FARMERS BEHAVIOUR REGARDING FOOD SECURITY BY PRACTICING THE 'SALOME' FARMING SYSTEM AS LOCAL WISDOM IN WEST TIMOR, EAST NUSA TENGGARA PROVINCE, INDONESIA[1]

[COMPORTAMIENTO DE LOS AGRICULTORES RESPECTO A LA SEGURIDAD ALIMENTARIA AL PRACTICAR EL SISTEMA AGRÍCOLA 'SALOME' COMO SABIDURÍA LOCAL EN TIMOR OESTE, PROVINCIA ORIENTAL DE NUSA TENGGARA, INDONESIA]

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SUMMARY

In West Timor, farmers employ local knowledge as part of their ancestral heritage, called the 'salome' traditional farming system. The farmers believe that the 'salome' system is able to increase the standard of food security. The goal of this study was to investigate the philosophy, socioeconomic factors, motivation and perceptions of farmers using this system. We investigated the existing 'salome' local farming system in Timor Tengah Selatan (TTS), a district of Nusa Tenggara Timur (NTT) province. A survey method was used with open-ended questions involving 126 interviews with farmers in West Timor. The data were descriptively analysed using SPPS. The results show that farmer's behaviour regarding the practice of 'salome' was influenced by social aspects, such as social norms, attitudes and intent, as well as motivations and perceptions regarding the effectiveness of 'salome' to overcome food insecurity. The practice of 'salome' is related to the indigenous food called 'jagung katemak'. Farmers were highly satisfied with the 'salome' system as a means to enhance food security. The implications are that the government should increase the quality of services, based on local wisdom to support the use 'salome' to fulfil food requirements.

Keywords: farming system; food security; local system.

RESUMEN

En Timor Occidental, los agricultores emplean el conocimiento local como parte de su patrimonio ancestral, llamado el sistema de agricultura tradicional 'salome'. Los agricultores creen que el sistema 'salome' es capaz de aumentar el nivel de seguridad alimentaria. El objetivo de este estudio fue investigar la filosofía, los factores socioeconómicos, la motivación y las percepciones de los agricultores que utilizan este sistema. Hemos investigado el sistema agrícola local actual 'salome' en Timor Tengah Selatan (TTS), un distrito de la provincia de Nusa Tenggara Timur (NTT). Se utilizó un método de encuesta con preguntas abiertas que incluían 126 entrevistas con agricultores de Timor Occidental. Los datos se analizaron descriptivamente mediante SPPS. Los resultados muestran que el comportamiento de los agricultores con respecto a la práctica del 'salome' fue influenciado por aspectos sociales, tales como las normas sociales, actitudes e intenciones, así como las motivaciones y percepciones sobre la efectividad de 'salome' para superar la inseguridad alimentaria. La práctica de 'salome' está relacionada con la comida indígena llamada 'jagung katemak'. Los agricultores se encuentran muy satisfechos con el sistema 'salome' como un medio para mejorar la seguridad alimentaria. Las implicaciones son que el gobierno debe aumentar la calidad de los servicios, basados en la sabiduría local para apoyar el uso de 'salome' para satisfacer las necesidades de alimentos.

Palabras clave: sistema de cultivo; seguridad alimentaria; sistema local.

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INTRODUCTION

Many countries in the world surely face problems caused by climate change driven by global warning, depleted natural resources, water shortages, deterioration in food production and environmental destruction. These changes will lead to suffering from hunger, diseases, poverty and many other social problems. Scientists believe that improved technologies should be applied to agricultural programme policy-making in order to prevent suffering from these multiple crises. Another important aspect is to determine the proper way to overcome social problems such a lack of food, which is experienced by many people in the world. Many new agricultural technologies have been invented and implemented to increase food production. However, most of these technologies have not improved the performance of agricultural production, especially food production.

As reported by International Rice Research Institute (IRRI) (2006, cited by Anonymous, 2007), global warning will have a number of serious impacts: 1) a 10% decrease in food production for every 1°C increase in temperature at night (especially for rice production), meaning that millions of people in the world will die of hunger; 2) the major countries involved in rice production will put less effort into rice cultivation; 3) a change in consumption from wheat to rice in the countries of South Asia and Africa; 4) the Statistics Central Bureau (BPS) of Indonesia (2014) has reported that land conversion from rice cultivation to other purposes has increased.

Based on these facts, there is a need for an alternative way to anticipate all the consequences of global climate change. In Indonesia, many food crops can be used to substitute rice as a food source, such as corn. In 2013, Indonesia was the 12th largest corn producer in the world with 11,200,000 tons; the USA leads corn production with 272,432,000 tons. This crop has spread widely to all provinces in Indonesia, including East Nusa Tenggara (NTT) province. In 2015, the six provinces with the highest corn production in Indonesia were East Java (5.2 million tons), central Java (3.2 million tons), Lampung (2 million tons), South Sulawesi (1.6 million tons), Gorontalo (617,350 tons) and NTT (612,127 tons) (Statistics Central Bureau, 2014).

