FACTORS ASSOCIATED WITH THE DEVELOPMENT OF ORGANIC AGRICULTURE IN KUPANG DISTRICT, INDONESIA

Kapioru Charles, **Pudjiastuti Sondang S.P.**, **Un Paulus**,
Bernadina Lika, **Hendrik Ernantje***

Department of Agribusiness, Faculty of Agriculture, University of Nusa Cendana, Indonesia

*E-mail: ernantje@gmail.com

ABSTRACT

The use of chemical fertilizers and pesticides in the long term causes degradation of the agricultural environment and leads to unsustainable agriculture. To overcome this problem, an agricultural system that is more environmentally friendly and sustainable is needed. Organic agriculture is one of the agricultural production systems that are often considered as an approach to achieving healthy and sustainable agricultural goals. The research results show that development of organic farming is included in the moderate category with an average score of 41.48, and the distribution of respondents in the good category of organic farming is as much as 5 respondents (8.62%), 42 respondents (72.41%) are moderate and 11 respondents (18.97%) are in poor category; factors related to the development of organic farming were: age of the respondent (p<0.05), and membership of farmer groups (p<0.01), while factors that are not related to the development of organic farming are: Gender, education, number of family members, and land area (p> 0.05).

KEY WORDS

Factors, development, organic agriculture, farmers.

Sustainable agricultural development talks about how to meet the needs of the current generation without causing future generations to not have their needs met. For this reason, agricultural environmental management is directed towards healthy and sustainable environmental goals and meeting food needs in the long term (Fao, 2018, Hendrik, 2021). Organic farming is an agricultural production system that is often considered as an approach to achieving sustainable agricultural goals. In this system, there are actually several techniques that are often used by traditional farmers, such as intercropping techniques, the use of livestock manure as fertilizer or crop residues as ground cover. Thus organic farming is an agricultural system combining tradition, innovation and science to benefit the environment and promote fair relations and a good quality of life for all involved (Oyedele at al, 2018; IFOAM, 2019).

To support organic farming in Indonesia since 2001, the government through the Ministry of Agriculture launched the "Go Organic 2010" program. with the mission of building eco-agribusiness, with the aim of increasing food security and social welfare, while promoting Indonesia as the world's leading organic market player and to increase farmers' income (Hidayat and Lesmana 2011 in Ashari at al. 2017; Pudjiastuti *at al* 2022).

Nonetheless, the development of organic farming in Indonesia until 2020 covers 75,793 ha (0.1% of the total global organic farming) this number is lower than in 2019 which covered 121,535 ha or reduced by 45,743 ha (IFOAM, 2022 in Pudjiastuti *at al* 2022). In addition, Indonesia's organic farming statistics show the level of rice organic certification in 2013 covering an area of 1,537.16 ha (monoculture), 81.81 ha (rice and secondary crops) and 5.93 ha of rice/flour processing (Indonesian Organic Alliance, 2013 in Ashari at al. 2017), the certified organic rice area is only 1,542.38 ha of 13.4 million ha of paddy fields (Ministry of Agriculture, 2014). The data shows that the level of organic rice farming is very low and also implies the adoption rate of organic farming is very slow among farmers in Indonesia (.Ashari at al. 2017; Pudjiastuti *at al* 2022).

One of the factors that inhibits farmers from switching to organic farming because their yields will decrease, even though organic products have a slightly higher price (Herath and

Wijekoon, 2013 in Ashari at al 2017), dependence on chemical fertilizers and pesticides because farmers have used them for a long time. the old one (Herath and Wijekoon, 2013 in Ashari at al 2017; Hendrik, 2019).

METHODS OF RESEARCH

Sampling and Data Collection Procedures. This research has been conducted in Kupang District. Organic farming development was measured based on the responses of 58 sample farmers to a series of questions. In this study, the descriptive statistical analysis technique used included: Presentation of data in the form table or frequency distribution and cross tabulation. With this analysis it will be known the trend of research findings, whether they fall into the low, medium or high category. Presentation of data: in the form of charts and graphs (pie chart) Calculation of the size of the central tendency (mean, median), and then, correlation analysis is used to obtain an overview of the relationship between the dependent and independent variables.

The results of research on organic farming revealed that there was a significant relationship between age, educational background, land area with the benefits of organic farming, and social factors. This shows that the community will have a high rate of adoption of innovations related to organic farming and other agricultural policies. In addition, it also revealed that some unexpected results such as costs associated with organic farming did not affect farmers' attitudes. Maybe the farmer's focus is on the yield and profit (benefit aspect) but not the cost of inputs in farming. Other factors such as knowledge, environment and gender have no explanatory significance on farmers' attitudes (Patidar, 2015) Research findings from Malgatti, (2011) also prove that the main driving factor for practicing organic farming is identified as cultivation cost reduction, increased income and net profit, internal dependence on inputs, reduced cases of pesticide poisoning, and agricultural diversification.

