventions, which helped them succeed in farming. The experience of planting sweet potatoes influenced the success of agriculture. Adventures, observations, hereditary experiences, the surrounding environment, counseling, and training were used to gain knowledge and farming skills from respondents. The expertise of cultivating sweet potato farmers over 30 years was 58.80%. Farmers with more experience have easier time-solving difficulties and accept failure more rationally. Most respondents were responsible for their three family members, two active in sweet potato farming. An active family may be a father, son-in-law, or son.

The study of sweet potato farming is centered on the culture of cultivating and eating sweet potatoes among farmers. The culture of growing sweet potatoes has been carried out from generation to generation. 100% of respondents stated that planting sweet potatoes has been a hereditary culture and habit. The culture of consuming sweet potatoes as respondents' farmers and their families mostly do so as a side food. The culture of consuming sweet potato was served in the morning and evening by 25.50% and not as culture by 74.50% (Table 2). 100% of farmers grow sweet potatoes, but only 25.5% consume sweet potatoes. (74.50%) farmers do not consume sweet potatoes. It was necessary to increase the awareness of sweet potato farmers to consume and increase sweet potato processed products. Results related to cultural analysis were expected to complete information on sweet potato farming with cultural factors such as household size, education level, farming experience, and farm acreage, which were socioeconomic characteristics that influence sweet potato output in the research area. Culture can influence household acceptance and consumption (Ume et al., 2016). With an average value of 0.79, allocating efficiency was already efficient (Leovita, 2018).

Conclusion

The study results showed that the age of sweet potato farmers is relatively old, an average of 53 years. The respondent farmers' education level was still low, with 75.80% of primary school graduates. The respondents' experience cultivating sweet potato farmers over 30 years was 75.80%. The average number of respondent farmer families was three people. Two people are active as sweet potato farmers. All respondents stated that planting sweet potatoes has been a hereditary culture and habit, while consuming sweet potatoes in processed form was not yet a culture (74.50%). The revenue was affected by the production and price of sweet potatoes. Recommendations for valuable improvements are training farmers about fertilizers and storage facilities. Improving sweet potato farming efforts will be useful in policymaking when food security is vital in many parts of the world.

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Author Contributions

Conceptualization, E.H., B.H.I, and I.S.S.; methodology, E.H. and B.H.I.; validation, E.H. and I.S.S.; formal analysis, E.H. and B.H.I.; investigation, E.H. and I.S.S.; resources, E.H. and B.H.I.; data curation, B.H.I. and I.S.S.; writing—original draft preparation, E.H. and I.S.S writing—review and editing, B.H.I; visualization, E.H., B.H.I. and I.S.S. All authors have read and agreed to the published version of the manuscript.

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Conflicts of interest

We convey that there are no conflicts of interest in the research and publication of this scientific paper.

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