The policy strategy of sustainable *pekarangan* development with analytical hierarchy process (AHP) in Arguni Bawah Sub District, Kaimana District, West Papua Province, Indonesia

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Abstract. The increase in the level of food consumption has resulted in a decrease in the wealth of available natural resources in Papua, Indonesia. Thus, there is a need to develop an effective strategy to manage these natural resources to preserve sustainable food sources. This study aimed to formulate an alternative strategic policy for the development and management of sustainable food in Arguni Bawah Sub District, Kaimana District, West Papua Province, Indonesia. The strategic policies were formulated by using the analytical hierarchy process (AHP) method. A total number of 5 respondents were chosen using the selection criteria for this study. The results of this research study showed that the alternative priority chosen to achieve the goals of sustainable field development is the marketing policy (with a weight of 0.359), in which the government is the main stakeholder. The findings in this study also showed that socio-cultural criteria (with a weight of 0.413) are an important factor that must be considered by decision makers. Furthermore, the main activity that fosters the development of a sustainable *pekarangan* is food self-reliance (with a weight of 0.441). Thus, the strategic policy for the development of the community *pekarangan* should be carried out by the local government, this strategic policy must be synergized with social capital to improve community welfare.
Key Words: decision makers, management of sustainable food, social cultural, marketing policy.

Introduction. *Pekarangan* is a plot of land that is around the house with the status of private ownership (individual or household owner) and has clear boundaries. Physical boundaries such as walls, iron fences, hedges, mounds, trenches, stakes or stone pillars or plants at the ends of land can be characterized by various plots depending on customs, habits, socio-culture of the community, economic status, location of *pekarangan* in village or city and others. *Pekarangan* management policy pays attention to the role of government, traditional institutions (LMA) and non-governmental organizations (NGOs). The strategies used in the formulation of sustainable *pekarangan* development policies are based on ecological, socio-cultural and economic criteria, as well as the analytical hierarchy process (AHP). The selection criteria are determined by policy makers and the type of problems that need to be resolved (Russo & Camanho 2015). Several research studies were selected and critically reviewed; the findings documented in these studies were used to develop an alternative management model. In previous research, it was documented that the leading agricultural commodities in Dairi Regency is coffee, with a weight of 0.238 (23.8%) (Leo et al 2014). The use of the AHP method considers the relative priorities of different factors, in order to select the best alternative (Pertama et al 2014). The use of decision support systems and AHP could be a probable solution to the problem of selecting plants based on the conditions of the land in a particular area (Mala et al 2018).

An alternative way of generating management models include: community participation, technology input, conservation of endemic products and marketing policy

strategies. The selection of alternative varieties is carried out based on the ability and needs of the decision making process (Roisdiansyah et al 2017).

The effectiveness of managing *pekarangan* results in the development of a sustainable utilization model and facilitates easier access to everyday needs (Cameron et al 2012). The goal of sustainable management of *pekarangan* is to improve community welfare by considering economic, ecological and socio-cultural conditions at the research location (Kamruzzaman & Shaw 2018). Previous research conducted by Robiansyah (2018) in West Papua Province has developed its sustainable development vision, and planned to become one of conservation provinces in Indonesia. By practicing sustainable development the province aims to maintain its forest cover while pursuing economic development.

Thus, this study aims to formulate the policy strategy for sustainable *pekarangan* development using AHP. The expected objectives of this research include: superior commodity mapping, increased revenue and food self-reliance.

Material and Method. This research was carried out in 15 villages in the Arguni Bawah District, Kaimana Regency, Province of West Papua, Indonesia. The implementation of this study used a structured interview method, which involved the selection of five target respondents with the following criteria: respondents are conversant with the location of the study, respondents have experience in interacting with the community and understanding the geographical and socio-cultural conditions of the community. Deep interviews were conducted with 5 experts from: government (Kaimana District Agriculture Services), Indigeneous community leaders, agricultural extension workers (PPL), coordinators of non-governmental organizations (NGOs) and intense local academics in nutmeg research in Arguni Bawah District within the last 3 years. This research was conducted for a period of 5 months (from November 2017 to March 2018). The major stages of this research implementation include the following: determination of the main objectives, determination of the criteria required for the achievement of the main objectives, determination of the role of strategic stakeholders and determination of the goals that would be achieved via this research study. The final step of this research implementation involved the development of alternative options. During the process of determining the hierarchical weighting and evaluation factors, the consistency test was carried out by using Eigen value calculation (CR < 0.100). The data obtained from respondents was processed with an expert choice program (Darmanto et al 2014). The policy strategy for sustainable *pekarangan* (yard) development is shown in Figure 1.