Herath and Wijekoon (2013) in their research found that non-organic farmers do not have a strong motivation to practice organic farming because their yields will decrease, even though organic coconuts have a slightly higher price. Conventional farmers are also reluctant to switch from chemical fertilizers and pesticides because they have used them for a long time. On the other hand, organic farmers practice organic farming mainly because of marketing assistance and input. Organic farmers also have a good attitude towards the environment. Knowledge of organic farming and contact extension workers greatly influence the motivation to adopt organic farming. Patil Jyoti Madhukar, 2019, finding of the reseearh shows that motivation has higly and positive correlation with the adoption of recommended organic farm practices. Essougong Kenfack *at al*, 2020, investigated how farmers prioritized cocoa management practices in two contrasting cocoa producing basins and the role of knowledge, aspirations, and abilities in explaining behavior, found that farmers' perceptions of soil fertility were consistent with biophysical knowledge but differed between individuals and locations. In addition, the availability and cost of inputs, lack of farmer knowledge and experience, and farmers' views on current soil fertility status are major factors in the adoption of soil fertility management practices. Oyodele at al, (2018), found that most farmers had not adopted organic farming systems. Many of the respondents thought that organic fertilizer processing was complicated and tedious, requiring more time and effort to get organic fertilizer, having to travel 20-30 kms to buy it.(Sudheer, 2013 and Ullah et al, 2015 in Ashari at al, 2019).

Organic Farming Concept. Sustainability of agriculture is closely related to how to avoid the adverse effects of modern agricultural practices which not only affect agriculture but also the health of all living things. The application of technology, particularly in terms of the use of chemical fertilizers and pesticides, has had negative effects on the environment such as soil degradation, soil pollution, and human and livestock health. To achieve sustainable agriculture, one approach that can be taken is to practice organic farming. Organic agriculture is "Agriculture with a production management system that promotes and enhances the health of agro-ecosystems, including biodiversity, biological cycles and soil biological activity". This is achieved by using wherever possible agronomic, biological and

mechanical methods, as opposed to using synthetic materials, to fulfill specific functions in the system (FAO, 1999 in Ashari et al, 2017; Patil Jyoti Madhukar, 2019). Organic cultivation attracts farmers worldwide because of its many advantages over modern agricultural practices. Organic farming is an agricultural system that supports and strengthens biological processes without the help of inorganic drugs such as chemicals or genetically engineered organisms (Reddy, 2010 in Patidar, 2015).

IFOAM (2014); defines organic farming as "a production system that sustains soil, ecosystem and human health, depending on ecological processes, biodiversity and cycles adapted to local conditions, not using inputs with detrimental effects". Thus, organic farming combines tradition, innovation and science knowledge for the mutual benefit of the environment and promoting fair relations and a good quality of life for all involved. Organic farming is an agricultural system that can provide solutions to the degradation of agricultural land and the environment. Lampkin and Padel, 1994 in Ashari at al, 2017, describes agriculture organic as an agricultural approach that aims to create integrated, humane, environmentally sound, and economically sustainable agricultural production systems, by maximizing dependence on agricultural derivative products, management processes of renewable resources and ecological and biological interactions". Thus the main goal of organic farming is the sustainable production of quality food with little or no effect on the environment.

RESULTS AND DISCUSSION

The results of data analysis showed that the average age of the respondents was 50.38 years, with a range of 23 – 62 years.

Table 1 – Distribution of Respondents by Age

Age of Respondents (Year)	Number of Respondents	Percentage (%)
< 15	0	0,00
15 – 55	44	75,86
≥ 55	14	24,14
Total	58	100.00

Source: Primary Data (2022).

From the results of the analysis it was also known that 44 people (75.86%) respondents were included in the productive age (15-55 years). Nevertheless, from the results of the interviews it is known that respondents who are not included in the productive age criteria with age > 55 years are still carrying out their farming activities well.

The number of respondents' family members is the number of family members consisting of husbands, wives, children and other family members who live together. The average number of respondents' family members was 2.64 with the lowest number of family members being 2 people and the highest number being 5 people.

Table 2 – Distribution of Respondents Based on Number of Family Members

Number of Family Members	Catergory	Number of Respondents	Perscentage
< 4	Small	50	86,21
4 – 6	Medium	8	13,79
≥ 7	Large	0	0,00
Jumlah		58	100,00

Source: Primary Data (2022).

According to BKKBN (1998), household size is the number of family members consisting of husband, wife, children and other family members who live together. Based on the number of household members, household size is grouped into three, namely small, medium and large households. Small households are households with <4 members. Medium households are households with between 4 -6 members. Meanwhile, large households are

households with more than ≥ 7 people. From the table above it can be seen that 50 respondents (86.21%) have a number of family members < 4 people or are in the small category and 8 respondents in medium category with number of family members 4-6 people (13.79%), respondents with a large number of family members with a number of family members 0.00%. The number of family members is related to the utilization of family power in running and managing the farm. The large number of family members with mature ages is a productive source of labor in managing farming.