Farmers in NTT usually grow corn on their farms. This crop is grown by farmers in all 22 districts in the province, and has become a part of NTT's cultural society. In some regions of NTT, particularly in West Timor, corn is used as the main crop and is the primary food in daily life. The local government of NTT has started to explore the local potential in terms of strengthening food security by increasing corn productivity. However, until June 2016, the local government did not have a specific programme to increase corn production, despite the fact that NTT is considered a 'corn province'. Production has been less than expected, with average production in the last six years (2010-2015) of 2.52 tons per hectare (Food and Cash Crops Division of NTT, 2016).

Although many technologies have been implemented in order to increase corn production, corn productivity in NTT is still low. Most farmers in NTT, particularly in the Timor Tengah Selatan (TTS) district, have no irrigation for rice. Moreover, the villages in TTS are reluctant to adopt innovations to increase corn production. So, it is suspected that farmers in this area might be suffering from a lack of food. However, they do not appear to suffer from hunger due to a lack of food. Thus, farmers in this region might be having a special way to overcome food insecurity. Many traditional people have local indigenous knowledge or local wisdom, which is a form of ancestral knowledge that has been improved over time by local people to improve agricultural activities and food security. Traditional people usually have local knowledge that allows them to manage their own natural sources. Unconsciously, this local farming system also maintains the ecosystem by balancing the needs of humans, with the land, climate, topography, natural crop diseases and the economy (Kelleher, 1988). As Mollison (1991) argued, a farming system based on local wisdom is similar to permanent agriculture. According to Nuningsih (2007), permanent agriculture has three ethics, including conservation and maintenance of the earth, protecting surplus land nutrients and decreasing consumption. Therefore, local people usually avoid adopting technology that has the potential to destroy their natural sources.

Initially investigated in January 2016 (Levis, 2016), it was found that farmers in this area avoid implementing innovations because they have local knowledge or local wisdom used to run the farming system; in this region, this is known as the 'salome' farming system. They also have a local food used to replace rice, known as 'jagung katemak'. The 'salome' system is part of the local wisdom practiced by farmers, passed down by their ancestors. It is a local system of corn production practiced by farmers in West Timor, performed by mixed planting in a single hole with corn, pumpkin and pigeon pea seeds. The goal of this study was to investigate the philosophy, socioeconomic factors, motivation and perceptions of farmers using this system.

METHODS

Research pproach

Farmers in West Timor practice the 'salome farming system' (Figure 1). This practice has been internalised and is expressed as farmers' daily behaviour that can be seen and observed. Hence, this research includes a positivist paradigm, which can be approached quantitatively (Aldonuary, 2012). According to the quantitative approach, knowledge comes from empirical experience and is followed by a reasoning process. For the quantitative approach, the survey method was used. The survey method used structured questionnaires (open-ended questions), a sampling system according to the location and respondent, examinations of reliability and validity, and the application of statistical analysis (Leedy, 1997; Sugiyono, 2011).

The study took place in the villages of Karangsirih and Nusa located in the Kopeta Soe sub-district and West Amanuban sub-district, respectively, in the TTS district (Figure 2). This district was selected as it contains the largest area of corn production in NTT, with 100,814 hectares (The Food and Cash Crops Division NTT, 2016). These sub-districts and villages were selected for three reasons: these villages provide the highest contribution to corn production, are well located located for corn production, and the land used for growing the corn crop is larger than in other sub-districts (Food Security and Extension Bureau of TTS, 2016).

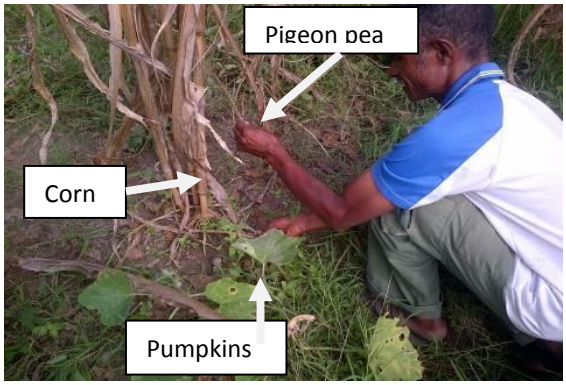

Figure 1. An example of 'Salome' farming system at Nusa village, West Timor.