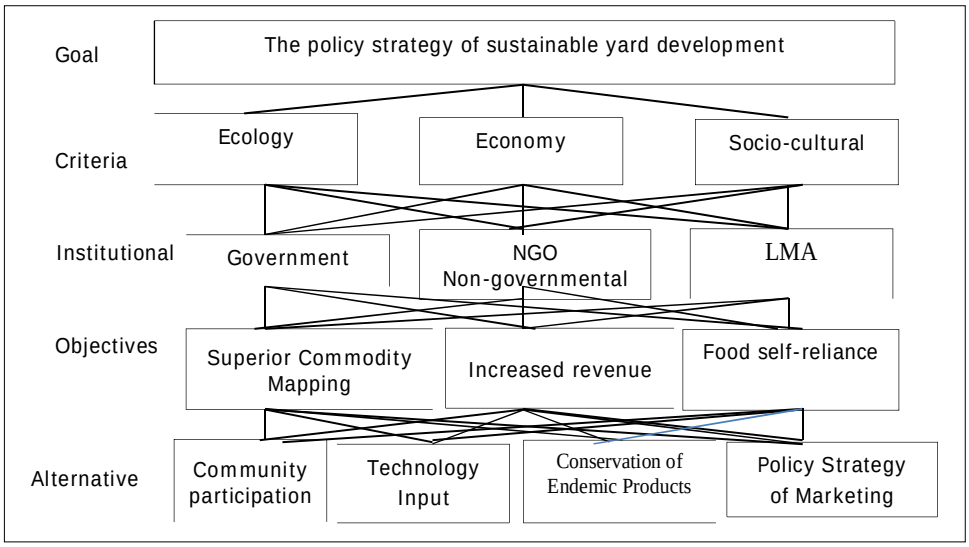

Figure 1. The flowchart of research goals, objectives, stakeholders, factors and alternative choices in AH.

Each hierarchy level was assessed through pairwise comparisons (Table 1). A scale of 1-9 was set to compare element pairs in each hierarchy level to an element above it (Saaty 1980; Marimin & Maghfiroh 2010). This comparison scale is used to distinguish the intensity of the relationship between each element. The qualitative opinions between different elements are also defined on the comparison scale (Saaty 1980; Marimin & Maghfiroh 2010).

Table 1

Definition of each comparison scale

Comparison value (A compared to B)	*Definition*
1	A is as important as B
3	A is slightly more important than B
1/3	B is a little more important than A
5	A is definitely more important than B
1/5	B is clearly more important than A
7	A is very clearly more important than B
1/7	B is very clearly more important than A
9	A is absolutely more important than B
1/9	B is absolutely more important than A
2, 4, 6, 8, or 1/2, 1/4, 1/6, 1/8	Given if there is a slight difference with the above standard

Source: Marimin & Maghfiroh (2010).

Results and Discussion. The arrangement of the strategy for the development of sustainable *pekarangan* and the management of *pekarangan* policy is illustrated in Figure 2.