The results of the data analysis showed that 25 respondents (43.10%) were members of farmer groups, and 33 respondents (56.90%) were not members.

Table 3 – Distribution of Respondents Based on Farmer Group Membership

Farmer Group Membership	Number of Respondents	Percentage
Member	25	43,10
Not member	33	56,90
Total	58	100,00

Source: Primary Data (2022).

All respondents stated that the farmer groups they followed were horticultural farmer groups with the main activity being cultivating horticultural crops.

The land owned by the respondent consisted of yards, rice fields, fields and mamar. These lands are generally owned for generations and are managed by family members, in addition to the mutual cooperation of the farmer groups they follow. The average area of the respondent's yard was 7.10 acres, 7.78 acres of paddy fields, 6.76 acres of fields, while the area of the mamar owned by the respondents at the time of this study was not covered because it was being re-measured.
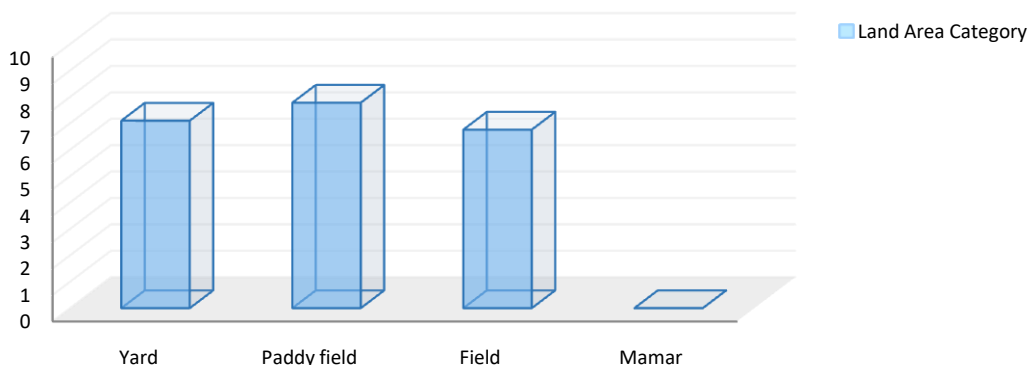

Figure 1 – Types and Areas of Farm Land (Source: Primary Data, 2022)

The results of the data analysis above show that of the 58 respondents, 58 (100%) have yards. 13 respondents (22.41%), paddy fields, 25 respondents (43.10%) fields.

Farming land can be categorized based on the area owned by the respondent. Land area is grouped into three categories, namely:
1. Narrow, land area of less than 50 acres;
2. Medium, land area between 50 - 200 acres;
3. Wide, land area of more than 200 acres.

Table 4 – Distribution of Respondents by Land Area Category

Land size (acre)	Category	Number of Respondents	Percentage
< 50	Narrow	57	98,28
50 – 200	Medium	1	1,72
> 200	Wide	0	0,00
Total		58	100,00

Source: Primary Data (2022).

From the table it can be seen that the land owned by the respondent farmers is included in the narrow cultivated area category with a total of 57 farmers (98.28%), in the category of medium land area 1 farmer (1.72%) and farmers who have an area of land > 200 are 0.00%.

The farming pattern run by the respondents is a dry land farming pattern with the types of crops cultivated are rice, corn, cassava, vegetables, peanuts, rice beans, papaya, bananas, coconuts, cashew nuts, and coconuts. The cropping pattern for rice, corn, peanuts and vegetables is generally planted with an intercropping pattern, where two or more crops are planted on the same land at the same time without different row arrangements. In addition to food crops, respondents generally also planted lamtoro (Leucaena leucocephala L) on the edge of the garden as a source of animal feed. The lamtoro plant is also known as a conservation plant because it is able to maintain soil fertility, as a ground cover plant in water conservation technology it can reduce evaporation, especially in dry land farming systems where rainwater is the main source of water in farming.

The type of fertilizer used by respondents consisted of organic and inorganic fertilizers. This type of organic fertilizer is animal manure. While inorganic fertilizers are used such as Urea, KCL, TSP. Animal manure fertilizers are more widely used in horticultural crops, especially vegetables, while inorganic fertilizers, Urea, TSP and KCL, are more widely applied to rice and corn plants with varying frequency of use, from 2-6 times per planting season. The distribution of respondents is based on usage.

Table 5 – Distribution of Respondents Based On the Use of Organic Fertilizers

Type of Fertilizer	Number of Respondents	Percentage
InOrganic Fertilizers	16	27,59
Organic + InOrganic	27	46,55
Organic Fertilizers	15	25,86
Total	58	100,00

Source: Primary Data (2022).