Population and sampling system

The research population included farmers who grow corn. The initial data (Levis, 2016) showed that as many as 110 farmers in Karangsirih and 318 farmers in Nusa grow corn. Using cluster random sampling, the 126 farmers were selected for the study consisted of 50 farmers in Karangsiri and 76 in Nusa. This number was calculated by using the Slovin formula (Levis, 2013).

$$n = \frac{N}{1 + N(d^2)}$$

Where:
n = number of samples expected
N = number of farmers who grow corn (HH)
d = level of expected confidence at 99% (α=0.1)

Figure 2. Sampling location

Variables and data sources

Primary and secondary data were collected. Primary data included the demographics of the respondents, the farming system used, the reasoning, motivation and perception of farmers regarding agricultural practice, and the opinions of Agricultural Extension Worker (AEWs), recorded using open-ended questions and the survey method. The reliability and validity of the data were examined using the split half method of Spearman and Brown. The secondary data were obtained from relevant institutions, namely the Food Security and Extension Bureau of TTS, monographic villages, the Food and Cash Crops Division NTT and interviews with AEWs.

Data analysis

This research used quantitative analysis, which was supported by the qualitative description. As Brannen argued (cited by Akram, 2013), quantitative analysis has two characteristics, namely enumerative induction and generalisation. Therefore, this research applied a scoring system with the Likert scale. The scoring system categorised farmers' perceptions as strongly satisfied with a score of 5 to strongly dissatisfied with a score of 1. Farmers' motivations were categorised as very high motivation with a score of 5 and very low motivation with a score of 1. Operationally, the first and the fourth goals were qualitatively analysed while the second and third goals were descriptively analysed statistically using SPPS 20.

RESULT AND DISCUSSION

Demographics of the respondents

Of the 126 farmers interviewed, 70 (55.56%) were male and 56 (44.40%) were female. The average age of the farmers was 43.94 years, ranging from 20 to 73 years. The average educational level of the respondents was primary school; the range included no education, primary school, junior high school and senior high school, with 14 (11.11%), 73 (57.94%), 17 (13.49%) and 22 (17.46%) respondents, respectively. The average family size was 4.7, ranging from 1 to 11 members. Family size was divided into three categories based on the number of people, including small families (1-4 members) for 68 (53.97%) respondents, medium-sized families (5-8 members) for 46 (36.51%) respondents and large families (more than 8 members) for 12 (9.52%) respondents.

All farmers grew corn. As many as 108 (85.71%) grew local seed, while the rest combined local seeds and hybrids of BC 16&22. There was only one type of land ownership for these farmers. The average land area used to grow corn was 84.86 are, with a range from 2 are to 600 are. The average production was 1.941 quintal with a range from 30 to 15,000 quintal.

Why farmers practice 'Salome'

The results show that 90 (71.42%) respondents practiced the 'salome' system, while 36 (28.57%) respondents did not do so. Farmers' behaviour in terms of sustaining the 'salome' system may have been due to income earnings, as reported by Close and Idsardi (2013). However, farmers in West Timor had additional reasons. 1) 82 (91.11%) respondents mentioned that 'salome' is part of the ancestral heritage and should be maintained by younger generations. 2) 70 (77.78%) respondents said the system has become a culture-based social norm, based on the belief system of local people that corn, similar to mankind, cannot live alone. 3) 90 (100%) respondents mentioned that the philosophy of the Timorese, taught by their ancestors, is that corn crops must 'live' together with other crops, especially with pumpkins and pigeon pea. All respondents stated that they eat corn mixed with pumpkin, pigeon pea and other crops. 4) 90 (100%) respondents said that the Timorese have a local food called 'jagung katemak'. This indigenous food has been used for hundreds of years by the Timorese to fulfil their nutritional needs and prevent hunger and disease. This result is in line with the findings of Kunyanga et al. (2011), who argued that this indigenous food has antioxidant and anti-diabetic properties. Moreover, and Lebu Raya (2013) said that people in NTT must eat more corn to avoid suffering diabetic. 5) 56 (62.22%) farmers described long experience with these three crops and stated that they are mutually symbiotic with each other. Farmers can harvest these crops for months. This argument is supported by Simon (1975), who pointed out the advantages of crop combination. Pumpkins, for instance, can keep crops free from weeds, add nutrients to the topsoil, act as mulch, and protect the topsoil against erosion and the loss of water. The 'salome' system is similar to the meaning of permaculture as argued by Mollison (1991) and Nuningsih (2007) and to the agroecosystem proposed by Kelleher (1988), but not in terms of economics. 6) 90 (100%) respondents argued that the local people have a buffer food besides corn to fulfil their nutritional needs, since after the corn has been harvested, pumpkins and pigeon pea can be harvested frequently. A clear example is given by the Timorese special local or indigenous food 'Jagung Katemak' which consists of five main ingredients: corn, pumpkins, rice nuts, pigeon peas and pumpkin leaves. Local people add other vegetables, chilies, salt and sometimes with meat. This local food meets the requirements for carbohydrates, protein, vitamins, minerals, fiber and water. In addition to its special taste, this food has other positive attributes, such as a

pleasant appearance, easy preparation and locally available ingredients.