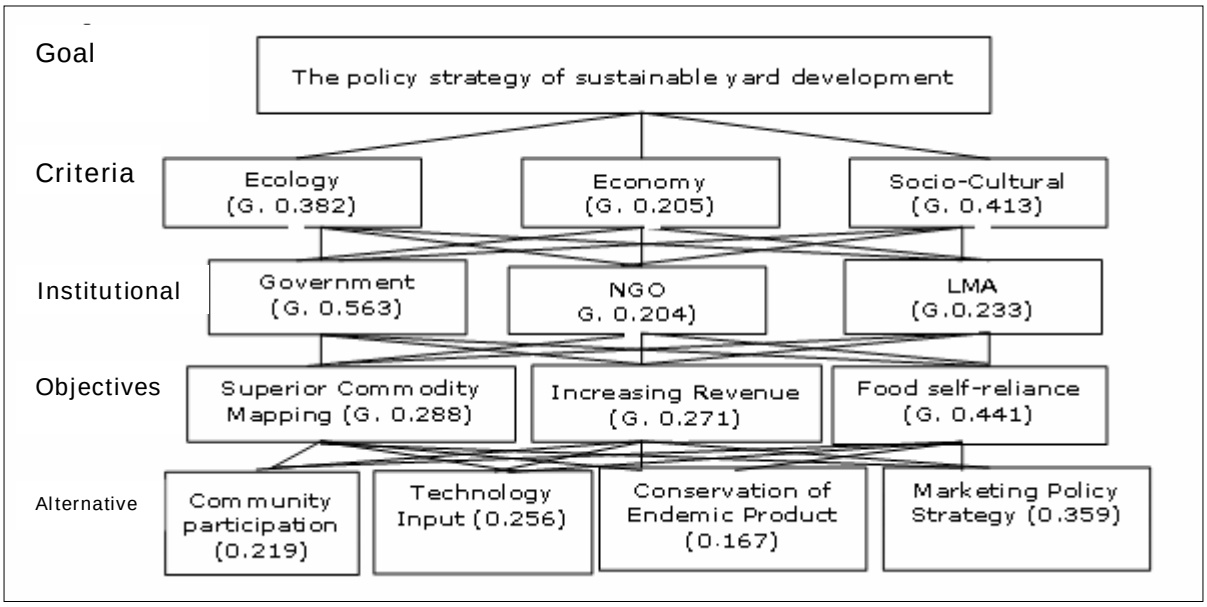

Figure 2. The flowchart of research goals, objectives, stakeholders, factors and alternative choices in AHP.

The alternative choices required to develop a *pekarangan* for primary food sustainability are related to socio-cultural conditions (0.413), ecological conditions (0.382) and economic conditions (0.205) (Figure 3). The ecological environment influences the patterns of adaptation reflected in the livelihood system, including the technological system that also affects other aspects of culture (such as social organizations and ideological systems or belief systems) (Dumatubun 2012). Strong social capital in indigenous communities is a factor that has a significant influence on the strategies

required for the development of management policies *pekarangan* to support the sustainability of food management.

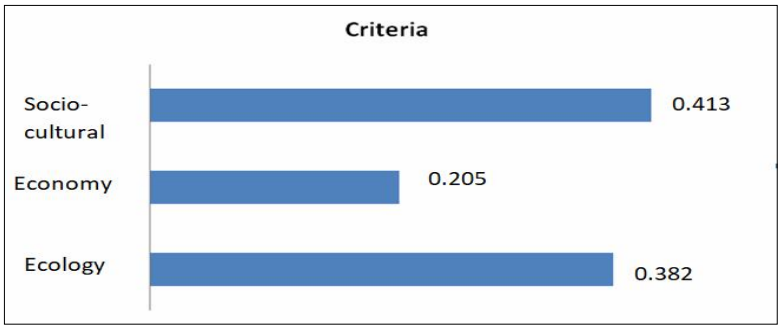

Figure 3. The criteria from socio-cultural, economic and ecology aspects.

The results of this study showed that the marketing policy strategy (0.359) has the highest score. Thus, it can be inferred that the determination of the right marketing strategy is quintessential to fostering sustainable management of *pekarangan*. This finding is not in consonance with previous research studies which documented the lack of intensive cultivation, lack of market orientation, lack of specific cultivation technology and lack of assistance in the *pekarangan* (Ashari et al 2012). In addition, the large role played by the government may have influenced the efficacy of the marketing strategy in the *pekarangan*. This finding is in line with the result that the government with a weight value (0.563) holds great control to coordinate strategic programs for sustainable *pekarangan* development. The government, through the agricultural service, provides guidance to communities in 15 villages in the Arguni Bawah District to plant garden crops that have economic value.