Inorganic fertilizers are generally obtained by farmers by buying at shops that provide agricultural inputs such as fertilizers and seeds, and according to government policy to help farmers by distributing subsidized fertilizers, farmers can buy cheaper prices from farmer groups where farmers are members.

Respondents stated that pesticides were given to types of plants such as rice according to the instructions for using pesticides, for corn plants they also used pesticides, while for vegetable crops only if pests were seen, the respondents would spray pesticides. The types of pesticides used by respondents consisted of chemical and natural pesticides, the chemical pesticides used were the types of Furadan, Curachon. The application is done by measuring using a bottle cap, 1 bottle cap mixed with water and sprayed on the plants, and is generally used for rice and corn plants with a frequency of spraying 1-2 times per growing season. The distribution of respondents based on pesticide use is shown in the following table:

Table 6 – Distribution of Respondents Based on Pesticide Use

Pesticide Use	Number of Respondents	Percentage
Using Chemical Pesticides	17	29,31
Do not Use Pesticides	41	70,69
Total	58	100,00

Source: Primary Data (2022).

The results of the data analysis showed that 41 respondents (70.69%) used chemical pesticides every planting season, 17 people (29.31%) stated that they did not use pesticides on the cultivated plants.

The results showed that organic farming developing was included in the moderate category with an average score of 41.48, with the distribution of respondents with good

category organic farming development as many as 5 respondents (8.62%), moderate 42 respondents (72.41%) and poor 11 respondents (18.97%). The distribution of respondents based on the development of organic farming is shown in the following table:

Table 7 – Distribution of Respondents Based on Organic Agriculture

Score	Category	Number of Respondents	Percentage
< 36,39	Poor	11	18,97
36,39 – 46,58	Moderate	42	72,41
≥ 46,58	Good	5	8,62
Total		58	100,00

Source: Primary Data (2022).

Respondents who were in the good category generally agreed with that statement: Organic farming is the best for increasing crop production, Organic farming is the best for increasing crop production, organic food is beneficial for disease prevention, livestock will benefit from organic farming, consumption of organic food is not at risk, organic farming costs less.

The results of the Kendall's tau_b statistical test show that the factors related to the development of organic agriculture are the age of the respondent, and being a member of a farmer group, while the factors that were not related to the development of organic agriculture were gender, education, number of family members and land area.

Table 8 – Factors Associated with Organic Agricultural Development

Factors	Coeficient Kendall τb	P- Value	Significanty
Gender	0,080	0,479	NS
Education	0,161	0,130	NS
Age	-0,196 [*)]	0,041	S
Number of Family Members	-0,047	0,664	NS
Farmer Group Members	0,302 [**)]	0,008	SS
Land area	0,160	0,096	NS

Source: SPSS Output, Test of Statistic Kendall's tau_b (2022).

From the table above it can be seen that there is a significant relationship between the age of the respondents ($p<0.05$) and organic farming. Respondents with a younger age are generally more connected to sources of information about organic farming, and respondents generally stated that information about organic farming was obtained from internet media, agricultural extension workers and neighbors. This result is in line with several research results which reveal a significant and positive relationship between age and the development of organic farming (Patidar, 2015; Malgati 2011; Oyodele at al, 2018). Being a member of a farmer group, has a very significant relationship ($p <0.01$) through the development of organic farming, by becoming a member of a farmer group, the respondents received various information about organic farming, through group activities such as extension activities. Respondents stated that organic farming costs less, so it can increase farm income, besides that organic is also better for human health, safe for consumption. The same results were also found in other studies which stated that organic farming is generally more profitable in terms of costs and financial returns than chemical farming (Patidar 2015; Oyodele at al, 2018), while, there is no significant relationship between Education, Land area of the respondents ($p>0.05$) and the development of organic farming. These findings differ from research by Patil Jyoti Madhukar in 2019, which found a highly significant correlation between age, land area with the adoption of recommended organic farm practices.

CONCLUSION

The development of organic agriculture is included in the fairly good category with an average score of 41.48, and the distribution of respondents in the good category is 5

respondents (8.62%), the category is quite good 42 respondents (72.41%) and it is not good 11 respondents (18.97%).

Factors related to the development of organic agriculture are: age of the respondent ($p<0.05$), and membership of farmer groups ($p<0.01$), while factors that are not related to the development of organic farming are: Gender, education, number of family members, and land area ($p> 0.05$).

It is necessary to activate younger farmers more in the development of organic farming, as Organic farming has received the attention of farmers, therefore farmers need to be encouraged to become members of farmer groups which will make it easier to get information and agricultural inputs at lower prices.The government needs to motivate farmers more with the help of special inputs aimed at developing organic agriculture.

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