Farmers' motivations to sustain 'Salome'

Data gained from the respondents pointed out that all farmers have two main motivations, namely social factors and food security. However, 16 (12.78%) combined economic and food security motivations. As shown in Table 1. 15 (11.90%) respondents had low motivation, but this indicated that all farmers have the social motivation to retain the 'salome' system. This means that social and food security motivations influence farmers to sustain the system. This finding is supported by Nordholt (1971), who wrote that, in every garden in West Timor, the first corn harvested is offered as a sacrifice to the Lord of the Earth. Hence, farmers' beliefs, attitudes and intent to practice 'salome', who was given to them by their ancestors as a social norm, support the continued use of this system. They must honour the ancestors who created this system. This result was also shown by Burton (2004), who conceded that this behaviour is determined by social norms, attitudes and intentions. Benu and Mudita (2013) argued that social aspects determine farmers' behaviour in West Timor with respect to food security.

Table 1. Farmers Motivation on Social Aspect to Sustain 'Salome' System

Level of Motivation	Frequencies	Percentage
Very low	0	0.00
Low	15	11.90
Neutral/medium	5	3.97
High	82	65.08
Very high	24	19.05
∑	126	100

Farmers' perceptions on the effectiveness of the 'Salome' farming system

Perception reflects the farmers' opinions on what they have experienced regarding the effectiveness of 'salome' in overcoming food insecurity. The opinions expressed their satisfaction, which influenced the farmers' behaviour in practicing the 'salome' system. Based on farmer's responses to the questions on perception, the data in Table 2 indicate that 90 (100%) farmers who practiced the 'salome' system were strongly satisfied, whilst 36 (28.57%) of 126 respondents were dissatisfied with the system and thus did not practice 'salome'. The average score of perception was 3.95 for 126 respondents, but the average score was 5 for the 90 farmers who practice the system. This means that farmers in West Timor perceive 'salome' as highly satisfactory. This positive perception influences farmers' behaviour regarding their practice of the system.

Table 2. Farmers Perception on the Effectiveness of 'Salome' for Food Security

Level of Perceptions	Frequencies	Percentage
Strongly dissatisfied	21	16.67
Dissatisfied	15	11.90
Neutral	0	0.00
Satisfied	3	2.38
Strongly satisfied	87	69.05
Jumlah	126	100

Opinion of farmers using the 'Salome' system

Two AEWs (Mr. Lorens Lali and Mrs. Debora Maria), who work at both villages, were interviewed to get their opinion as to why farmers still practice 'salome'. According to the AEWs, the factors that make farmers reluctant to change from the 'salome' system to a new technology are: 1) the poverty level of farmers, such that they have no budget to buy some modern input such as hybrid corn seed, fertiliser and pesticides; 2) farmers are still implementing a shift-work system; 3) there has been no action from the government to convince farmers regarding the effectiveness of modern practices in overcoming food insecurity; 4) AEWs, as the 'point of the spear' of agricultural development, could not change farmers' behaviour because the farmers still uphold their social norms and believe that they must obey their ancestors; 5) the extension system undertaken by AEWs still uses a 'blueprint approach' not based on local or indigenous knowledge.

CONCLUSIONS

Farmers' behaviour in terms of practicing the 'salome' system is influenced by social aspects, such as social norms, attitudes and respect for their ancestors; the motivations and perceptions regarding effectiveness of 'salome' at overcoming food insecurity are also important. One aspect is that 'salome' is related to the indigenous food called 'jagung katemak'. Farmers have three motivations to practice 'salome', namely social, food security and economical. Farmers are highly satisfied with the 'salome' system in terms of overcoming food insecurity. Farmers are reluctant to change from 'salome' to new technology. The implication from this study are the government should increase the quality of extension service not based on 'blue print approach' but based on local wisdom to strengthening the local wisdom of 'salome' to fulfil their need of food. Needed further research the potential of 'jagung katemak' as an antioxidant and antidiabetic.

Acknowledgement

This study was a part of dissertation research, conducted as a condition for admission to the degree of PhD in Agricultural Science at Agricultural Faculty of Brawijaya University. This is the first study ever done in TTS district particularly in both villages, which involved farmers in practicing 'salome' farming system. Some problems had been faced during the study. However, my principal supervisor constructive comment and far experience in agricultural extension and sociology was unable to solve these problems. Not any part of this original paper has been previously published or presented at any journal or forum.

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