The socio-cultural criteria had the highest score (0.413). This shows that the criteria are important and must be prioritized for consideration prior to the implementation of the sustainable development program of *pekarangan*. Land ownership (either communal or individual) pays attention to strong social capital in a good society as a driving factor to encourage the creation of new strategic policies. Other research studies also suggested that the criteria and alternatives obtained include socio-cultural (3 alternatives), economics (3 alternatives), institutions (2 alternatives), and government policies (4 alternatives). The results of the weighting in the study stated that the combined opinion of 12 respondents' institutional criteria was a relative priority (Putra et al 2013). The government policy could be supported by social capital, where socio-cultural values provide support in the implementation of government policies (Hendrarini et al 2018). Thus, the government uses the power of social capital as a space to implement policies in the development of *pekarangan* in the community (Figure 4). Local food development can involve a bigger government role in developing local food products towards food self-sufficiency.

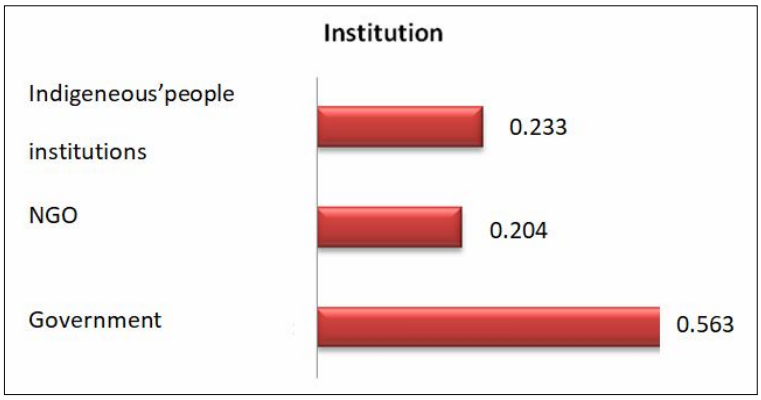

Figure 4. The role of dominant institutions in local food development.

An important target that must be implemented in the development of the community of *pekarangan* is food self-reliance (0.441). This result shows that members of the community can share the excessive garden produce such as: sweet potatoes, bananas, vegetables and even fruits. Hence, the development of the *pekarangan* must involve the agriculture department to ensure food sustainability (Figure 5). Furthermore, important physiological needs such as food safety, food security, food availability, food accessibility and food consume ability must be addressed (Alikodra 2012).

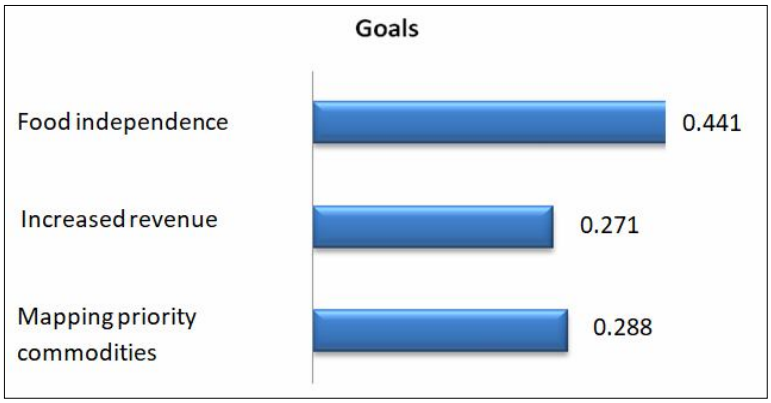

Figure 5. The goals achieved in the development of local food.

The communities with a high level of participation have a good social capital and positively encourage the development of economic plants to fulfill the needs of the community (Hendrarini et al 2018). The results of this study showed that sustainable development of *pekarangan* help people to save more energy and time as well as reduce additional expenditure.

The marketing policy strategy (with a weight of 0.359) is an appropriate alternative. This is due to its influence on the development of food independence (0.441), superior commodity mapping activities (0.288) and increasing income (0.271). Institutionally, the government plays a bigger role (0.563), followed by indigenous people institutions (0.233) and non-governmental organizations (0.204).

Conclusions. The alternative priority chosen to achieve the goal of sustainable garden development is the marketing policy strategy (with a weight of 0.359), with the government as the main stakeholder. Socio-cultural criteria (with a weight of 0.413) were identified as important factors to be considered by decision makers. Furthermore, the main activity that fosters the development of a sustainable of *pekarangan* is food self-reliance (with a weight of 0.441).

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